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```
R000001
R000002 ************************************************************************
R000003 *                                                                      *
R000004 *          THIS AGC PROGRAM SHALL ALSO BE REFERRED TO AS:              *
R000005 *                                                                      *
R000006 *                                                                      *
R000007 *                          COLOSSUS 3                                  *
R000008 *                                                                      *
R000009 *                                                                      *
R00001  *       THIS PROGRAM IS INTENDED FOR USE IN THE CM AS SPECIFIED        *
R000011 *       IN REPORT R-577. THIS PROGRAM WAS PREPARED UNDER DSR           *
R000012 *       PROJECT 55-23890, SPONSORED BY THE MANNED SPACECRAFT           *
R000013 *       CENTER OF THE NATIONAL AERONAUTICS AND SPACE                   *
R000014 *       ADMINISTRATION THROUGH CONTRACT NAS 9-4065 WITH THE            *
R000015 *       CHARLES STARK DRAPER LABORATORY, MASSACHUSETTS INSTITUTE OF    *
R000016 *       TECHNOLOGY, CAMBRIDGE, MASS.                                   *
R000017 *                                                                      *
R000018 ************************************************************************


R000019         SUBMITTED:
R00002              A.G.ENGEL JR, COLOSSUS PROGRAMMING LEADER
R000021             APOLLO GUIDANCE AND NAVIGATION

R000022         APPROVED:
R000023             M.H.HAMILTON, DIRECTOR, MISSION PROGRAM DEVELOPMENT
R000024             APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000025         APPROVED:
R000026             S.L.COPPS, COLOSSUS PROJECT MANAGER
R000027             APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000031         APPROVED:
R000032             R.H. BATTIN, DIRECTOR, MISSION DEVELOPMENT
R000033             APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000034         APPROVED:
R000036             D.G. HOAG, DIRECTOR
R000037             APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000038         APPROVED:
R000039             R.R. RAGAN, DEPUTY DIRECTOR
R00004              INSTRUMENTATION LABORATORY
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P0001 ASSEMBLY AND OPERATIONS INFORMATION
R0002 TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS
R00025 ABSOLUTE LOCATIONS FOR UPDATES
R00031 SUBROUTINE CALLS

R00041 ERASTOTL
R00051 ERASABLE ASSIGNMENTS
R00052 CHECK EQUALS LIST
R00061 DIOGENES
R00065 INTERRUPT LEAD INS
R00071 T4RUPT PROGRAM
R00081 DOWNLINK LISTS
R0009 FRESH START AND RESTART
R0010 RESTART TABLES
R0011 SXTMARK
R0012 EXTENDED VERBS
R0013 PINBALL NOUN TABLES
R0014 CSM GEOMETRY
R0015 IMU COMPENSATION PACKAGE
R0016 PINBALL GAME BUTTONS AND LIGHTS
R0017 R60,R62
R0018 ANGLFIND
R0019 GIMBAL LOCK AVOIDANCE
R0020 KALCMANU STEERING
R0021 SYSTEM TEST STANDARD LEAD INS
R0022 IMU CALIBRATION AND ALIGNMENT
R0023 MEDUSA
R0024 GROUND TRACKING DETERMINATION PROGRAM - P21
R0025 P34-P35, P74-P75
R0026 R31
R0027 P76
R00281 R30
R00301 MENELAUS
R0031 P15
R0032 P11
R0033 P20-P25
R0034 P30,P31
R0035 P32-P33, P72-P73
R0036 P40-P47
R0037 P51-P53
R0038 LUNAR AND SOLAR EPHEMERIDES SUBROUTINES
R0039 P61-P67
R0040 SERVICER207
R0041 ENTRY LEXICON
R0042 REENTRY CONTROL
R0043 CM BODY ATTITUDE
R0044 P37,P70
R0045 S-BAND ANTENNA FOR CM
R0046 ULYSSES

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R0047		TVCINITIALIZE
R0048		TVCEXECUTIVE
R0049		TVCMASSPROP
R0050		TVCRESTARTS
R0051		TVCDAPS
R0053		TVCROLLDAP
R0055		MYSUBS
R0056		RCS-CSM DIGITAL AUTOPILOT
R0057		AUTOMATIC MANEUVERS
R0058		RCS-CSM DAP EXECUTIVE PROGRAMS
R0059		JET SELECTION LOGIC
R0060		CM ENTRY DIGITAL AUTOPILOT
R00605	ZEUS	
R0061		DOWN-TELEMETRY PROGRAM
R0062		INTER-BANK COMMUNICATION
R0063		INTERPRETER
R0064		FIXED-FIXED CONSTANT POOL
R0065		INTERPRETIVE CONSTANTS
R0066		SINGLE PRECISION SUBROUTINES
R0067		EXECUTIVE
R0068		WAITLIST
R0069		LATITUDE LONGITUDE SUBROUTINES
R0070		PLANETARY INERTIAL ORIENTATION
R0071		MEASUREMENT INCORPORATION
R0072		CONIC SUBROUTINES
R0073		INTEGRATION INITIALIZATION
R0074		ORBITAL INTEGRATION
R0075		INFLIGHT ALIGNMENT ROUTINES
R0076		POWERED FLIGHT SUBROUTINES
R0077		TIME OF FREE FALL
R0078		STAR TABLES
R0079		AGC BLOCK TWO SELF-CHECK
R0080		PHASE TABLE MAINTENANCE
R0081		RESTARTS ROUTINE
R0082		IMU MODE SWITCHING ROUTINES
R0083		KEYRUPT, UPRUPT
R0084		DISPLAY INTERFACE ROUTINES
R0085		SERVICE ROUTINES
R0086		ALARM AND ABORT
R0087		UPDATE PROGRAM
R0088		RTB OP CODES

R0089	SYMBOL TABLE LISTING
R0090	UNREFERENCED SYMBOL LISTING
R0091	ERASABLE & EQUALS CROSS-REFERENCE TABLE
R0092	SUMMARY OF SYMBOL TABLE LISTINGS
R0093	MEMORY TYPE & AVAILABLITY DISPLAY
R0094	COUNT TABLE
R0095	PARAGRAPHS GENERATED FOR THIS ASSEMBLY

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R0096 OCTAL LISTING
R0097 OCCUPIED LOCATIONS TABLE
R0098 SUBROS CALLED & PROGRAM STATUS

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P0099 VERB LIST FOR CSM

R0100 REGULAR VERBS

R0101 00 NOT IN USE
R0102 01 DISPLAY OCTAL COMP 1 IN R1
R0103 02 DISPLAY OCTAL COMP 2 IN R1
R0104 03 DISPLAY OCTAL COMP 3 IN R1
R0105 04 DISPLAY OCTAL COMP 1,2 IN R1,R2
R0106 05 DISPLAY OCTAL COMP 1,2,3 IN R1,R2,R3
R0107 06 DISPLAY DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0108 07 DISPLAY DP DECIMAL IN R1,R2 (TEST ONLY)
R0109 08
R0110 09
R0111 10
R0112 11 MONITOR OCTAL COMP 1 IN R1
R0113 12 MONITOR OCTAL COMP 2 IN R1
R0114 13 MONITOR OCTAL COMP 3 IN R1
R0115 14 MONITOR OCTAL COMP 1,2 IN R1,R2
R0116 15 MONITOR OCTAL COMP 1,2,3 IN R1,R2,R3
R0117 16 MONITOR DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0118 17 MONITOR DP DECIMAL IN R1,R2 (TEST ONLY)
R0119 18
R0120 19
R0121 20
R0122 21 LOAD COMPONENT 1 INTO R1
R0123 22 LOAD COMPONENT 2 INTO R2
R0124 23 LOAD COMPONENT 3 INTO R3
R0125 24 LOAD COMPONENT 1,2 INTO R1,R2
R0126 25 LOAD COMPONENT 1,2,3 INTO R1,R2,R3
R0127 26
R0128 27 DISPLAY FIXED MEMORY
R0129 28
R0130 29
R0131 30 REQUEST EXECUTIVE
R0132 31 REQUEST WAITLIST
R0133 32 RECYCLE PROGRAM
R0134 33 PROCEED WITHOUT DSKY INPUTS
R0135 34 TERMINATE FUNCTION
R0136 35 TEST LIGHTS
R0137 36 REQUEST FRESH START
R0138 37 CHANGE PROGRAM (MAJOR MODE)
R0139 38
R0140 39

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P0141 EXTENDED VERBS

R0142 40 ZERO CDU-S
R0143 41 COARSE ALIGN CDU-S
R0144 42 FINE ALIGN IMU-S
R0145 43 LOAD IMU ATT ERROR METERS
R0146 44 SET SURFACE FLAG
R0147 45 RESET SURFACE FLAG
R0148 46 ESTABLISH G+C CONTROL
R0149 47 MOVE LM STATE VECTOR INTO CM STATE VECTOR.
R0150 48 REQUEST DAP DATA LOAD ROUTINE (R03)
R0151 49 REQUEST CREW DEFINED MANEUVER ROUTINE (R62)
R0152 50 PLEASE PERFORM
R0153 51 PLEASE MARK
R0154 52 MARK ON OFFSET LANDING SITE
R0155 53 PLEASE PERFORM ALTERNATE LOS MARK
R0156 54 REQUEST RENDEZVOUS BACKUP SIGHTING MARK ROUTINE (R23)
R0157 55 INCREMENT AGC TIME (DECIMAL)
R0158 56 TERMINATE RENDEZVOUS TRACKING (P20)
R0159 57 DISPLAY UPDAT STATE OF FULTKFLG
R0160 58 ENABLE AUTO MANEUVER IN P20
R0161 59 PLEASE CALIBRATE
R0162 60 SET ASTRONAUT TOTAL ATTITUDE (N17) TO PRESENT ATTITUDE
R0163 61 DISPLAY DAP ATTITUDE ERROR
R0164 62 DISPLAY TOTAL ATTITUDE ERROR (WRT N22 (THETAD))
R0165 63 DISPLAY TOTAL ASTRONAUT ATTITUDE ERROR (WRT N17 (CPHIX))
R0166 64 REQUEST S-BAND ANTENNA ROUTINE
R0167 65 OPTICAL VERIFICATION OF PRELAUNCH ALIGNMENT
R0168 66 VEHICLES ARE ATTACHED. MOVE THIS VEHICLE STATE TO OTHER VEHICLE.
R0169 67 DISPLAY W MATRIX
R0170 68 SPARE
R0171 69 CAUSE RESTART
R0172 70 UPDATE LIFTOFF TIME
R0173 71 UNIVERSAL UPDATE-BLOCK ADR
R0174 72 UNIVERSAL UPDATE-SINGLE ADR
R0175 73 UPDATE AGC TIME (OCTAL)
R0176 74 INITIALIZE ERASABLE DUMP VIA DOWNLINK
R0177 75 BACKUP LIFTOFF
R0178 76 SPARE
R0179 77 SPARE
R0180 78 UPDATE PRELAUNCH AZIMUTH
R0181 79 SPARE
R0182 80 UPDATE LEM STATE VECTOR
R0183 81 UPDATE CSM STATE VECTOR
R0184 82 REQUEST ORBIT PARAM DISPLAY (R30)
R0185 83 REQUEST REND PARAM DISPLAY (R31)
R0186 84 SPARE
R0187 85 REQUEST RENDEZVOUS PARAMETER DISPLAY NO. 2 (R34)
R0188 86 REJECT RENDEZVOUS BACKUP SIGHTING MARK
R0189 87 SET VHF RANGE FLAG

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R0190   88 RESET VHF RANGE FLAG
R0191   89 REQUEST RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)
R0192   90 REQUEST RENDEZVOUS OUT OF PLANE DISPLAY ROUTINE (R36)
R0193   91 DISPLAY BANK SUM
R0194   92 OPERATE IMU PERFORMANCE TEST (P07)
R0195   93 ENABLE W MATRIX INITIALIZATION
R0196   94 PERFORM CYSLUNAR ATTITUDE MANEUVER (P23)
R0197   95 SPARE
R0198   96 TERMINATE INTEGRATION AND GO TO P00
R0199   97 PERFORM ENGINE FAIL PROCEDURE
R0200   98 SPARE
R0201   99 PLEASE ENABLE ENGINE
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P0202 IN THE FOLLOWING NOUN LIST THE :NO LOAD: RESTRICTION MEANS THE NOUN
R0203 CONTAINS AT LEAST ONE COMPONENT WHICH CANNOT BE LOADED, I.E. OF
R0204 SCALE TYPE L (MIN/SEC) OR PP (2 INTEGERS).
R0205 IN THIS CASE VERBS 24 AND 25 ARE NOT ALLOWED, BUT VERBS 21, 22 OR 23
R0206 MAY BE USED TO LOAD ANY OF THE NOUN:S COMPONENTS WHICH ARE NOT OF THE
R0207 ABOVE SCALE TYPES.
R0208 THE :DEC ONLY: RESTRICTION MEANS ONLY DECIMAL OPERATION IS ALLOWED ON
R0209 EVERY COMPONENT IN THE NOUN. (NOTE THAT :NO LOAD: IMPLIES :DEC ONLY:)

	NORMAL NOUNS		COMPONENTS	SCALE AND DECIMAL POINT	RESTRICTIONS
R0212	00	NOT IN USE			
R0213	01	SPECIFY MACHINE ADDRESS (FRACTIONAL)	3COMP	.XXXXX FOR EACH	
R0214	02	SPECIFY MACHINE ADDRESS (WHOLE)	3COMP	XXXXX. FOR EACH	
R0215	03	SPECIFY MACHINE ADDRESS (DEGREES)	3COMP	XXX.XX DEG FOR EACH	
R0216	04	SPARE			
R0217	05	ANGULAR ERROR/DIFFERENCE	1COMP	XXX.XX DEG	
R0218	06	OPTION CODE	2COMP	OCTAL ONLY FOR EACH	
R0219	LOADING NOUN 07 WILL SET OR RESET SELECTED BITS IN ANY ERASABLE REGISTER				
R0220	07	ECADR OF WORD TO BE MODIFIED	3COMP	OCTAL ONLY FOR EACH	
R0221		ONES FOR BITS TO BE MODIFIED			
R0222		1 TO SET OR 0 TO RESET SELECTED BITS			
R0223	08	ALARM DATA	3COMP	OCTAL ONLY FOR EACH	
R0224	09	ALARM CODES	3COMP	OCTAL ONLY FOR EACH	
R0225	10	CHANNEL TO BE SPECIFIED	1COMP	OCTAL ONLY	
R0226	11	TIG OF CSI	3COMP	00XXX. HRS	DEC ONLY
R0228				000XX. MIN	MUST LOAD 3 COMPS
R0230				0XX.XX SEC	
R0231	12	OPTION CODE	2COMP	OCTAL ONLY FOR EACH	
R0232		(USED BY EXTENDED VERBS ONLY)			
R0233	13	TIG OF CDH	3COMP	00XXX. HRS	DEC ONLY
R0235				000XX. MIN	MUST LOAD 3 COMPS
R0237				0XX.XX SEC	
R0238	14	INERTIAL VEL MAG AT TLI CUTOFF	1COMP	XXXXX. FT/SEC	
R0239	15	INCREMENT MACHINE ADDRESS	1COMP	OCTAL ONLY	
R0240	16	TIME OF EVENT	3COMP	00XXX. HRS	DEC ONLY
R0242		(USED BY EXTENDED VERBS ONLY)		000XX. MIN	MUST LOAD 3 COMPS
R0244				0XX.XX SEC	
R0245	17	ASTRONAUT TOTAL ATTITUDE	3COMP	XXX.XX DEG FOR EACH	
R0246	18	AUTO MANEUVER BALL ANGLES	3COMP	XXX.XX DEG FOR EACH	
R0247	19	SPARE			
R0248	20	ICDU ANGLES	3COMP	XXX.XX DEG FOR EACH	
R0249	21	PIPAS	3COMP	XXXXX. PULSES FOR EACH	
R0251	22	NEW ICDU ANGLES	3COMP	XXX.XX DEG FOR EACH	
R0252	23	SPARE			
R0253	24	DELTA TIME FOR AGC CLOCK	3COMP	00XXX. HRS	DEC ONLY
R0255				000XX. MIN	MUST LOAD 3 COMPS
R0257				0XX.XX SEC	
R0258	25	CHECKLIST	3COMP	XXXXX. FOR EACH	
R0259		(USED WITH PLEASE PERFORM ONLY)			

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R0260	26	PRIORITY/DELAY, ADRES, BBCON	3COMP	OCTAL ONLY FOR EACH	
R0261	27	SELF TEST ON/OFF SWITCH	1COMP	XXXXX.	
R0262	28	SPARE			
R0263	29	XSM LAUNCH AZIMUTH	1COMP	XXX.XX DEG	DEC ONLY

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P0265	30	TARGET CODES	3COMP	XXXXX FOR EACH	
R0266	31	TIME OF W INIT	3COMP	00XXX. HRS	DEC ONLY
R0267				000XX. MIN	MUST LOAD 3 COMPS
R0269				0XX.XX SEC	
R0268	32	TIME FROM PERIGEE	3COMP	00XXX. HRS	DEC ONLY
R0270				000XX. MIN	MUST LOAD 3 COMPS
R0272				0XX.XX SEC	
R0273	33	TIME OF IGNITION	3COMP	00XXX. HRS	DEC ONLY
R0275				000XX. MIN	MUST LOAD 3 COMPS
R0277				0XX.XX SEC	
R0278	34	TIME OF EVENT	3COMP	00XXX. HRS	DEC ONLY
R0280				000XX. MIN	MUST LOAD 3 COMPS
R0282				0XX.XX SEC	
R0283	35	TIME FROM EVENT	3COMP	00XXX. HRS	DEC ONLY
R0285				000XX. MIN	MUST LOAD 3 COMPS
R0287				0XX.XX SEC	
R0288	36	TIME OF AGC CLOCK	3COMP	00XXX. HRS	DEC ONLY
R0290				000XX. MIN	MUST LOAD 3 COMPS
R0292				0XX.XX SEC	
R0293	37	TIG OF TPI	3COMP	00XXX HRS	DEC ONLY
R0295				000XX. MIN	MUST LOAD 3 COMPS
R0297				0XX.XX SEC	
R0298	38	TIME OF STATE VECTOR	3COMP	00XXX. HRS	DEC ONLY
R0300				000XX. MIN	MUST LOAD 3 COMPS
R0302				0XX.XX SEC	
R0303	39	DELTA TIME FOR TRANSFER	3COMP	00XXX. HRS	DEC ONLY
R0305				000XX. MIN	MUST LOAD 3 COMPS
R0307				0XX.XX SEC	

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P0308	MIXED NOUNS		COMPONENTS	SCALE AND DECIMAL POINT	RESTRICTIONS
R0310	40	TIME FROM IGNITION/CUTOFF	3COMP	XXBXX MIN/SEC	NO LOAD, DEC ONLY
R0312		VG,		XXXX.X FT/SEC	
R0313		DELTA V (ACCUMULATED)		XXXX.X FT/SEC	
R0314	41	TARGET AZIMUTH,	2COMP	XXX.XX DEG	
R0315		ELEVATION		XX.XXX DEG	
R0316	42	APOGEE,	3COMP	XXXX.X NAUT MI	DEC ONLY
R0318		PERIGEE,		XXXX.X NAUT MI	
R0319		DELTA V (REQUIRED)		XXXX.X FT/SEC	
R0320	43	LATITUDE,	3COMP	XXX.XX DEG	DEC ONLY
R0322		LONGITUDE,		XXX.XX DEG	
R0323		ALTITUDE		XXXX.X NAUT MI	
R0324	44	APOGEE,	3COMP	XXXX.X NAUT MI	NO LOAD, DEC ONLY
R0326		PERIGEE,		XXXX.X NAUT MI	
R0327		TFF		XXBXX MIN/SEC	
R0328	45	MARKS (VHF - OPTICS)	3 COMP	+XXBXX	NO LOAD, DEC ONLY
R0330		TFI OF NEXT BURN		XXBXX MIN/SEC	
R0331		MGA		XXX.XX DEG	
R0332	46	AUTOPILOT CONFIGURATION	2COMP	OCTAL ONLY FOR EACH	
R0333	47	THIS VEHICLE WEIGHT	2COMP	XXXXX. LBS	DEC ONLY
R0335		OTHER VEHICLE WEIGHT		XXXXX. LBS	
R0336	48	PITCH TRIM	2COMP	XXX.XX DEG	DEC ONLY
R0338		YAW TRIM,		XXX.XX DEG	
R0339	49	DELTA R	3COMP	XXXX.X NAUT MI	DEC ONLY
R0341		DELTA V		XXXX.X FT/SEC	
R0342		VHF OR OPTICS CODE		XXXXX.	
R0343	50	SPLASH ERROR,	3COMP	XXXX.X NAUT MI	NO LOAD, DEC ONLY
R0345		PERIGEE,		XXXX.X NAUT MI	
R0346		TFF		XXBXX MIN/SEC	
R0347	51	S-BAND ANTENNA ANGLES PITCH	2COMP	XXX.XX DEG	DEC ONLY
R0349		YAW		XXX.XX DEG	
R0350	52	CENTRAL ANGLE OF ACTIVE VEHICLE	1COMP	XXX.XX DEG	
R0351	53	RANGE,	3COMP	XXX.XX NAUT MI	DEC ONLY
R0353		RANGE RATE,		XXXX.X FT/SEC	
R0354		PHI		XXX.XX DEG	
R0355	54	RANGE,	3COMP	XXX.XX NAUT MI	DEC ONLY
R0357		RANGE RATE,		XXXX.X FT/SEC	
R0358		THETA		XXX.XX DEG	
R0359	55	PERIGEE CODE	3COMP	XXXXX.	DEC ONLY
R0361		ELEVATION ANGLE		XXX.XX DEG	
R0362		CENTRAL ANGLE OF PASSIVE VEHICLE		XXX.XX DEG	
R0363	56	REENTRY ANGLE,	2COMP	XXX.XX DEG	DEC ONLY
R0365		DELTA V		XXXXX. FT/SEC	
R0366	57	SPARE			
R0367	58	PERIGEE ALT (POST TPI)	3COMP	XXXX.X NAUT MI	DEC ONLY
R0369		DELTA V TPI		XXXX.X FT/SEC	
R0370		DELTA V TPF		XXXX.X FT/SEC	
R0371	59	DELTA VELOCITY LOS	3COMP	XXXX.X FT/SEC FOR EA.	DEC ONLY
R0373	60	GMAX,	3COMP	XXX.XX G	DEC ONLY

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R0375		VPRED,		XXXXX. FT/SEC	
R0376		GAMMA EI		XXX.XX DEG	
R0377	61	IMPACT LATITUDE,	3COMP	XXX.XX DEG	DEC ONLY
R0379		IMPACT LONGITUDE,		XXX.XX DEG	
R0380		HEADS UP/DOWN		+/- 00001	
R0381	62	INERTIAL VEL MAG (VI),	3COMP	XXXXX. FT/SEC	DEC ONLY
R0383		ALT RATE CHANGE (HDOT),		XXXXX. FT/SEC	
R0384		ALT ABOVE PAD RADIUS (H)		XXXX.X NAUT MI	
R0385	63	RANGE 297,431 TO SPLASH (RTGO),	3COMP	XXXX.X NAUT MI	NO LOAD, DEC ONLY
R0387		PREDICTED INERT VEL (VIO),		XXXXX. FT/SEC	
R0388		TIME FROM 297,431 (TFE)		XXBXX MIN/SEC	
R0389	64	DRAG ACCELERATION,	3COMP	XXX.XX G	DEC ONLY
R0391		INERTIAL VELOCITY (VI),		XXXXX. FT/SEC	
R0392		RANGE TO SPLASH		XXXX.X NAUT MI	
R0393	65	SAMPLED AGC TIME	3COMP	00XXX. HRS	DEC ONLY
R0395		(FETCHED IN INTERRUPT)		000XX. MIN	MUST LOAD 3 COMPS
R0397				0XX.XX SEC	
R0398	66	COMMAND BANK ANGLE (BETA),	3COMP	XXX.XX DEG	DEC ONLY
R0400		CROSS RANGE ERROR,		XXXX.X NAUT MI	
R0401		DOWN RANGE ERROR		XXXX.X NAUT MI	
R0402	67	RANGE TO TARGET,	3COMP	XXXX.X NAUT MI	DEC ONLY
R0404		PRESENT LATITUDE,		XXX.XX DEG	
R0405		PRESENT LONGITUDE		XXX.XX DEG	
R0406	68	COMMAND BANK ANGLE (BETA),	3COMP	XXX.XX DEG	DEC ONLY
R0408		INERTIAL VELOCITY (VI),		XXXXX. FT/SEC	
R0409		ALT RATE CHANGE (RDOT)		XXXXX. FT/SEC	
R0410	69	BETA	3COMP	XXX.XX DEG	DEC ONLY
R0412		DL		XXX.XX G	
R0413		VL		XXXXX. FT/SEC	
R0414	70	STAR CODE,	3COMP	OCTAL ONLY	
R0415		LANDMARK DATA,		OCTAL ONLY	
R0416		HORIZON DATA		OCTAL ONLY	
R0417	71	STAR CODE	3COMP	OCTAL ONLY	
R0418		LANDMARK DATA		OCTAL ONLY	
R0419		HORIZON DATA		OCTAL ONLY	
R0420	72	SPARE			
R0421	73	ALTITUDE	3COMP	XXXXXB. NAUT MI	
R0422		VELOCITY		XXXXX. FT/SEC	
R0423		FLIGHT PATH ANGLE		XXX.XX DEG	
R0424	74	COMMAND BANK ANGLE (BETA)	3COMP	XXX.XX DEG	
R0425		INERTIAL VELOCITY (VI)		XXXXX. FT/SEC	
R0426		DRAG ACCELERATION		XXX.XX G	
R0427	75	DELTA ALTITUDE CDH	3COMP	XXXX.X NAUT MI	NO LOAD, DEC ONLY
R0429		DELTA TIME (CDH-CSI OR TPI-CDH)		XXBXX MIN/SEC	
R0430		DELTA TIME (TPI-CDH OR TPI-NOMTPI)		XXBXX MIN/SEC	
R0431	76	SPARE			
R0432	77	SPARE			
R0433	78	YAW ANGLE FOR P20	3COMP	XXX.XX DEG	
R0434		PITCH ANGLE FOR P20		XXX.XX DEG	
R0435		AZIMUTH CONSTRAINT FOR P20		XXX.XX DEG	

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R0436	79	P20 ROTATION RATE	2COMP	X.XXXX DEG/SEC	
R0437		P20 ROTATION DEADBAND		XXX.XX DEG	
R04375	80	TIME FROM IGNITION/CUTOFF	3COMP	XXBXX MIN/SEC	NO LOAD, DEC ONLY
R0438		VG		XXXXX. FT/SEC	
R0439		DELTA V (ACCUMULATED)		XXXXX. FT/SEC	
R0440	81	DELTA V (LV)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0442	82	DELTA V (LV)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0445	83	DELTA V (BODY)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0447	84	DELTA V (OTHER VEHICLE)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0449	85	VG (BODY)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0451	86	DELTA V(LV)	3COMP	XXXXX. FT/SEC FOR EACH	DEC ONLY
R0453	87	MARK DATA SHAFT,	2COMP	XXX.XX DEG	
R0454		TRUNION		XX.XXX DEG	
R0455	88	HALF UNIT SUN OR PLANET VECTOR	3COMP	.XXXXX FOR EACH	DEC ONLY
R0457	89	LANDMARK LATITUDE,	3COMP	XX.XXX DEG	DEC ONLY
R0459		LONGITUDE/2,		XX.XXX DEG	
R0460		ALTITUDE		XXX.XX NAUT MI	
R0461	90	Y ACTIVE VEH 3COMP	XXX.XX NM		DEC ONLY
R0463		Y DOT ACTIVE VEH	XXXX.X FPS		
R0464		Y DOT PASSIVE VEH	XXXX.X FPS		
R0465	91	OCDU ANGLES SHAFT,	2COMP	XXX.XX DEG	
R0466		TRUNION		XX.XXX DEG	
R0467	92	NEW OPTICS ANGLES SHAFT,	2COMP	XXX.XX DEG	
R0468		TRUNION		XX.XXX DEG	
R0469	93	DELTA GYRO ANGLES	3COMP	XX.XXX DEG FOR EACH	
R0470	94	NEW OPTICS ANGLES SHAFT	2COMP	XXX.XX DEG	
R0471		TRUNNION		XX.XXX DEG	
R0472	95	TIME FROM IGNITION/CUTOFF	3COMP	XXBXX MIN/SEC	
R04721		VG		XXXXX. FT/SEC	
R04722		INERTIAL VEL MAG		XXXXX. FT/SEC	
R0473	96	Y CM	3COMP	XXX.XX NM	DEC ONLY
R04732		Y DOT CM	XXXX.X FPS		
R04733		Y DOT LM	XXXX.X FPS		
R0474	97	SYSTEM TEST INPUTS	3COMP	XXXXX. FOR EACH	
R0475	98	SYSTEM TEST RESULTS AND INPUTS	3COMP	XXXXX.	
R0476				.XXXXX	
R0477				XXXXX.	
R0478	99	RMS IN POSITION	3COMP	XXXXX.FT	DEC ONLY
R0480		RMS IN VELOCITY		XXXX.X FT/SEC	
R0481		RMS OPTION		XXXXX.	

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P0482 REGISTERS AND SCALING FOR NORMAL NOUNS

R0483	NOUN	REGISTER	SCALE TYPE
R0484	00	NOT IN USE	
R0485	01	SPECIFY ADDRESS	B
R0486	02	SPECIFY ADDRESS	C
R0487	03	SPECIFY ADDRESS	D
R0488	04	SPARE	
R0489	05	DSPTEM1	H
R0490	06	OPTION1	A
R0491	07	XREG	A
R0492	08	ALMCADR	A
R0493	09	FAILREG	A
R0494	10	SPECIFY CHANNEL	A
R0495	11	TCSI	K
R0496	12	OPTIONX	A
R0497	13	TCDH	K
R0498	14	VC/O	P
R0499	15	INCREMENT ADDRESS	A
R0500	16	DSPTEMX	K
R0501	17	CPHIX	D
R0502	18	THETAD	D
R0503	19	SPARE	
R0504	20	CDUX	D
R0505	21	PIPAX	C
R0506	22	THETAD	D
R0507	23	SPARE	
R0508	24	DSPTEM2 +1	K
R0509	25	DSPTEM1	C
R0510	26	N26/PRI	A
R0511	27	SMODE	C
R0512	28	SPARE	
R0513	29	DSPTEM1	D
R0514	30	DSPTEM1	C
R0515	31	AGEOFW	K
R0516	32	-TPER	K
R0517	33	TIG	K
R0518	34	DSPTEM1	K
R0519	35	TTOGO	K
R0520	36	TIME2	K
R0521	37	TTPI	K
R0522	38	TET	K
R0523	39	T3TOT4	K

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P0524 REGISTERS AND SCALING FOR MIXED NOUNS

R0525	NOUN	COMP	REGISTER	SCALE TYPE
R0526	40	1	TTOGO	L
R0527		2	VGDISP	S
R0528		3	DVTOTAL	S
R0529	41	1	DSPTEM1	D
R0530		2	DSPTEM1 +1	E
R0531	42	1	HAPO	Q
R0532		2	HPER	Q
R0533		3	VGDISP	S
R0534	43	1	LAT	H
R0535		2	LONG	H
R0536		3	ALT	Q
R0537	44	1	HAPOX	Q
R0538		2	HPERX	Q
R0539		3	TFF	L
R0540	45	1	VHFCNT	PP
R0541		2	TTOGO	L
R0542		3	+MGA	H
R0543	46	1	DAPDATR1	A
R0544		2	DAPDATR2	A
R0545	47	1	CSMMASS	KK
R0546		2	LEMMASS	KK
R0547	48	1	PACTOFF	FF
R0548		2	YACTOFF	FF
R0549	49	1	N49DISP	Q
R0550		2	N49DISP +2	S
R0551		3	N49DISP +4	C
R0552	50	1	RSP-RREC	LL
R0553		2	HPERX	Q
R0554		3	TFF	L
R0555	51	1	RHOSB	H
R0556		2	GAMMASB	H
R0557	52	1	ACTCENT	H
R0558	53	1	RANGE	JJ
R0559		2	RRATE	S
R0560		3	RTHETA	H
R0561	54	1	RANGE	JJ
R0562		2	RRATE	S
R0563		3	RTHETA	H
R0564	55	1	NN1	C
R0565		2	ELEV	H
R0566		3	CENTANG	H
R0567	56	1	RTEGAM2D	H
R0568		2	RTEDVD	P
R0569	57	1	DELTAR	Q
R0570	58	1	POSTTPI	Q
R0571		2	DELVTPI	S

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R0572		3	DELVTPF	S
R0573	59	1	DVLOS	S
R0574		2	DVLOS +2	S
R0575		3	DVLOS +4	S
R0576	60	1	GMAX	T
R0577		2	VPRED	P
R0578		3	GAMMAEI	H
R0579	61	1	LAT(SPL)	H
R0580		2	LNG(SPL)	H
R0581		3	HEADSUP	C
R0582	62	1	VMAGI	P
R0583		2	HDOT	P
R0584		3	ALTI	Q
R0585	63	1	RTGO	LL
R0586		2	VIO	P
R0587		3	TTE	L
R0588	64	1	D	MM
R0589		2	VMAGI	P
R0590		3	RTGON64	LL
R0591	65	1	SAMPTIME	K
R0592		2	SAMPTIME	K
R0593		3	SAMPTIME	K
R0594	66	1	ROLLC	H
R0595		2	XRNGERR	VV
R0596		3	DNRNGERR	LL
R0597	67	1	RTGON67	LL
R0598		2	LAT	H
R0599		3	LONG	H
R0600	68	1	ROLLC	H
R0601		2	VMAGI	P
R0602		3	RDOT	UU
R0603	69	1	ROLLC	H
R0604		2	Q7	MM
R0605		3	VL	UU
R0606	70	1	STARCODE	A
R0607		2	LANDMARK	A
R0608		3	HORIZON	A
R0609	71	1	STARCODE	A
R0610		2	LANDMARK	A
R0611		3	HORIZON	A
R0612	72	SPARE		
R0613	73	1	P21ALT	Q (MEMORY/100 TO DISPLAY TENS N.M.)
R0614		2	P21VEL	P
R0615		3	P21GAM	H
R0616	74	1	ROLLC	H
R0617		2	VMAGI	P
R0618		3	D	MM
R0619	75	1	DIFFALT	Q
R0620		2	T1TOT2	L
R0621		3	T2TOT3	L

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R0622	76		SPARE		
R0623	77		SPARE		
R0624	78	1	UTYAW	D	
R0625	78	2	UTPIT	D	
R0626	78	3	AZIMANGL	D	
R0627	79	1	RATEPTC	E	(MEMORY/10 TO LOAD X.XXXX DEG/SEC)
R0628		2	DBPTC	D	
R0629	80	1	TTOGO	L	
R06292		2	VGDISP	P	
R06294		3	DVTORAL	P	
R0630	81	1	DELVLVC	S	
R0631		2	DELVLVC +2	S	
R0632		3	DELVLVC +4	S	
R0633	82	1	DELVLVC	S	
R0634		2	DELVLVC +2	S	
R0635		3	DELVLVC +4	S	
R0636	83	1	DELVIMU	S	
R0637		2	DELVIMU +2	S	
R0638		3	DELVIMU +4	S	
R0639	84	1	DELVOV	S	
R0640		2	DELVOV +2	S	
R0641		3	DELVOV +4	S	
R0642	85	1	VGBODY	S	
R0643		2	VGBODY +2	S	
R0644		3	VGBODY +4	S	
R0645	86	1	DELVLVC	P	
R0646		2	DELVLVC +2	P	
R0647		3	DELVLVC +4	P	
R0648	87	1	MRKBUF1 +3	D	
R0649		2	MRKBUF1 +5	J	
R0650	88	1	STARSAV3	ZZ	
R0651		2	STARSAV3 +2	ZZ	
R0652		3	STARSAV3 +4	ZZ	
R0653	89	1	LANDLAT	G	
R0654		2	LANDLONG	G	
R0655		3	LANDALT	JJ	
R0656	90	1	YCSM	JJ	
R0657		2	YDOTC	S	
R0658		3	YDOTL	S	
R0659	91	1	CDUS	D	
R0660		2	CDUT	J	
R0661	92	1	SAC	D	
R0662		2	PAC	J	
R0663	93	1	OGC	G	
R0664		2	OGC +2	G	
R0665		3	OGC +4	G	
R0666	94	1	MRKBUF1 +3	D	
R0667		2	MRKBUF1 +5	J	
R0668	95	1	TTOGO	L	
R06681		2	VGTLI	P	

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R06682		3	VNOW	P
R0669	96	1	RANGE	JJ
R06691		2	RRATE	S
R06692		3	RRATE2	S
R0670	97	1	DSPTEM1	C
R0671		2	DSPTEM1 +1	C
R0672		3	DSPTEM1 +2	C
R0673	98	1	DSPTEM2	C
R0674		2	DSPTEM2 +1	B
R0675		3	DSPTEM2 +2	C
R0676	99	1	WWPOS	XX
R0677		2	WWVEL	YY
R0678		3	WWOPT	C

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P0679 NOUN SCALES AND FORMATS

	-SCALE TYPE-		PRECISION
R0680			
R0681	UNITS	DECIMAL FORMAT	-- AGC FORMAT
R0682	----------	----------	-- ----------
R0683	-A-		
R0684	OCTAL	XXXXX	SP OCTAL
R0685	-B-		
R0686	FRACTIONAL	.XXXXX	SP BIT 1 = 2^{-14} UNITS
R0687		(MAX .99996)	
R0688	-C-		
R0689	WHOLE	XXXXX.	SP BIT 1 = 1 UNIT
R0690		(MAX 16383.)	
R0691	-D-		
R0692	CDU DEGREES	XXX.XX DEGREES	SP BIT 1 = $360/2^{15}$ DEGREES
R0693		(MAX 359.99)	(USES 15 BITS FOR MAGNI-
R0694			TUDE AND 2-S COMP.)
R0695	-E-		
R0696	ELEVATION DEGREES	XX.XXX DEGREES	SP BIT 1 = $90/2^{14}$ DEGREES
R0697		(MAX 89.999)	
R0698	-F-		
R0699	DEGREES (180)	XXX.XX DEGREES	SP BIT 1 = $180/2^{14}$ DEGREES
R0700		(MAX 179.99)	
R0701	-G-		
R0702	DP DEGREES(90)	XX.XXX DEGREES	DP BIT 1 OF LOW REGISTER =
R0703			$360/2^{28}$
R0704			DEGREES
R0705	-H-		
R0706	DP DEGREES (360)	XXX.XX DEGREES	DP BIT 1 OF LOW REGISTER =
R0707			$360/2^{28}$
R0708		(MAX 359.99)	DEGREES
R0709	-J-		
R0710	Y OPTICS DEGREES	XX.XXX DEGREES	SP BIT 1 = $90/2^{15}$ DEGREES
R0711		(BIAS OF 19.775	(USES 15 BITS FOR MAGNI-
R0712		DEGREES ADDED FOR	TUDE AND 2-S COMP.)
R0713		DISPLAY, SUBTRACTED	
R0714		FOR LOAD.)	
R0715		NOTE: NEGATIVE NUM-	
R0716		BERS CANNOT BE	
R0717		LOADED.	
R0718	-K-		

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```
R0719   TIME (HR, MIN, SEC)  00XXX. HR              DP BIT 1 OF LOW REGISTER =
R0720                       000XX. MIN                    -2
R0721                       0XX.XX SEC               10    SEC
R0722                       (DECIMAL ONLY.
R0723                       MAX MIN COMP=59
R0724                       MAX SEC COMP=59.99
R0725                       MAX CAPACITY=745 HRS
R0726                                    39 MINS
R0727                                    14.55 SECS.
R0728                       WHEN LOADING, ALL 3
R0729                       COMPONENTS MUST BE
R0730                       SUPPLIED.)

R0731   -L-
R0732   TIME (MIN/SEC)      XX8XX MIN/SEC          DP BIT 1 OF LOW REGISTER =
R0733                       (8 IS A BLANK                -2
R0734                       POSITION, DECIMAL       10    SEC
R0735                       ONLY, DISPLAY OR
R0736                       MONITOR ONLY. CANNOT
R0737                       BE LOADED.
R0738                       MAX MIN COMP=59
R0739                       MAX SEC COMP=59
R0740                       VALUES GREATER THAN
R0741                       59 MIN 59 SEC
R0742                       ARE DISPLAYED AS
R0743                       59 MIN 59 SEC.)

R0744   -M-                                              -2
R0745   TIME (SEC)          XXX.XX SEC             SP BIT 1 = 10    SEC
R0746                       (MAX 163.83)

R0747   -N-
R0748   TIME(SEC) DP        XXX.XX SEC             DP BIT 1 OF LOW REGISTER =
R0749                                                   -2
R0750                                                 10    SEC

R0751   -P-
R0752   VELOCITY 2          XXXXX. FEET/SEC        DP BIT 1 OF HIGH REGISTER =
R0753                       (MAX 41994.)                -7
R0754                                                 2    METERS/CENTI-SEC

R0755   -Q-
R0756   POSITION 4          XXXX.X NAUTICAL MILES  DP BIT 1 OF LOW REGISTER =
R0757                                              2 METERS

R0758   -S-
R0759   VELOCITY 3          XXXX.X FT/SEC          DP BIT 1 OF HIGH REGISTER =
R0760                                                  -7
R0761                                                 2    METERS/CENTI-SEC
```

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R0762	-I-		
R0763	G	XXX.XX G	SP BIT 1 = 10^{-2} G
R0764		(MAX 163.83)	
R0765	-FF-		
R0766	TRIM DEGREES	XXX.XX DEG.	SP LOW ORDER BIT = 85.41 SEC
R0767		(MAX 388.69)	OF ARC
R0768	-GG-		
R0769	INERTIA	XXXXXBB. SLUG FT SQ	SP FRACTIONAL PART OF
R0770		(MAX 07733BB.)	2^{20} 2^{2}
R0771			2 KG M
R0772	-II-		
R0773	THRUST MOMENT	XXXXXBB. FT LBS	SP FRACTIONAL PART OF 2^{20}
R0774		(MAX 07733BB.)	NEWTON METER
R0775	-JJ-		
R0776	POSITION5	XXX.XX NAUT MI	DP BIT 1 OF LOW REGISTER =
R0777			2 METERS
R0778	-KK-		
R0779	WEIGHT2	XXXXX. LBS	SP FRACTIONAL PART OF 2^{16} KG
R0780	-LL-		
R0781	POSITION6	XXXX.X NAUT MI	DP BIT 1 OF LOW REG =
R0782			-28
R0783			$(6,373,338)(2(PI))X2$
R0784			----------
R0785			1852
R0786			NAUT. MI.
R0787	-MM-		
R0788	DRAG ACCELERATION	XXX.XX G	DP BIT 1 OF LOW REGISTER =
R0789		MAX (024.99)	-28
R0790			$25X2$ G
R0791	-PP-		
R0792	2 INTEGERS	+XXBYY	DP BIT 1 OF HIGH REGISTER =
R0793		(B IS A BLANK	1 UNIT OF XX
R0794		POSITION. DECIMAL	BIT 1 OF LOW REGISTER =
R0795		ONLY, DISPLAY OR	1 UNIT OF YY
R0796		MONITOR ONLY. CANNOT	(EACH REGISTER MUST
R0797		BE LOADED.)	CONTAIN A POSITIVE INTEGER
R0798		(MAX 99B99)	LESS THAN 100)
R0799	-UU-		
R0800	VELOCITY/2VS	XXXXX. FEET/SEC	DP FRACTIONAL PART OF
R0801		(MAX 51532.)	2VS FEET/SEC
R0802			(VS = 25766.1973)

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```
PC803   -VV-
RC804   POSITION8              XXXX.X NAUT MI          DP BIT 1 OF LOW REGISTER =
RC805                                                          -28
RC806                                                  4 X 6,373,338 X 2
RC807                                                  ------------------
RC808                                                        1852
RC809                                                  NAUT MI

RC810   -XX-
RC811   POSITION 9             XXXXX. FEET             DP BIT 1 OF LOW REGISTER =
RC812                                                    -9
RC813                                                  2   METERS

RC814   -YY-
RC815   VELOCITY 4             XXXX.X FEET/SEC         DP FRACTIONAL PART OF
RC816                          (MAX 328.0)               METERS/CENTI-SEC

RC817   -ZZ-
RC818   DP FRACTIONAL          .XXXXX                  DP BIT 1 OF HIGH REGISTER =
RC819                                                    -14
RC820                                                  2    UNITS

RC821   THAT-S ALL ON THE NOUNS.
```

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P0822 ALARM CODES
R0823 REPORT DEFICIENCIES TO JOHN SUTHERLAND @ MIT 617-864-6900 X1458

R0824	*9	*18	*60	*25 COLUMN
R0826	CODE	* TYPE	SET BY	ALARM ROUTINE
R0828	00110	NO MARK SINCE LAST MARK REJECT	SXTMARK	ALARM
R0830	00113	NO INBITS	SXTMARK	ALARM
R0832	00114	MARK MADE BUT NOT DESIRED	SXTMARK	ALARM
R0834	00115	OPTICS TORQUE REQUESTWITH SWITCH NOT AT	EXT VERB OPTICS CDU	ALARM
R0836		CGC		
R0837	00116	OPTICS SWITCH ALTERED BEFORE 15 SEC ZERO	T4RUPT	ALARM
R0839		TIME ELAPSED.		
R0840	00117	OPTICS TORQUE REQUEST WITH OPTICS NOT	EXT VERB OPTICS CDU	ALARM
R0842		AVAILABLE (OPTIND=-0)		
R0843	00120	OPTICS TORQUE REQUEST WITH OPTICS	T4RUPT	ALARM
R0845		NOT ZEROED		
R0846	00121	CDUS NO GOOD AT TIME OF MARK	SXTMARK	ALARM
R0848	00205	BAD PIPA READING	SERVICER	ALARM
R0850	00206	ZERO ENCODE NOT ALLOWED WITH COARSE ALIGN	IMU MODE SWITCHING	ALARM
R0852		+ GIMBAL LOCK		
R0853	00207	ISS TURNON REQUEST NOT PRESENT FOR 90 SEC	T4RUPT	ALARM
R0855	00210	IMU NOT OPERATING	IMU MODE SWITCH, IMU-2, R02, P51	ALARM,VARALARM
R0857	00211	COARSE ALIGN ERROR - DRIVE > 2 DEGREES	IMU MODE SWITCH	ALARM
R0859	00212	PIPA FAIL BUT PIPA IS NOT BEING USED	IMU MODE SWITCH,T4RPT	ALARM
R0861	00213	IMU NOT OPERATING WITH TURN-ON REQUEST	T4RUPT	ALARM
R0863	00214	PROGRAM USING IMU WHEN TURNED OFF	T4RUPT	ALARM
R0865	00217	BAD RETURN FROM STALL ROUTINES.	CURTAINS	ALARM2
R0867	00220	IMU NOT ALIGNED - NO REFSMMAT	R02,P51	
R0869	00401	DESIRED GIMBAL ANGLES YIELD GIMBAL LOCK	IMF ALIGN, IMU-2	ALARM
R08701	00402	CREW MUST HONOR 2ND MINKEY TORQUE REQUEST	P52	ALARM
R0871	00404	TARGET OUT OF VIEW - TRUN ANGLE > 90 DEG	R52	PRIOLARM
R0873	00405	TWO STARS NOT AVAILABLE	P52,P54	ALARM
R0875	00406	REND NAVIGATION NOT OPERATING	R21,R23	ALARM
R0877	00421	W-MATRIX OVERFLOW	INTEGRV	VARALARM
R0879	00600	IMAGINARY ROOTS ON FIRST ITERATION	P32, P72	VARALARM
R0881	00601	PERIGEE ALTITUDE LT PMIN1	P32,P72,	VARALARM
R0883	00602	PERIGEE ALTITUDE LT PMIN2	P32,P72,	VARALARM
R0885	00603	CSI TO CDH TIME LT PMIN22	P32,P72,P33,P73	VARALARM
R0887	00604	CDH TO TPI TIME LT PMIN23	P32,P72	VARALARM
R0889	00605	NUMBER OF ITERATIONS EXCEEDS LOOP MAXIMUM	P32,P72,P37	VARALARM
R0891	00606	DV EXCEEDS MAXIMUM	P32,P72	VARALARM
R0893	00611	NO TIG FOR GIVEN ELEV ANGLE	P34, P74	VARALARM
R0895	00612	STATE VECTOR IN WRONG SPHERE OF INFLUENCE	P37	VARALARM
R0897	00613	REENTRY ANGLE OUT OF LIMITS	P37	VARALARM
R0899	00777	PIPA FAIL CAUSED ISS WARNING.	T4RUPT	VARALARM
R0901	01102	CMC SELF TEST ERROR		ALARM2
R0903	01105	DOWNLINK TOO FAST	T4RUPT	ALARM
R0905	01106	UPLINK TOO FAST	T4RUPT	ALARM

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R0907 R0909	01107	PHASE TABLE FAILURE. ASSUME ERASABLE MEMORY IS DESTROYED	RESATRT	ALARM
R0910	01301	ARCSIN-ARCCOS ARGUMENT TOO LARGE	INTERPRETER	ALARM
R0912	01407	VG INCREASING	S40.8	ALARM
R0914	01426	IMU UNSATISFACTORY	P61, P62	ALARM
R0916	01427	IMU REVERSED	P61, P62	ALARM
R0918	01520	V37 REQUEST NOT PERMITTED AT THIS TIME	V37	ALARM
R0920	01600	OVERFLOW IN DRIFT TEST	OPT PRE ALIGN CALIB	ALARM
R0922	01601	BAD IMU TORQUE	OPT PRE ALIGN CALIB	ALARM
R0924	01703	INSUF. TIME FOR INTEG., TIG WAS SLIPPED	R41	ALARM
R0926	03777	ICDU FAIL CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0928	04777	ICDU , PIPA FAILS CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0930	07777	IMU FAIL CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0932	10777	IMU , PIPA FAILS CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0934	13777	IMU , ICDU FAILS CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0936	14777	IMU,ICDU,PIPA FAILS CAUSED THE ISSWNING	T4RUPT	VARALARM
R0938	20430	* INTEG. ABORT DUE TO SUB-SURFACE S.V.	ALL CALLS TO INTEG.	POODOO
R0940 R0942	20607	* NO SOLUTION FROM TIME-THETA OR TIME-RADIUS	TIMETHET, TIMERAD	POODOO
R0943	20610	* LAMBDA LESS THAN UNITY	P37	POODOO
R0945	21204	* NEGATIVE OR ZERO WAITLIST CALL	WAITLIST	POODOO
R0947 R0949	21206	* SECOND JOB ATTEMPTS TO GO TO SLEEP VIA KEYBOARD AND DISPLAY PROGRAM	PINBALL	POODOO
R0950	21210	* TWO PROGRAMS USING DEVICE AT SAME TIME	IMU MODE SWITCH	POODOO
R0952	21302	* SQRT CALLED WITH NEGATIVE ARGUMENT.ABORT	INTERPRETER	POODOO
R0954 R0956	21501	* KEYBOARD AND DISPLAY ALARM DURING INTERNAL USE (NVSUB). ABORT.	PINBALL	POODOO
R0957	21502	* ILLEGAL FLASHING DISPLAY	GOPLAY	POODOO
R0959	21521	* P01 OR P07 ILLEGALLY SELECTED	P01, P07	POODOO
R0961	31104	* DELAY ROUTINE BUSY	SERVICE ROUTINES	BAILOUT
R0963	31201	* EXECUTIVE OVERFLOW - NO VAC AREAS	EXECUTIVE	BAILOUT
R0965	31202	* EXECUTIVE OVERFLOW - NO CORE SETS	EXECUTIVE	BAILOUT
R0967	31203	* WAITLIST OVERFLOW - TOO MANY TASKS	WAITLIST	BAILOUT
R0969	31211	* ILLEGAL INTERRUPT OF EXTENDED VERB	SXTMARK	BAILOUT
R0971				

R0972 * INDICATES ABORT TYPE. ALL OTHERS NON-ABORTIVE

L ASSEMBLY AND OPERATION INFORMATION USER'S PAGE NO. 25 EQ

P0973 CHECKLIST CODES FOR 504

R0974 PLEASE REPORT ANY DEFICIENCIES IN THIS LIST TO ASSEMBLY CONTROL

R0975 *9 *17 *26 COLUMN

R0976 R1 CODE ACTION TO BE EFFECTED

R0977 00014 KEY IN FINE ALIGNMENT OPTION
R0978 00015 PERFORM CELESTIAL BODY ACQUISITION
R0979 00016 KEY IN TERMINATE MARK SEQUENCE
R0979.5 00017 PERFORM MINKEY RENDEZVOUS
R0979.6 00020 PERFORM MINKEY PLANE CHANGE PULSE TORQUING
R0980 00041 SWITCH CM/SM SEPARATION TO UP
R0981 00062 SWITCH AGC POWER DOWN
R0982 00202 PERFORM GNCS AUTOMATIC MANEUVER
R0983 00203 SWITCH TO CMC-AUTO
R0984 00204 PERFORM SPS GIMBAL TRIM
R0985 00403 SWITCH OPTICS TO MANUAL OR ZERO
R0986 SWITCH DENOTES CHANGE POSITION OF A CONSOLE SWITCH
R0987 PERFORM DENOTES START OR END OF A TASK
R0988 KEY IN DENOTES KEY IN OF DATA THRU THE DSKY

L ASSEMBLY AND OPERATION INFORMATION USER'S PAGE NO. 26 ED

P0989 OPTION CODES FOR 504

R0990 PLEASE REPORT ANY DEFICIENCIES IN THIS LIST TO ASSEMBLY CONTROL
R0991 THE SPECIFIED OPTION CODES WILL BE FLASHED IN COMPONENT R1 IN
R0992 CONJUNCTION WITH VERB04NOUN06 TO REQUEST THE ASTRONAUT TO LOAD INTO
R0993 COMPONENT R2 THE OPTION HE DESIRES.

R0994 *9 *17 *52 *11 *25 COLUMN

R0996 R0997	OPTION CODE	PURPOSE	INPUT FOR COMPONENT 2	PROGRAM(S)	APPLICABILITY
R0999	00001	SPECIFY IMU ORIENTATION	1=PREF 2=NOM 3=REFSMMAT	P50'S	ALL
R1001	00002	SPECIFY VEHICLE	1=THIS 2=OTHER	P21,R30	ALL
R1003	00003	SPECIFY TRACKING ATTITUDE	1=PREFERRED 2=OTHER	R63	ALL
R1005	00004	SPECIFY STATE OF TRACKING=FULTKFLAG	0=FULL 1=PARTIAL	P20	COLOSSUS
R1007	00006	SPECIFY RR COARSE ALIGN OPTION	1=LOCKON 2=CONTINUOUS DESIG.	V41N72	SUNDANCE + LUMINARY
R1009	00007	SPECIFY PROPULSION SYSTEM	1=SPS 2=RCS	P37	COLOSSUS
R1011	00010	SPECIFY ALIGNMENT MODE	0=ANY TIME 1=REFSMMAT +G	P57	LUMINARY
R1013			2=TWO BODIES 3=ONE BODY + G		
R1014	00011	SPECIFY SEPARATION MONITOR PHASE	1=DELTAV 2=STATE VECTOR UPDATE	P46	LUMINARY
R1016	00012	SPECIFY CSM ORBIT OPTION	1=NO ORBIT CHANGE 2=CHANGE	P22	LUMINARY
R1018			ORBIT TO PASS OVER LM		
R1020	00024	SPECIFY TRACKING OPTION	0 = RENDEZVOUS, VECPOINT	P20	COLOSSUS
R1022			1 = CELESTIAL BODY, VECPOINT		
R1023			2 = ROTATION		
R1024			4 = RENDEZVOUS, 3-AXIS		
R1025			5 = CELESTIAL BODY, 3-AXIS		

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 1 F

```
0001                        44,2000  44,2000   FIXED    MEMORY 120000 - 167777
0002  REF  1                                            COUNT  BANKSUM

R00025          MODULE 1 CONTAINS BANKS 0 THROUGH 5

0003                        4000                        BLOCK  02
0004                        4000                FFTAG1  EQUALS
0005                        4000                FFTAG2  EQUALS
0006                        4000                FFTAG3  EQUALS
0007                        4000                FFTAG4  EQUALS
0008                        4000                FFTAG7  EQUALS
0009                        4000                FFTAG8  EQUALS
0010                        4000                EXECF2  EQUALS
00105                       4000                WAITF2  EQUALS
0011                        4000                FFTAG10 EQUALS
0012                        4000                FFTAG12 EQUALS
00125                       4000                P30SUBS EQUALS
00126                       4000                STOPRAT EQUALS
0013      0 WORDS LEFT      4000  NO NEED               BNKSUM 02


0014                        6000                        BLOCK  03
0015                        6000                INTERF3 EQUALS
0016                        6000                FFTAG6  EQUALS
00162                       6000                FFTAG13 EQUALS
0017      41 WORDS LEFT     7726  07726 0               BNKSUM 03
0017                        7727  07727 1


0018                        00,2000                     BANK   00
0019                        00,2000             DLAYJOB EQUALS
00191                       00,2000             INTERB0 EQUALS
0020       8 WORDS LEFT     00,3767  03767 1            BNKSUM 00
0020                        00,3770  03770 1


0021                        01,2000                     BANK   01
0022                        01,2000             RESTART EQUALS
00222                       01,2000             R02     EQUALS
0023      22 WORDS LEFT     01,3751  03751 1            BNKSUM 01
0023                        01,3752  03752 1


00231                       01,2000             INTERB1 EQUALS
00232                       01,2000             EXECB1  EQUALS
0024                        04,2000                     BANK   4
0025                        04,2000             VERB37  EQUALS
0026                        04,2000             P50S4   EQUALS
0028                        04,2000             CSI/CDH1 EQUALS
0029                        04,2000             INTPRET2 EQUALS
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 2 ED

```
00294                 04,2000            MIDDGIM  EQUALS
00295                 04,2000            P31TAG   EQUALS
00296                 04,2000            C13BANK  EQUALS              C13STALL - CHANGE CODE IF THIS IS MOVED
00298                 04,2000            P60S6    EQUALS
0030    1 WORDS LEFT  04,3776  03776 1            BNKSUM 04


0031                  05,2000                     BANK   5
0032                  05,2000            FRANDRES EQUALS
0033                  05,2000            DOWNTELM EQUALS
00335                 05,2000            DAPMASS  EQUALS
00336                 05,2000            CONICS4  EQUALS
00337                 05,2000            CSITAG1  EQUALS
00338                 05,2000            INTINIT3 EQUALS
0034    3 WORDS LEFT  05,3774  03774 0            BNKSUM 05
0034                  05,3775  03775 1


R00345          MODULE 2 CONTAINS BANKS 6 THROUGH 13

0035                  06,2000                     BANK   6
0036                  06,2000            IMUCOMP  EQUALS
0037                  06,2000            T4RUP    EQUALS
00377                 06,2000            CSIPROG  EQUALS
00378                 06,2000            P60S7    EQUALS
0038    0 WORDS LEFT  06,2000  NO NEED             BNKSUM 06


0039                  07,2000                     BANK   7
0040                  07,2000            SXTMARKE EQUALS
0042                  07,2000            MODESW   EQUALS
0044                  07,2000            KEYRUPT  EQUALS
00445                 07,2000            CSIPROG6 EQUALS
00446                 07,2000            RATEBNK  EQUALS
0045    0 WORDS LEFT  07,2000  NO NEED             BNKSUM 07


0046                  10,2000                     BANK   10
0047                  10,2000            DISPLAYS EQUALS
0048                  10,2000            PHASETAB EQUALS
0049                  10,2000            COMGEOM2 EQUALS
0051                  10,2000            P60S4    EQUALS
0052                  10,2000            OPTDRV   EQUALS
00525                 10,2000            CSIPROG8 EQUALS
00526                 10,2000            KALCMON3 EQUALS
00527                 10,2000            CONICS5  EQUALS
0053    0 WORDS LEFT  10,2000  NO NEED             BNKSUM 10


0054                  11,2000                     BANK   11
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 3 EJ

```
0055                    11,2000             ORBITAL  EQUALS
0056                    11,2000             ORBITAL1 EQUALS          CONSTANTS
0057                    11,2000             INTVEL   EQUALS
0058                    11,2000             S52/2    EQUALS
00585                   11,2000             CONICS3  EQUALS
00586                   11,2000             INTINIT1 EQUALS
0059    5 WORDS LEFT    11,3772  03772 0            BNKSUM 11
0059                    11,3773  03773 1

0060                    12,2000                      BANK   12
0061                    12,2000             CONICS   EQUALS
00611                   12,2000             E/PROG   EQUALS
00615                   12,2000             CSIPROG2 EQUALS
00616                   12,2000             CSI/CDH2 EQUALS
00617                   12,2000             N90TAG   EQUALS
0062    5 WORDS LEFT    12,3772  03772 0            BNKSUM 12
0062                    12,3773  03773 1

0063                    13,2000                      BANK   13
0064                    13,2000             P76LOC   EQUALS
0065                    13,2000             LATLONG  EQUALS
0066                    13,2000             INTINIT  EQUALS
0067                    13,2000             SR52/1   EQUALS
00675                   13,2000             ORBITAL2 EQUALS
00677                   13,2000             E/PROG1  EQUALS
00678                   13,2000             P24PROG  EQUALS
0069    6 WORDS LEFT    13,3771  03771 0            BNKSUM 13
0069                    13,3772  03772 0

R0070   SPACER

R00705          MODULE 3 CONTAINS BANKS 14 THROUGH 21

0071                    14,2000                      BANK   14
0072                    14,2000             P50S     EQUALS
0073                    14,2000             RT53     EQUALS
0074                    14,2000             P50S1    EQUALS
0075    4 WORDS LEFT    14,3773  03773 1            BNKSUM 14
0075                    14,3774  03774 0

0076                    15,2000                      BANK   15
0077                    15,2000             STARTAB  EQUALS
0078                    15,2000             ETRYDAP  EQUALS
0079                    15,2000             CDHTAGS  EQUALS
00795                   15,2000             CONICS1  EQUALS
0080    1 WORDS LEFT    15,3776  03776 1            BNKSUM 15
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 4

```
0081                    16,2000                         BANK    16
0082                    16,2000             P40S1       EQUALS
0083                    16,2000             DAPROLL     EQUALS
0084                    16,2000             P50S2       EQUALS
00841                   16,2000             INTVEL1     EQUALS
00842                   16,2000             RTE2        EQUALS
00843                   16,2000             CSIPROG5    EQUALS
00844                   16,2000             LATLONG1    EQUALS
0085    1 WORDS LEFT    16,3776  03776 1                BNKSUM  16

0086                    17,2000                         BANK    17
00865                   17,2000             EXTVRBS1    EQUALS
0087                    17,2000             DAPS4       EQUALS
0088                    17,2000             DAPS5       EQUALS
0089                    17,2000             DAPS7       EQUALS
00891                   17,2000             P50S3       EQUALS
00895                   17,2000             CONICS2     EQUALS
0090    5 WORDS LEFT    17,3772  03772 0                BNKSUM  17
0090                    17,3773  03773 1

0091                    20,2000                         BANK    20
0092                    20,2000             DAPS6       EQUALS
0093                    20,2000             DAPS1       EQUALS
0094                    20,2000             DAPS2       EQUALS
00941                   20,2000             MANUSTUF    EQUALS
00943                   20,2000             VAC5LOC     EQUALS
00945                   20,2000             P15LOC      EQUALS
00946                   20,2000             P29TAG2     EQUALS
0095   23 WORDS LEFT    20,3750  03750 0                BNKSUM  20
0095                    20,3751  03751 1

0096                    21,2000                         BANK    21
0097                    21,2000             DAPS3       EQUALS
0098                    21,2000             MYSUBS      EQUALS
00985                   21,2000             P11THREE    EQUALS
0099    6 WORDS LEFT    21,3771  03771 0                BNKSUM  21
0099                    21,3772  03772 0

R00995          MODULE 4 CONTAINS BANKS 22 THROUGH 27

0100                    22,2000                         BANK    22
0101                    22,2000             RTBCODES    EQUALS
0103                    22,2000             DAPS8       EQUALS
0104                    22,2000             APOPERI     EQUALS
0106                    22,2000             KALCMON2    EQUALS
0107                    22,2000             KALCMON1    EQUALS
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 5 E0

```
01075                    22,2000          CSIPROG3 EQUALS
01076                    22,2000          P36TAG   EQUALS
0108     4 WORDS LEFT    22,3773  03773 1         BNKSUM 22
0108                     22,3774  03774 0

0109                     23,2000                  BANK   23
0110                     23,2000          P20S2    EQUALS
0111                     23,2000          INFLIGHT EQUALS
0112                     23,2000          COMGEOM1 EQUALS
0113                     23,2000          POWFLITE EQUALS
0114                     23,2000          POWFLIT1 EQUALS
0116                     23,2000          POWFLIT2 EQUALS
0117                     23,2000          R30LOC   EQUALS
01185                    23,2000          CSIPROG4 EQUALS
0119     4 WORDS LEFT    23,3773  03773 1         BNKSUM 23
0119                     23,3774  03774 0

0120                     24,2000                  BANK   24
0121                     24,2000          RTBCODE1 EQUALS
0122                     24,2000          P40S     EQUALS
01225                    24,2000          CSIPROG7 EQUALS
01226                    24,2000          R36CM    EQUALS
01228                    24,2000          P20S5    EQUALS
0125     7 WORDS LEFT    24,3770  03770 1         BNKSUM 24
0125                     24,3771  03771 0

0126                     25,2000                  BANK   25
0127                     25,2000          REENTRY  EQUALS
0128     6 WORDS LEFT    25,3771  03771 0         BNKSUM 25
0128                     25,3772  03772 0

0129                     26,2000                  BANK   26
0130                     26,2000          INTPRET1 EQUALS
0131                     26,2000          REENTRY1 EQUALS
0132                     26,2000          P60S     EQUALS
0133                     26,2000          P60S1    EQUALS
0134                     26,2000          P60S2    EQUALS
0135                     26,2000          P60S3    EQUALS
0136                     26,2000          PLANTIN  EQUALS          LUNAR ROT
0137                     26,2000          EPHEM    EQUALS
0138                     26,2000          P05P06   EQUALS
01381                    26,2000          26P50S   EQUALS
01383                    26,2000          P30S1A   EQUALS
01384                    26,2000          P11FOUR  EQUALS
0139     4 WORDS LEFT    26,3773  03773 1         BNKSUM 26
0139                     26,3774  03774 0
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 6 E

```
RC140

 0141                          27,2000                        BANK   27
 0142                          27,2000          TOF-FF        EQUALS
 0144                          27,2000          MANUVER       EQUALS
 0145                          27,2000          MANUVER1      EQUALS
 01455                         27,2000          P40S5         EQUALS
 0146                          27,2000          VECPT         EQUALS
 0147                          27,2000          MGIM          EQUALS
 0148                          27,2000          UPDATE2       EQUALS
 0149                          27,2000          R22S1         EQUALS
 01495                         27,2000          P60S5         EQUALS
 01496                         27,2000          CDHTAG        EQUALS
 01497                         27,2000          JANESUB       EQUALS
 0150     10 WORDS LEFT        27,3765  03765 0               BNKSUM 27
 0150                          27,3766  03766 0

RC1505          MODULE 5 CONTAINS BANKS 30 THROUGH 35

 0151                          30,2000                        BANK   30
 0153                          30,2000          LOWSUPER      EQUALS
 0156                          30,2000          P20S1         EQUALS
 0157                          30,2000          P20S6         EQUALS
 01575                         30,2000          P40S3         EQUALS
 01576                         30,2000          P29TAG1       EQUALS
 0158     8 WORDS LEFT         30,3767  03767 1               BNKSUM 30
 0158                          30,3770  03770 1

 0159                          31,2000                        BANK   31
 0161                          31,2000          RT23          EQUALS
 01621                         31,2000          R34           EQUALS
 01625                         31,2000          CDHTAG2       EQUALS
 01626                         31,2000          CSIPROG9      EQUALS
 01627                         31,2000          R31           EQUALS
 01628                         31,2000          P22S          EQUALS
 01629                         31,2000          RTE3          EQUALS
 016295                        31,2000          MEASINC3      EQUALS
 016296                        31,2000          V89TAG        EQUALS
 0163     7 WORDS LEFT         31,3770  03770 1               BNKSUM 31
 0163                          31,3771  03771 0

 0164                          32,2000                        BANK   32
 0165                          32,2000          P20S9         EQUALS
 0166                          32,2000          RTE           EQUALS
 0167                          32,2000          DELRSPL1      EQUALS
 01675                         32,2000          IMUCAL3       EQUALS
 0168     2 WORDS LEFT         32,3775  03775 1               BNKSUM 32
 0168                          32,3776  03776 1
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 7 EO

```
C169                    33,2000                         BANK    33
C170                    33,2000             TESTLEAD    EQUALS
C171                    33,2000             IMUCAL      EQUALS
C1711                   33,2000             P11TWO      EQUALS
C1715                   33,2000             P15LOC1     EQUALS
C172    1 WORDS LEFT    33,3776  03776 1                BNKSUM  33


C173                    34,2000                         BANK    34
C175                    34,2000             P11ONE      EQUALS
C176                    34,2000             P20S3       EQUALS
C177                    34,2000             P20S4       EQUALS
C1771                   34,2000             TOF-FF1     EQUALS
C178    5 WORDS LEFT    34,3772  03772 0                BNKSUM  34
C178                    34,3773  03773 1


C179                    35,2000                         BANK    35
C1795                   35,2000             RTECON1     EQUALS
C180                    35,2000             CSI/CDH     EQUALS
C181                    35,2000             P30S1       EQUALS
C183                    35,2000             P20S8       EQUALS
C1846                   35,2000             INTINIT2    EQUALS
C185    7 WORDS LEFT    35,3770  03770 1                BNKSUM  35
C185                    35,3771  03771 0


R01855          MODULE 6 CONTAINS BANKS 36 THROUGH 43

C186                    36,2000                         BANK    36
C188                    36,2000             MEASINC     EQUALS
C189                    36,2000             MEASINC1    EQUALS
C190                    36,2000             P15LOC2     EQUALS
C1905                   36,2000             P20S7       EQUALS
C191                    36,2000             RTE1        EQUALS
C1911                   36,2000             S3435LOC    EQUALS
C192    9 WORDS LEFT    36,3766  03766 0                BNKSUM  36
C192                    36,3767  03767 1


C193                    37,2000                         BANK    37
C194                    37,2000             P20S        EQUALS
C195                    37,2000             BODYATT     EQUALS
C196                    37,2000             RENDEZ      EQUALS
C197                    37,2000             SERVICES    EQUALS
C1977                   37,2000             COMTAG3     EQUALS
C198    59 WORDS LEFT   37,3704  03704 1                BNKSUM  37
C198                    37,3705  03705 0
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. B E

```
0199                    40,2000                         BANK    40
0200                    40,2000             PINSUPER    EQUALS
0202                    40,2000             PINBALL1    EQUALS
0203    2 WORDS LEFT    40,3775     03775 1             BNKSUM  40
0203                    40,3776     03776 1

0204                    41,2000                         BANK    41
0205                    41,2000             PINBALL2    EQUALS
0206    145 WORDS LEFT  41,3556     03556 1             BNKSUM  41
0206                    41,3557     03557 0

0207                    42,2000                         BANK    42
0208                    42,2000             SBAND       EQUALS
0209                    42,2000             PINBALL3    EQUALS
02095                   42,2000             EXTVBS      EQUALS
02097                   42,2000             UPDATE3     EQUALS
0210    2 WORDS LEFT    42,3775     03775 1             BNKSUM  42
0210                    42,3776     03776 1

0211                    43,2000                         BANK    43
0212                    43,2000             SELFCHEC    EQUALS
0213                    43,2000             EXTVERBS    EQUALS
0214    45 WORDS LEFT   43,3722     03722 0             BNKSUM  43
0214                    43,3723     03723 1

0215    REF   1         26,3335             HI6ZEROS    EQUALS  ZEROVECS        ZERO VECTOR ALWAYS IN HIGH MEMORY
0216    REF   1         04,3761             LO6ZEROS    EQUALS  ZEROVEC         ZERO VECTOR ALWAYS IN LOW MEMORY
0217    REF   1         26,3333             HIDPHALF    EQUALS  UNITX
0218    REF   1         04,3757             LODPHALF    EQUALS  XUNIT
0219    REF   1         26,3325             HIDP1/4     EQUALS  DP1/4TH
0220    REF   1         15,3411             LODP1/4     EQUALS  D1/4           2DEC .25
0221    REF   2 LAST 34 26,3333             HIUNITX     EQUALS  UNITX
0222    REF   1         26,3331             HIUNITY     EQUALS  UNITY
0223    REF   1         26,3327             HIUNITZ     EQUALS  UNITZ
0224    REF   2 LAST 34 04,3757             LOUNITX     EQUALS  XUNIT          2DEC .5
0225    REF   1         04,3755             LOUNITY     EQUALS  YUNIT          2DEC 0
0226    REF   1         04,3753             LOUNITZ     EQUALS  ZUNIT          2DEC 0
0227    REF   1         11,3760             3/4LOWDP    EQUALS  3/4            2DEC 3.0 B-2
0228    REF   1         30,2000                         SBANK=  LOWSUPER

R0229   ROPE SPECIFIC ASSIGNS OBVIATING NEED TO CHECK COMPUTER FLAG IN DETVRUZVING INTEGRATION AREA ENTRIES
0231    REF   1         13,3161             OTHPREC     EQUALS  LEMPREC
0232    REF   1         13,3034             ATOPOTH     EQUALS  ATOPLEM
0233    REF   1         13,2761             ATOPTHIS    EQUALS  ATOPCSM
0234    REF   1             0173            MOONTHIS    EQUALS  CMOONFLG
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 9 EQ S?

```
 02345  REF   1                0174          MOONOTH  EQUALS LMOONFLG
 0235   REF   1              13,2774         MOVATHIS EQUALS MOVEACSM
 0236   REF   1              31,2031         STATEST  EQUALS V83CALL        * TEMPORARY
 0237   REF   1              13,3145         THISPREC EQUALS CSMPREC
 0238   REF   3  LAST   34   26,3333         THISAXIS =      UNITX
 02385  REF   1                5041          ERASID   EQUALS LOW10          DOWNLINK ERASABLE DUMP ID
 02388  REF   1                6214          DELAYNUM EQUALS THREE
R0239   ********************************************************************************************************
```

L ABSOLUTE LOCATIONS FOR UPDATES USER'S PAGE NO. 1 E 5?

RC110 RC111			ECADR	MNEMONIC	
0120	REF	1	01501 1	=ECADR UPSVFLAG	CSM/LM STATE VECTOR UPDATE
0130	REF	1	00306 1	=ECADR XSMD	DESIRED REFSMMAT UPDATE
0140	REF	1	01733 1	=ECADR REFSMMAT	REFSMMAT UPDATE
0150	REF	1	03404 1	=ECADR DELVSLV	EXTERNAL DELTA-V UPDATE
0160	REF	1	03400 0	=ECADR LAT(SPL)	RETROFIRE EXT DELTA-V OR ENTRY UPDATE
0170	REF	1	03412 0	=ECADR TIG	LAMBERT TARGET UPDATE
0180	REF	1	02025 1	=ECADR RLS	LANDING SITE VECTOR UPDATE

L SUBROUTINE CALLS USER'S PAGE NO. 1 E S?

0001		0000	SUBRO	ERASTOTL	041
0002		0000	SUBRO	DIOGENES	064
0003		0000	SUBRO	MEDUSA	035
0004	*	0000	SUBRO	MENELAUS	061
0005		0000	SUBRO	ULYSSES	029
0006		0000	SUBRO	ZEUS	046

*** END OF MAIN PROGRAM ***

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 1 E. S?

```
R0001   CONVENTIONS AND NOTATIONS UTILIZED FOR ERASABLE ASSIGNMENTS.

R0002           EQUALS IS USED IN TWO WAYS.  IT IS OFTEN USED TO CHAIN A GROUP
R0003                   OF ASSIGNMENTS SO THAT THE GROUP MAY BE MOVED WITH THE
R0004                   CHANGING OF ONLY ONE CARD.  EXAMPLE.

A0005                                   X       EQUALS START
A0006                                   Y       EQUALS X        +SIZE.X
A0007                                   Z       EQUALS Y        +SIZE.Y

R0008                   (X, Y, AND Z ARE CONSECUTIVE AND BEGIN AT START.        )
R0009                   (SIZE.X AND SIZE.Y ARE THE RESPECTIVE SIZES OF X AND Y,
R0010                    USUALLY NUMERIC,  IE. 1, 2, 6, 18D ETC.                )

R0011           EQUALS OFTEN IMPLIES THE SHARING OF REGISTERS (DIFFERENT NAMES
R0012                   AND DIFFERENT DATA).  EXAMPLE.

A0013                                   X       EQUALS Y

R0014           = MEANS THAT MULTIPLE NAMES HAVE BEEN GIVEN TO THE SAME DATA.
R0015                   (THIS IS LOGICAL EQUIVALENCE, NOT SHARING)  EXAMPLE.

A0016                                   X       =       Y

R0017           THE SIZE AND UTILIZATION OF AN ERASABLE ARE OFTEN INCLUDED IN
R0018           THE COMMENTS IN THE FOLLOWING FORM.  M(SIZE)N.

R0019                   M REFERS TO THE MOBILITY OF THE ASSIGNMENT.
R0020                       B   MEANS THAT THE SYMBOL IS REFERENCED BY BASIC
R0021                           INSTRUCTIONS AND THUS IS E-BANK SENSITIVE.
R0022                       I   MEANS THAT THE SYMBOL IS REFERENCED ONLY BY
R0023                           INTERPRETIVE INSTRUCTIONS, AND IS THUS E-BANK
R0024                           INSENSITIVE AND MAY APPEAR IN ANY E-BANK.

R0025                   SIZE IS THE NUMBER OF REGISTERS INCLUDED BY THE SYMBOL.

R0026                   N INDICATES THE NATURE OR PERMANENCE OF THE CONTENTS.
R0027                       PL MEANS THAT THE CONTENTS ARE PAD LOADED.
R0028                       DSP MEANS THAT THE REGISTER IS USED FOR A DISPLAY.
R0029                       PRM MEANS THAT THE REGISTER IS PERMANENT, IE. IT
R0030                           IS USED DURING THE ENTIRE MISSION FOR ONE
R0031                           PURPOSE AND CANNOT BE SHARED.
R0032                       TMP MEANS THAT THE REGISTER IS USED TEMPORARILY OR
R0033                           IS A SCRATCH REGISTER FOR THE ROUTINE TO WHICH
R0034                           IT IS ASSIGNED.  THAT IS, IT NEED NOT BE SET
R0035                           PRIOR TO INVOCATION OF THE ROUTINE NOR DOES IT
R0036                           CONTAIN USEFUL OUTPUT TO ANOTHER ROUTINE.  THUS
```

```
R0037                    IT MAY BE SHARED WITH ANY OTHER ROUTINE WHICH
R0038                    IS NOT ACTIVE IN PARALLEL.
R0039                IN  MEANS INPUT TO THE ROUTINE AND IT IS PROBABLY
R0040                    TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
R0041               OUT  MEANS OUTPUT FROM THE ROUTINE, PROBABLY
R0042                    TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
```

```
P0050           SPECIAL REGISTERS.

 0051                0000      A         EQUALS 0
 0052                0001      L         EQUALS 1          L AND Q ARE BOTH CHANNELS AND REGISTERS.
 0053                0002      Q         EQUALS 2
 0054                0003      EBANK     EQUALS 3
 0055                0004      FBANK     EQUALS 4
 0056                0005      Z         EQUALS 5          ADJACENT TO FBANK AND BBANK FOR DXCH Z
 0057                0006      BBANK     EQUALS 6          (DTCB) AND DXCH FBANK (DTCF)
A0058                                                      REGISTER 7 IS A ZERO-SOURCE, USED BY ZL.

 0059                0010      ARUPT     EQUALS 10         INTERRUPT STORAGE.
 0060                0011      LRUPT     EQUALS 11
 0061                0012      QRUPT     EQUALS 12
 0062                0013      SAMPTIME  EQUALS 13         SAMPLED TIME 1 & 2
 0063                0015      ZRUPT     EQUALS 15         (13 AND 14 ARE SPARES.)
 0064                0016      BANKRUPT  EQUALS 16         USUALLY HOLDS FBANK OR BBANK
 0065                0017      BRUPT     EQUALS 17         RESUME ADDRESS AS WELL.

 0066                0020      CYR       EQUALS 20
 0067                0021      SR        EQUALS 21
 0068                0022      CYL       EQUALS 22
 0069                0023      EDOP      EQUALS 23         EDITS INTERPRETIVE OPERATION CODE PAIRS.

 0070                0024      TIME2     EQUALS 24
 0071                0025      TIME1     EQUALS 25
 0072                0026      TIME3     EQUALS 26
 0073                0027      TIME4     EQUALS 27
 0074                0030      TIME5     EQUALS 30
 0075                0031      TIME6     EQUALS 31
 0076                0032      CDUX      EQUALS 32
 0077                0033      CDUY      EQUALS 33
 0078                0034      CDUZ      EQUALS 34
 0079                0035      CDUT      EQUALS 35         OPTICS TRUNNION CDU (WAS OPTY)
 0081                0036      CDUS      EQUALS 36         OPTICS SHAFT CDU (WAS OPTX)
 0083                0037      PIPAX     EQUALS 37
 0084                0040      PIPAY     EQUALS 40
 0085                0041      PIPAZ     EQUALS 41
 0086                0042      BMAGX     EQUALS 42
 0087                0043      BMAGY     EQUALS 43
 0088                0044      BMAGZ     EQUALS 44
 0089                0045      INLINK    EQUALS 45
 0090                0046      RNRAD     EQUALS 46
 0092                0047      GYROCMD   EQUALS 47
 0093                0050      CDUXCMD   EQUALS 50
 0094                0051      CDUYCMD   EQUALS 51
 0095                0052      CDUZCMD   EQUALS 52
 0096                0053      CDUTCMD   EQUALS 53         OPTICS TRUNNION COMMAND (WAS OPTYCMD).
 0098   REF   1      0053      TVCYAW    EQUALS CDUTCMD    SPS YAW COMMAND IN TVC MODE.
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 4 EQ S?

```
0099                    0054        CDUSCMD  EQUALS 54          OPTICS SHAFT COMMAND (WAS OPTXCMD).
0100   REF   1          0054        TVCPITCH EQUALS CDUSCMD     SPS PITCH COMMAND IN TVC MODE.
R0105  REGISTERS 55-60 ARE COUNTERS WHICH ARE NOT PRESENTLY WIRED, AND SO MAY BE USED WITH CARE


R0107          INTERPRETIVE REGISTERS ADDRESSED RELATIVE TO VAC AREA.

0108                    0042        LVSQUARE EQUALS 34D         SQUARE OF VECTOR INPUT TO ABVAL AND UNIT
0109                    0044        LV       EQUALS 36D         LENGTH OF VECTOR INPUT TO UNIT.
0110                    0046        X1       EQUALS 38D         INTERPRETIVE SPECIAL REGISTERS RELATIVE
0111                    0047        X2       EQUALS 39D         TO THE WORK AREA
0112                    0050        S1       EQUALS 40D
0113                    0051        S2       EQUALS 41D
0114                    0052        QPRET    EQUALS 42D
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 5 ED 5?

P0115 INPUT/OUTPUT CHANNELS

```
A01151                          *** CHANNEL ZERO IS TO BE USED IN AN INDEXED OPERATION ONLY. ***
 01152  REF   1        0001     LCHAN     EQUALS L
 01153  REF   1        0002     QCHAN     EQUALS Q
 0116                  0003     HISCALAR  EQUALS 3
 0117                  0004     LOSCALAR  EQUALS 4
 0118                  0005     PYJETS    EQUALS 5
 01185  REF   1        0005     CHAN5     =      PYJETS
 0119                  0006     ROLLJETS  EQUALS 6
 01195  REF   1        0006     CHAN6     =      ROLLJETS
 0120                  0007     SUPERBNK  EQUALS 7
 0121                  0010     OUT0      EQUALS 10
 0122                  0011     DSALMOUT  EQUALS 11
 0123                  0012     CHAN12    EQUALS 12
 0124                  0013     CHAN13    EQUALS 13
 0125                  0014     CHAN14    EQUALS 14
 0126                  0015     MNKEYIN   EQUALS 15
 0127                  0016     NAVKEYIN  EQUALS 16
 01271                 0030     CHAN30    EQUALS 30
 01272                 0031     CHAN31    EQUALS 31
 01273                 0032     CHAN32    EQUALS 32
 0128                  0033     CHAN33    EQUALS 33
 0129                  0034     DNTM1     EQUALS 34
 0130                  0035     DNTM2     EQUALS 35
 01301                 0076     CHAN76    EQUALS 76
 01302                 0077     CHAN77    EQUALS 77
R0131  END OF CHANNEL ASSIGNMENTS
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 6 EQ S?

P0135 FLAGWORDS

R0136	FLAGWRD0	STATE +0	(000-014)
R0137	FLAGWRD1	STATE +1	(015-029)
R0138	FLAGWRD2	STATE +2	(030-044)
R0139	FLAGWRD3	STATE +3	(045-059)
R0140	FLAGWRD4	STATE +4	(060-074)
R0141	FLAGWRD5	STATE +5	(075-089)
R0142	FLAGWRD6	STATE +6	(090-104)
R0143	FLAGWRD7	STATE +7	(105-119)
R0144	FLAGWRD8	STATE +8D	(120-134)
R0145	FLAGWRD9	STATE +9D	(135-149)
A0146			

R0147 SORTED LIST OF

R0148 INTERPITIVE SWITCH BIT ASSIGNMENTS

R0149 INTERPRETIVE SWITCH BIT ASSIGNMENTS

R0150	FLAGWORD	DEC NUM	BIT + FLAG	EQUIVALENT FLAGWORDS
R1505	*.C5GSW	102D	BIT 3 FLAG 6	
R0151	22DSPFLG	032D	BIT 13 FLAG 2	
R0152	360SW	134D	BIT 1 FLAG 8	
R0153	3AXISFLG	084D	BIT 6 FLAG 5	
R0156	ADVTRK	125D	BIT 10 FLAG 8	
R1565	AMOONFLG	13D	BIT 2 FLAG 0	
R0157	APSESW	130D	BIT 5 FLAG 8	
R0159	ASTNFLAG	108D	BIT 12 FLAG 7	
R0161	ATTCHFLG	118D	BIT 2 FLAG 7	
R0162	AUTOSEQ	158D	BIT 7 FLAG 10	
R0164	AVEGFLAG	029D	BIT 1 FLAG 1	
R0165	AVEMIDSW	149D	BIT 1 FLAG 9	
R0166	AVFLAG	040D	BIT 5 FLAG 2	
R0167	AZIMFLAG	172D	BIT 8 FLAG 11	
R0168	BURNFLAG	155D	BIT 10 FLAG 10	
R0169	CALCMAN2	043D	BIT 2 FLAG 2	
R0171	CMDAPARM	093D	BIT 12 FLAG 6	
R0172	CMOONFLG	123D	BIT 12 FLAG 8	
R0173	CM/DSTBY	103D	BIT 2 FLAG 6	
R0174	COGAFLAG	131D	BIT 4 FLAG 8	
R0175	COMPUTER	082D	BIT 8 FLAG 5	
R1765	CSISFLAG	174D	BIT 6 FLAG11	
R0177	CULTFLAG	053D	BIT 7 FLAG 3	
R0178	CYC61FLG	11D	BIT 4 FLAG 0	
R0179	D6OR9FLG	058D	BIT 2 FLAG 3	
R0180	DAPBIT1	090D	BIT 15 FLAG 6	
R0181	DAPBIT2	091D	BIT 14 FLAG 6	

L	ERASABLE ASSIGNMENTS	USER'S PAGE NO. I EQ S?		
R0182	DIMOFLAG	059D	BIT 1 FLAG 3	
R0184	DMENFLG	081D	BIT 9 FLAG 5	
R0185	DRIFTFLG	030D	BIT 15 FLAG 2	
R0186	DSKYFLAG	075D	BIT 15 FLAG 5	
R0187	EGSW	97D	BIT 8 FLAG 6	KNOWNFLG R57FLAG
R0190	ENG2FLAG	019D	BIT 11 FLAG 1	
R0191	ENGONFLG	083D	BIT 7 FLAG 5	
R0192	*ENTRYDSP	047D	BIT 13 FLAG 6	
R0193	ERADFLAG	017D	BIT 13 FLAG 1	
R0194	ETPIFLAG	038D	BIT 7 FLAG 2	FIRSTFLG OPTNSW
R0196	F2RTE	10D	BIT 5 FLAG 0	
R0197	FINALFLG	039D	BIT 6 FLAG 2	
R0198	FIRSTFLG	38D	BIT 7 FLAG 2	ETPIFLAG OPTNSW
R0201	FREEFLAG	012D	BIT 3 FLAG 0	
R02015	FULTKFLG	163D	BIT 2 FLAG 10	
R0202	GAMDIFSW	094D	BIT 11 FLAG 6	
R0204	GLOKFAIL	046D	BIT 14 FLAG 3	
R0207	GONEBY	112D	BIT 8 FLAG 7	
R0208	GONEPAST	095D	BIT 10 FLAG 6	
R0209	GRRBKFLG	085D	BIT 5 FLAG 5	
R0211	GUESSW	028D	BIT 2 FLAG 1	
R0212	GYMDIFSW	104D	BIT 1 FLAG 6	
R02135	HAFLAG	173D	BIT 7 FLAG 11	
R02136	HDSUPFLG	154D	BIT 11 FLAG 10	
R0214	HIND	099D	BIT 6 FLAG 6	
R02152	IDLEFAIL	024D	BIT 6 FLAG 1	
R0217	IGNFLAG	107D	BIT 13 FLAG 7	
R0218	IMPULSW	036D	BIT 9 FLAG 2	
R0219	IMUSE	007D	BIT 8 FLAG 0	
R0220	INCORFLG	079D	BIT 11 FLAG 5	
R0221	INFINFLG	128D	BIT 7 FLAG 8	
R0222	INRLSW	100D	BIT 5 FLAG 6	
R02221	INTFLAG	151D	BIT 14 FLAG 10	
R0225	INTYPFLG	056D	BIT 4 FLAG 3	
R0227	ITSWICH	106D	BIT 14 FLAG 7	
R0228	*JSWITCH	001D	BIT 14 FLAG 0	
R0232	KNOWNFLG	097D	BIT 8 FLAG 6	EGSW R57FLAG
R0234	LATSW	101D	BIT 4 FLAG 6	
R0235	LMOONFLG	124D	BIT 11 FLAG 8	
R0238	LUNAFLAG	048D	BIT 12 FLAG 3	
R02385	MANEUFLG	160D	BIT 5 FLAG 10	
R0239	MARKFLG	026D	BIT 4 FLAG 1	
R02395	MAXDBFLG	138D	BIT 12 FLAG 9	
R0240	MGLVFLAG	088D	BIT 2 FLAG 5	
R0241	MID1FLAG	147D	BIT 3 FLAG 9	
R0242	MIDAVFLG	148D	BIT 2 FLAG 9	
R0243	MIDFLAG	002D	BIT 13 FLAG 0	
R0244	MKOVFLAG	072D	BIT 3 FLAG 4	
R0245	MOONFLAG	003D	BIT 12 FLAG 0	
R0246	MRKIDFLG	060D	BIT 15 FLAG 4	

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 8 EQ S?

R0247	MRKNVFLG	066D	BIT 9 FLAG 4
R0248	MRUPTFLG	070D	BIT 5 FLAG 4
R0251	MWAITFLG	064D	BIT 11 FLAG 4
R0252	N22ORN17	144D	BIT 6 FLAG 9
R0254	NEEDLFLG	006D	BIT 9 FLAG 0
R0255	NEWIFLG	122D	BIT 13 FLAG 8
R02551	NEWLMFLG	121D	BIT 14 FLAG 8
R02552	NEWTFLAG	80D	BIT 10 FLAG 5
R0256	NJETSFLG	015D	BIT 15 FLAG 1
R0258	NODOFLAG	044D	BIT 1 FLAG 2
R02581	NODOP01	018D	BIT 12 FLAG 1
R0259	NORFHOR	004D	BIT 11 FLAG 0
R0260	NORMSW	110D	BIT 10 FLAG 7
R0261	NOSWITCH	098D	BIT 7 FLAG 6
R0265	NRMIDFLG	062D	BIT 13 FLAG 4
R0266	NRMNVFLG	067D	BIT 8 FLAG 4
R0267	NRUPTFLG	071D	BIT 4 FLAG 4
R0269	NWAITFLG	065D	BIT 10 FLAG 4
R0274	ORBWFLAG	054D	BIT 6 FLAG 3
R0275	ORDERSW	129D	BIT 6 FLAG 8
R0276	P21FLAG 033D		BIT 12 FLAG 2
R02765	P22MKFLG	49D	BIT 11 FLAG 3
R02766	P24FLAG	136D	BIT 14 FLAG 9
R02767	P24MKFLG	042D	BIT 3 FLAG 2
R0277	P29FLAG	14D	BIT 1 FLAG 0
R0278	P35FLAG	157D	BIT 8 FLAG 10
R02785	PCFLAG	164D	BIT 1 FLAG 10
R02788	PCMANFLG	150D	BIT 15 FLAG 10
R0279	PDSPFLAG	063D	BIT 12 FLAG 4
R0280	PFRATFLG	041D	BIT 4 FLAG 2
R0281	PINBRFLG	069D	BIT 6 FLAG 4
R02815	PCOFLAG	051D	BIT 9 FLAG 3
R0282	PRECIFLG	052D	BIT 8 FLAG 3
R0284	PRIODFLG	061D	BIT 14 FLAG 4
R0285	PRONVFLG	068D	BIT 7 FLAG 4
R02855	PTV93FLG	161D	BIT 4 FLAG 10
R0286	QUITFLAG	145D	BIT 5 FLAG 9
R0287	R21MARK	031D	BIT 14 FLAG 2
R0288	R22CAFLG	143D	BIT 7 FLAG 9
R0291	R31FLAG	146D	BIT 4 FLAG 9
R0293	R53FLAG	009D	BIT 6 FLAG 0
R029601	R67FLAG	133D	BIT 2 FLAG 8
R02961	RANGFLAG	156D	BIT 9 FLAG 10
R0297	REFSMFLG	047D	BIT 13 FLAG 3
R02971	REINTFLG	152D	BIT 13 FLAG 10
R02972	REJCTFLG	153D	BIT 12 FLAG 10
R0298	RELVELSW	096D	BIT 9 FLAG 6
R0299	RENDWFLG	089D	BIT 1 FLAG 5
R02995	RETROFLG	76D	BIT 14 FLAG 5
R0300	RNDVZFLG	008D	BIT 7 FLAG 0

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 9 ED S?

R0304	RPQFLAG	120D	BIT 15 FLAG 8
R0308	RVSW	111D	BIT 9 FLAG 7
R0309	*S32.1F1	165D	BIT 15 FLAG 11
R0310	*S32.1F2	166D	BIT 14 FLAG 11
R0311	*S32.1F3A	167D	BIT 13 FLAG 11
R0312	*S32.1F3B	168D	BIT 12 FLAG 11
R0313	SAVECFLG	140D	BIT 10 FLAG 9
R03135	SKIPVHF 035D		BIT 10 FLAG 2
R0314	SLOPESW	027D	BIT 3 FLAG 1
R03145	SLOWFLG	77D	BIT 13 FLAG 5
R0315	SOLNSW	087D	BIT 3 FLAG 5
R0316	SOURCFLG	142D	BIT 8 FLAG 9
R0318	STATEFLG	055D	BIT 5 FLAG 3
R0319	STEERSW	034D	BIT 11 FLAG 2
R0320	STIKFLAG	016D	BIT 14 FLAG 1
R03201	STRULLSW	92D	BIT 13 FLAG 6
R0321	SURFFLAG	127D	BIT 8 FLAG 8
R0323	SWTOVER	135D	BIT 15 FLAG 9
R0324	TARG1FLG	020D	BIT 10 FLAG 1
R0325	TARG2FLG	021D	BIT 9 FLAG 1
R0326	TERMIFLG	105D	BIT 15 FLAG 7
R0327	TFFSW	119D	BIT 1 FLAG 7
R0328	TIMRFLAG	109D	BIT 11 FLAG 7
R03285	TPIMNFLG	162D	BIT 3 FLAG 10
R0329	TRACKFLG	025D	BIT 5 FLAG 1
R0332	UPDATFLG	023D	BIT 7 FLAG 1
R0334	UPLOCKFL	116D	BIT 4 FLAG 7
R03341	UTFLAG	126D	BIT 9 FLAG 8
R0335	V37FLAG	114D	BIT 6 FLAG 7
R03355	V50N18FL	045D	BIT 15 FLAG 3
R0336	V59FLAG	078D	BIT 12 FLAG 5
R03362	V82EMFLG	137D	BIT 13 FLAG 9
R0337	V94FLAG	139D	BIT 11 FLAG 9
R03375	V96ONFLG	132D	BIT 3 FLAG 8
R0338	VEHUPFLG	022D	BIT 8 FLAG 1
R0339	VERIFLAG	117D	BIT 3 FLAG 7
R0340	VFLAG	050D	BIT 10 FLAG 3
R0341	VHFRFLAG	141D	BIT 9 FLAG 9
R0343	VINTFLAG	057D	BIT 3 FLAG 3
R03435	VNFLAG	073D	BIT 2 FLAG 4
R0344	XDELVFLG	037D	BIT 8 FLAG 2
R0345	XDSPFLAG	074D	BIT 1 FLAG 4
R0346	*ZMEASURE	005D	BIT 10 FLAG 0

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 10 EQ S?

P0352 INTERPRETIVE SWITCH BIT ASSIGNMENTS
0353 REF 1 0074 FLAGWRD0 = STATE +0 (000-014)

A0354					(SET)	(RESET)
A0355				BIT 15 FLAG 0		
A0356			=	000D		
A0358				BIT 14 FLAG 0		
0359		0001	JSWITCH =	001D	INTEGRATION OF W MATRIX	INTEGRATION OF STATE VECTOR
A0360						
03605	REF 1	4753	JSWCHBIT =	BIT14		
A0361				BIT 13 FLAG 0		
0362		0002	MIDFLAG =	002D	INTEGRATION WITH SOLAR PERTURBATIONS	INTEGRATION WITHOUT SOLAR PERTURBATIONS
A0363						
03635	REF 1	4754	MIDFLBIT =	BIT13		
A0364				BIT 12 FLAG 0		
0365		0003	MOONFLAG =	003D	MOON IS SPHERE OF INFLUENCE	EARTH IS SPHERE OF INFLUENCE
A0366						
03665	REF 1	4755	MOONBIT =	BIT12		
A0369				BIT 11 FLAG 0		
0370		0004	NORFHOR =	004D	FAR HORIZON	NEAR HORIZON
03705	REF 1	4756	NORFBIT =	BIT11		
A0373				BIT 10 FLAG 0		
0374		0005	ZMEASURE =	005D	MEASUREMENT PLANET AND PRIMARY PLANET DIFFERENT	MEASUREMENT PLANET AND PRIMARY PLANET SAME
A0375						
A0376						
03775	REF 1	4757	ZMEASBIT =	BIT10		
A0379				BIT 9 FLAG 0		
0380		0006	NEEDLFLG =	006D	TOTAL ATTITUDE ERROR DISPLAYED	A/P FOLLOWING ERROR DISPLAYED
A0381						
03815	REF 1	4760	NEEDLBIT =	BIT9		
A0382				BIT 8 FLAG 0		
0383		0007	IMUSE =	007D	IMU IN USE	IMU NOT IN USE
03835	REF 1	4761	IMUSEBIT =	BIT8		
A0384				BIT 7 FLAG 0		

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 11 ED 5?

0385			0010	RNDVZFLG =	008D	P20 RUNNING	P20 NOT RUNNING
03865	REF	1	4762	RNDVZBIT =	BIT7		
A0390					BIT 6 FLAG 0		
0391			0011	R53FLAG =	009D	V51 INITIATED	V51 NOT INITIATED
03915	REF	1	4763	R53FLBIT =	BIT6		
A0395					BIT 5 FLAG 0		
0396			0012	F2RTE =	010D	IN TIME CRITICAL	NOT IN TIME CRITICAL
A0397						MODE	MODE
03975	REF	1	4764	F2RTEBIT =	BIT5		
A0398					BIT 4 FLAG 0		
0399			0013	CYC61FLG =	11D	KALCMAN3 TO RETURN	KALCMAN3 TO DO
A0400						TO R61 AFTER	MANEUVER
0401	REF	1	4765	CYC61BIT =	BIT4	COMPUTING TM	
A0403					BIT 3 FLAG 0		
0404			0014	FREEFLAG =	012D	(TEMPORARY FLAG USED IN MANY ROUTINES)	
04045	REF	1	4766	FREEFBIT =	BIT3		
A0405					BIT 2 FLAG 0		
0406			0015	AMOONFLG =	013D	STATE VECTOR IN	STATE VECTOR IN
0407	REF	1	4767	AMOONBIT =	BIT2	LUNAR SPHERE AT	EARTH SPHERE AT
A04071						MIDTOAVE	MIDTOAVE
A0408					BIT 1 FLAG 0		
0409			0016	P29FLAG =	14D	P29 RUNNING. 1ST	P29 FINISHED WITH
0410	REF	1	4770	P29BIT =	BIT1	PASS IN PROGRESS.	1ST PASS.
0411	REF	2 LAST 47	0075	FLAGWRD1 =	STATE +1	(015-029)	
A0412						(SET)	(RESET)
A0413					BIT 15 FLAG 1		
0414			0017	NJETSFLG =	015D	TWO JET RCS BURN	FOUR JET RCS BURN
04145	REF	1	4752	NJETSBIT =	BIT15		
A0415					BIT 14 FLAG 1		
0416			0020	STIKFLAG =	016D	RHC CONTROL	CMC CONTROL

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 12 EQ S?

04165 REF 2 LAST 47 4753 STIKBIT = BIT14

A0417 BIT 13 FLAG 1
C418 0021 ERADFLAG = 017D EARTH, COMPUTE FISCHER ELLIPSOID RADIUS; EARTH, USE FIXED RADIUS
A0419
A04191
A04192 MOON, USE FIXED RADIUS; MOON, USE RLS FOR LUNAR RADIUS
A04193

04195 REF 2 LAST 47 4754 ERADFBIT = BIT13

A0420 BIT 12 FLAG 1
0421 0022 NODOP01 = 018D P01 NOT ALLOWED; P01 ALLOWED

04211 REF 2 LAST 47 4755 NOP01BIT = BIT12

A0422 BIT 11 FLAG 1
0423 0023 ENG2FLAG = 019D RCS BURN; SPS BURN

04235 REF 2 LAST 47 4756 ENG2BIT = BIT11

A0427 BIT 10 FLAG 1
0428 0024 TARG1FLG = 020D SIGHTING LEM; NOT SIGHTING LEM

04285 REF 2 LAST 47 4757 TARG1BIT = BIT10

A0429 BIT 9 FLAG 1
0430 0025 TARG2FLG = 021D SIGHTING LANDMARK; SIGHTING STAR

04305 REF 2 LAST 47 4760 TARG2BIT = BIT9

A0434 BIT 8 FLAG 1
0435 0026 VEHUPFLG = 022D CSM STATE VECTOR BEING UPDATED; LEM STATE VECTOR BEING UPDATED
A0436

04365 REF 2 LAST 47 4761 VEHUPBIT = BIT8

A0437 BIT 7 FLAG 1
0438 0027 UPDATFLG = 023D UPDATING BY MARKS ALLOWED; UPDATING BY MARKS NOT ALLOWED
A0439

04395 REF 2 LAST 48 4762 UPDATBIT = BIT7

A0440 BIT 6 FLAG 1
04411 0030 IDLEFAIL = 024D INHIBIT R41; ENABLE R41 (ENGFAIL)

04415 REF 2 LAST 48 4763 IDLEBIT = BIT6

L ERASABLE ASSIGNMENTS

AC442						BIT 5 FLAG 1		
0443				0031	TRACKFLG =	025D	TRACKING ALLOWED	TRACKING NOT ALLOWED
04435	REF	2	LAST 48	4764	TRACKBIT =	BIT5		
AC444						BIT 4 FLAG 1		
0445				0032	MARKFLG =	026D	A MARK HAS BEEN	NO MARK HAS BEEN
0446	REF	2	LAST 48	4765	MARKBIT =	BIT4	ACCEPTED. ALLOW	ACCEPTED. DO NOT
AC447							MARK REJECT.	MARK REJECT.
AC450						BIT 3 FLAG 1		
0451				0033	SLOPESW =	27D	ITERATE WITH BIAS	ITERATE WITH REGULA
AC452							METHOD IN ITERATOR	FALSI METHOD IN
AC4521								ITERATOR
04525	REF	2	LAST 48	4766	SLOPEBIT =	BIT3		
AC456						BIT 2 FLAG 1		
0457				0034	GUESSW =	028D	NO STARTING VALUE	STARTING VALUE FOR
AC458							FOR ITERATION	ITERATION EXISTS
04585	REF	2	LAST 48	4767	GUESSBIT =	BIT2		
AC459						BIT 1 FLAG 1		
0460				0035	AVEGFLAG =	029D	AVERAGEG (SERVICER)	AVERAGEG (SERVICER)
AC461							TO CONTINUE	TO CEASE
04615	REF	2	LAST 48	4770	AVEGBIT =	BIT1		
0462	REF	3	LAST 48	0076	FLAGWRD2 =	STATE +2	(030-044)	
AC463							(SET)	(RESET)
AC464						BIT 15 FLAG 2		
0465				0036	DRIFTFLG =	030D	T3RUPT CALLS GYRO	T3RUPT DOES NO GYRO
AC466							COMPENSATION	COMPENSATION
04665	REF	2	LAST 48	4752	DRFTBIT =	BIT15		
AC470						BIT 14 FLAG 2		
0471				0037	R21MARK =	031D	OPTION ONE FOR	OPTION TWO FOR
AC472							MARKRUPT	MARKRUPT
04725	REF	3	LAST 49	4753	R21BIT =	BIT14		
AC476						BIT 13 FLAG 2		
0477				0040	22DSPFLG =	032D	DISPLAY DR,DV	DO NOT DISPLAY DR,DV

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 14 EQ S?

```
 04775  REF   3  LAST   49      4754          22DSPBIT =      BIT13

A0478                                                  BIT 12 FLAG 2
 0479                          0041          P21FLAG  =      0330      SUCCEEDING PASS     1ST PASS THRU P21,
A0480                                                                  THRU P21, USE BASE  CALCULATE BASE
 0481  REF   3  LAST   49      4755          P21BIT   =      BIT12     VECTOR FOR CALC.    VECTOR
 0482                          0042          STEERSW  =      0340      STEERING TO BE DONE STEERING OMITTED

 04825  REF   3  LAST   49      4756          STEERBIT =      BIT11

A0483                                                  BIT 10 FLAG 2
 0484                          0043          SKIPVHF  =      0350      DISREGARD RADAR     RADAR READ TO
A0485                                                                  READ BECAUSE OF     PROCEED NORMALLY
 04851  REF   3  LAST   49      4757          SKIPVBIT =      BIT10     SFTWRE OR HDWRE
A04852                                                                 RESTART

A0486                                                  BIT 9 FLAG 2
 0487                          0044          IMPULSW  =      0360      MINIMUM IMPULSE     STEERING BURN (NO
A0488                                                                  BURN (CUTOFF TIME   CUTOFF TIME YET
A0489                                                                  SPECIFIED)          AVAILABLE)

 04895  REF   3  LAST   49      4760          IMPULBIT =      BIT9

A0490                                                  BIT 8 FLAG 2
 0491                          0045          XDELVFLG =      0370      EXTERNAL DELTAV VG  LAMBERT (AIMPOINT)
A0492                                                                  COMPUTATION         VG COMPUTATION

 04925  REF   3  LAST   49      4761          XDELVBIT =      BIT8
A0493                                                  BIT 7 FLAG 2
 0494                          0046          ETPIFLAG =      0380      ELEVATION ANGLE     TPI TIME SUPPLIED
A0495                                                                  SUPPLIED FOR P34,74 FOR P34,74

 04955  REF   3  LAST   49      4762          ETPIBIT  =      BIT7

A0496                                                  BIT 7 FLAG 2
 0497  REF   1                 0046          FIRSTFLG =      ETPIFLAG  FIRST PASS           SUCCEEDING PASS THRU
A0498                                                                  THRU S40.9          S40.9

 04985  REF   4  LAST   51      4762          FIRSTBIT =      BIT7

 05025  REF   3  LAST   49      4763          FINALBIT =      BIT6

A0503                                                  BIT 6 FLAG 2
 0504                          0047          FINALFLG =      0390      LSAT PASS THROUGH   INTERIM PASS THROUGH
A0505                                                                  RENDEZVOUS PROGRAM  RENDEZVOUS PROGRAM
A0506                                                                  COMPUTATIONS        COMPUTATIONS

 05065  REF   3  LAST   50      4764          AVFLBIT  =      BIT5

A0507                                                  BIT 5 FLAG 2
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 15 ED 5?

0508				0050	AVFLAG =	040D	LEM IS ACTIVE VEHICLE	CSM IS ACTIVE VEHICLE
A0509								
A0510						BIT 4 FLAG 2		
0511				0051	PFRATFLG =	041D	PREFERRED ATTITUDE COMPUTED	PREFERRED ATTITUDE NOT COMPUTED
A0512								
05125	REF 3	LAST	50	4765	PFRATBIT =	BIT4		
A0513						BIT 3 FLAG 2		
0514				0052	P24MKFLG =	042D	P24 MARKING	P24 NOT MARKING
0515	REF 3	LAST	50	4766	P24MKBIT =	BIT3		
A0516						BIT 2 FLAG 2		
0517				0053	CALCMAN2 =	043D	PERFORM MANEUVER STARTING PROCEDURE	BYPASS STARTING PROCEDURE
A0518								
05185	REF 3	LAST	50	4767	CALC2BIT =	BIT2		
A0519						BIT 1 FLAG 2		
0520				0054	NODOFLAG =	044D	V37 NOT PERMITTED	V37 PERMITTED
05205	REF 3	LAST	50	4770	NODOBIT =	BIT1		
0521	REF 4	LAST	50	0077	FLAGWRD3 =	STATE +3	(045-059)	
A0522							(SET)	(RESET)
A0523						BIT 15 FLAG 3		
0524				0055	V50N18FL =	045D	ENABLE R60 ATT MANEUVER	INHIBIT R60 ATTITUDE MANEUVER
0525	REF 3	LAST	50	4752	V50N18BT =	BIT15		
A0526						BIT 14 FLAG 3		
0527				0056	GLOKFAIL =	046D	GIMBAL LOCK HAS OCCURED	NOT IN GIMBAL LOCK
A0528								
05285	REF 4	LAST	50	4753	GLOKFBIT =	BIT14		
A0529						BIT 13 FLAG 3		
0530				0057	REFSMFLG =	047D	REFSMMAT GOOD	REFSMMAT NO GOOD
05305	REF 4	LAST	51	4754	REFSMBIT =	BIT13		
A0531						BIT 12 FLAG 3		
0532				0060	LUNAFLAG =	048D	LUNAR LAT-LONG	EARTH LAT-LONG
05325	REF 4	LAST	51	4755	LUNABIT =	BIT12		
A0533						BIT 11 FLAG 3		

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 16 EQ S?

0534				0061	P22MKFLG =	49D	P22 DOWNLINKED MARK DATA WAS JUST TAKEN	P22 DOWLINK MARK DATA NOT JUST TAKEN
A0535								
05355	REF	4	LAST 51	4756	P22MKBIT =	BIT11		
A0537						BIT 10 FLAG 3		
0538				0062	VFLAG =	050D	LESS THAN TWO STARS IN FIELD OF VIEW	TWO STARS IN FIELD OF VIEW
A0539								
05395	REF	4	LAST 51	4757	VFLAGBIT =	BIT10		
A0540						BIT 9 FLAG 3		
0541				0063	POOFLAG =	051D	INHIBIT BACKWARDS INTEGRATION	ALLOW BACKWARDS INTEGRATION
05415	REF	4	LAST 51	4760	POOBIT =	BIT9		
A0542						BIT 8 FLAG 3		
0543				0064	PRECIFLG =	052D	CSMPREC, LEMPREC OR INTEGRVS CALLED	INTGRV CALLED
0544	REF	4	LAST 51	4761	PRECIBIT =	BIT8		
A0545						BIT 7 FLAG 3		
0546				0065	CULTFLAG =	053D	STAR OCCULTED	STAR NOT OCCULTED
05465	REF	5	LAST 51	4762	CULTBIT =	BIT7		
A0547						BIT 6 FLAG 3		
0548				0066	ORBWFLAG =	054D	W MATRIX VALID FOR ORBITAL NIVIGATION	W MATRIX INVALID FOR ORBITAL NAVIGATION
A0549								
05495	REF	4	LAST 51	4763	ORBWFBIT =	BIT6		
A0550						BIT 5 FLAG 3		
0551				0067	STATEFLG =	055D	PERMANENT STATE VECTOR UPDATED	PERMANENT STATE VECTOR NOT UPDATED
A0552								
05525	REF	4	LAST 51	4764	STATEBIT =	BIT5		
A0553						BIT 4 FLAG 3		
0554				0070	INTYPFLG =	056D	CONIC INTEGRATION	ENCKE INTEGRATION
05545	REF	4	LAST 52	4765	INTYBIT =	BIT4		
A0555						BIT 3 FLAG 3		
0556				0071	VINTFLAG =	057D	CSM STATE VECTOR BEING INTEGRATED	LEM STATE VECTOR BEING INTEGRATED
A0557								
05575	REF	4	LAST 52	4766	VINTFBIT =	BIT3		
A0558						BIT 2 FLAG 3		
0559				0072	D6OR9FLG =	058D	DIMENSION OF W IS 9 FOR INTEGRATION	DIMENSION OF W IS 6 FOR INTEGRATION
A0560								

05605 REF 4 LAST 52 4767 D60R9BIT = BIT2

A0561

BIT 1 FLAG 3

0562 0073 DIMOFLAG = 059D W MATRIX IS TO BE USED W MATRIX IS NOT TO BE USED

A0563

0564 REF 5 LAST 52 0100 FLAGWRD4 = STATE +4 (060-074)

A0565 (SET) (RESET)

05655 REF 4 LAST 52 4770 DIMOBIT = BIT1

A0566

BIT 15 FLAG 4

0567 0074 MRKIDFLG = 060D MARK DISPLAY IN ENDIDLE NO MARK DISPLAY IN ENDIDLE

A0568

05685 REF 4 LAST 52 4752 MRKIDBIT = BIT15

A0569

BIT 14 FLAG 4

0570 0075 PRIODFLG = 061D PRIORITY DISPLAY IN ENDIDLE NO PRIORITY DISPLAY IN ENDIDLE

A0571

05715 REF 5 LAST 52 4753 PRIODBIT = BIT14

A0572

BIT 13 FLAG 4

0573 0076 NRMIDFLG = 062D NORMAL DISPLAY IN ENDIDLE NO NORMAL DISPLAY IN ENDIDLE

A0574

05745 REF 5 LAST 52 4754 NRMIDBIT = BIT13

A0575

BIT 12 FLAG 4

0576 0077 PDSPFLAG = 063D CAN'T INTERRUPT PRIORITY DISPLAY SEE M. HAMILTON

A0577

05775 REF 5 LAST 52 4755 PDSPFBIT = BIT12

A0578

BIT 11 FLAG 4

0579 0100 MWAITFLG = 064D HIGHER PRIORITY DISPLAY OPERATING WHEN MARK DISPLAY INITIATED NO HIGHER PRIORITY DISPLAY OPERATING WHEN MARK DISPLAY INITIATED

A0580

A0581

A0582

05825 REF 5 LAST 53 4756 MWAITBIT = BIT11

A0583

BIT 10 FLAG 4

0584 0101 NWAITFLG = 065D HIGHER PRIORITY DISPLAY OPERATING WHEN NORMAL DISPLAY INITIATED NO HIGHER PRIORITY DISPLAY OPERATING WHEN NORMAL DISPLAY INITIATED

A0585

A0586

A0587

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 18 EC S?

```
 05875  REF   5  LAST   53      4757          NWAITBIT =      BIT10

A0588                                        BIT 9 FLAG 4
 0589                          0102          MRKNVFLG =      0660    ASTRONAUT USING      ASTRONAUT NOT USING
A0590                                                              KEYBOARD WHEN MARK   KEYBOARD WHEN MARK
A0591                                                              DISPLAY INITIATED    DISPLAY INITIATED

 05915  REF   5  LAST   53      4760          MRKNVBIT =      BIT9

A0592                                        BIT 8 FLAG 4
 0593                          0103          NRMNVFLG =      0670    ASTRONAUT USING      ASTRONAUT NOT USING
A0594                                                              KEYBOARD WHEN        KEYBOARD WHEN
A0595                                                              NORMAL DISPLAY       NORMAL DISPLAY
A0596                                                              INITIATED            INITIATED

 05965  REF   5  LAST   53      4761          NRMNVBIT =      BIT8

A0597                                        BIT 7 FLAG 4
 0598                          0104          PRONVFLG =      0680    ASTRONAUT USING      ASTRONAUT NOT USING
A0599                                                              KEYBOARD WHEN        KEYBOARD WHEN
A0600                                                              PRIORITY DISPLAY     PRIORITY DISPLAY
A0601                                                              INITIATED            INITIATED

 06015  REF   6  LAST   53      4762          PRONVBIT =      BIT7

A0602                                        BIT 6 FLAG 4
 0603                          0105          PINBRFLG =      0690    ASTRONAUT HAS        ASTRONAUT HAS NOT
A0604                                                              INTERFERED WITH      INTERFERED WITH
A0605                                                              EXISTING DISPLAY     EXISTING DISPLAY

 06055  REF   5  LAST   53      4763          PINBRBIT =      BIT6

A0606                                        BIT 5 FLAG 4
 0607                          0106          MRUPTFLG =      070D    MARK DISPLAY         MARK DISPLAY NOT
A0608                                                              INTERRUPTED BY       INTERRUPTED BY
A0609                                                              PRIORITY DISPLAY     PRIORITY DISPLAY

 06095  REF   5  LAST   53      4764          MRUPTBIT =      BIT5

A0610                                        BIT 4 FLAG 4
 0611                          0107          NRUPTFLG =      071D    NORMAL DISPLAY       NORMAL DISPLAY NOT
A0612                                                              INTERRUPTED BY       INTERRUPTED BY
A0613                                                              PRIORITY OR MARK     PRIORITY OR MARK
A0614                                                              DISPLAY              DISPLAY

 06145  REF   5  LAST   53      4765          NRUPTBIT =      BIT4

A0615                                        BIT 3 FLAG 4
 0616                          0110          MKOVFLAG =      072D    MARK DISPLAY OVER    NO MARK DISPLAY OVER
A0617                                                              NORMAL               NORMAL
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 19 E. S?

```
 06175 REF   5 LAST   53      4766          MKOVBIT  =      BIT3

A06179                                      BIT 2 FLAG 4   DISPLAY BIT
  0618                       0111          VNFLAG   =      073D           DISPLAY IS A          DISPLAY IS NOT A
  0619 REF   5 LAST   54      4767          VNBIT    =      BIT2           VNFLASH TYPE          VNFLASH TYPE

A0620                                       BIT 1 FLAG 4   MARK DISPLAY NOT TO NO SPECIAL MARK
  0621                       0112          XDSPFLAG =      074D           BE INTERRUPTED        INFORMATION.

 06215 REF   5 LAST   54      4770          XDSPBIT  =      BIT1

 0622  REF   6 LAST   54      0101          FLAGWRD5 =      STATE +5       (075-099)

A0623                                                      (SET)                 (RESET)

A0624                                       BIT 15 FLAG 5
  0625                       0113          DSKYFLAG =      075D           DISPLAYS SENT TO      NO DISPLAYS TO DSKY
A0626                                                                     DSKY
A06265

 062655 REF  5 LAST   54      4752          DSKYBIT  =      BIT15

A0627                                       BIT 14 FLAG 5
  0628                       0114          RETROFLG =      76D            P37 PREMANEUVER       ORBIT NOT RETROGRADE
 06285 REF   6 LAST   54      4753          RETROBIT =      BIT14          ORBIT IS RETROGRADE

A0630                                       BIT 13 FLAG 5
  0631                       0115          SLOWFLG  =      77D            P37 TRANSEARTH        SLOW DOWN IS NOT
  0632 REF   6 LAST   54      4754          SLOWBIT  =      BIT13          COAST SLOW DOWN       DESIRED
A0633                                                                     IS DESIRED

A0637                                       BIT 12 FLAG 5
  0638                       0116          V59FLAG  =      078D           CALIBRATING FOR       NORMAL MARKING FOR
A0639                                                                     P 23                  P 23

 06395 REF   6 LAST   54      4755          V59FLBIT =      BIT12

A0640                                       BIT 11 FLAG 5
  0641                       0117          INCORFLG =      079D           FIRST INCORPORATION   SECOND INCORPORATION

 06415 REF   6 LAST   54      4756          INCORBIT =      BIT11

A0642                                       BIT 10 FLAG 5
  0643                       0120          NEWTFLAG =      80D            RETURN TO P29 SKIP-   NORMAL OPERATION
  0644 REF   6 LAST   55      4757          NEWTBIT  =      BIT10          PING LONGITUDE DIS-
A0645                                                                     PLAY

A0649                                       BIT 9 FLAG 5
  0650                       0121          DMENFLG  =      081D           DIMENSION OF W IS 9   DIMENSION OF W IS 6
A0651                                                                     FOR INCORPORATION     FOR INCORPORATION
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 2. EQ S?

06515 REF 6 LAST 55 4760 DMENFBIT = BIT9

A0652 BIT 8 FLAG 5
0653 0122 COMPUTER = 082D COMPUTER IS CMC COMPUTER IS LGC

06535 REF 6 LAST 55 4761 COMPTBIT = BIT8

A0654 BIT 7 FLAG 5
0655 0123 ENGONFLG = 083D ENGINE TURNED ON ENGINE TURNED OFF

06555 REF 7 LAST 55 4762 ENGONBIT = BIT7

A0656 BIT 6 FLAG 5
0657 0124 3AXISFLG = 084D MANEUVER SPECIFIED MANEUVER SPECIFIED
A0658 BY THREE AXES BY ONE AXIS

06585 REF 6 LAST 55 4763 3AXISBIT = BIT6

A0662 BIT 5 FLAG 5
0663 0125 GRRBKFLG = 085D BACKUP GRR RECEIVED BACKUP GRR NOT
A0664 RECEIVED

06645 REF 6 LAST 55 4764 GRRBKBIT = BIT5

A0665 BIT 4 FLAG 5
A0666 = 086D
A0667

A0672 BIT 3 FLAG 5
0673 0127 SOLNSW = 87D LAMBERT DOES NOT LAMBERT CONVERGES OR
A0674 CONVERGE, OR TIME- TIME-RADIUS NON
A06741 RADIUS NEARLY CIRC. CIRCULAR.

06745 REF 6 LAST 56 4766 SOLNSBIT = BIT3

A0675 BIT 2 FLAG 5
0676 0130 MGLVFLAG = 088D LOCAL VERTICAL MIDDLE GIMBAL ANGLE
A0677 COORDINATES COMPUTED
A0678 COMPUTED

06785 REF 6 LAST 56 4767 MGLVFBIT = BIT2

A0679 BIT 1 FLAG 5
0680 0131 RENDWFLG = 089D W MATRIX VALID W MATRIX INVALID
A0681 FOR RENDEZVOUS FOR RENDEZVOUS
A0682 NAVIGATION NAVIGATION

06825 REF 6 LAST 56 4770 RENDWBIT = BIT1

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 21 EQ S?

0683	REF 7 LAST 56	0102	FLAGWRD6 =	STATE +6	(090-104)			
A0684					(SET)		(RESET)	
A0687				BIT 15 FLAG 6				
0688		0132	DAPBIT1 =	090D	1 SATURN 1 TVC		0 RCS	0 NO
06885	REF 6 LAST 56	4752	DAP1BIT =	BIT15				
A0689				BIT 14 FLAG 6				
0690		0133	DAPBIT2 =	091D	1 A/P	0 A/P	1 A/P	0 A/P
06905	REF 7 LAST 56	4753	DAP2BIT =	BIT14				
A0694				BIT 13 FLAG 6				
0695		0134	STRULLSW =	92D	DO STEERULL		DO ULAGEOFF ONLY	
A0696								
06965	REF 7 LAST 56	4754	STRULBIT =	BIT13				
A0697				BIT 13 FLAG 6				
0698	REF 1	0134	ENTRYDSP =	STRULLSW	DO ENTRY DISPLAY VIA ENTRYVN.		OMIT ENTRY DISPLAY	
A0699								
06995	REF 8 LAST 58	4754	ENDSPBIT =	BIT13				
A0706				BIT 12 FLAG 6				
0707		0135	CMDAPARM =	093D	ALOW ENTRY FIRINGS AND CALCULATIONS		INHIBIT ENTRY FIRING AND CONTROL FUNCTION	
A0708								
07085	REF 7 LAST 56	4755	CMARMBIT =	BIT12				
A0709				BIT 11 FLAG 6				
0710		0136	GAMDIFSW =	094D	CALCULATE GAMDOT		GAMDOT NOT TO BE CALCULATED	
A0711								
07115	REF 7 LAST 56	4756	GMDIFBIT =	BIT11				
A0714				BIT 10 FLAG 6				
0715		0137	GONEPAST =	095D	LATERAL CONTROL CALCULATIONS TO BE OMITTED		LATERAL CONTROL CALCULATIONS TO BE DONE	
A0716								
A0717								
07175	REF 7 LAST 56	4757	GONEBIT =	BIT10				
A0718				BIT 9 FLAG 6				
0719		0140	RELVELSW =	096D	TARGETING USES EARTH-RELATIVE		TARGETING USES INERTIAL VELOCITY	
A0720								

DO NOT SHARE BIT12 WITH PROGRAMS USING SERVICER

L ERASABLE ASSIGNMENTS EQ S?

```
A0721                                                                   VELOCITY

 07215  REF   7  LAST   57      4760          RELVBIT  =      BIT9

A0724                                                          BIT 8 FLAG 6
 0725                          0141          EGSW     =      097D          IN FINAL PHASE      NOT IN FINAL PHASE

 07255  REF   7  LAST   57      4761          EGFLGBIT =      BIT8

A0726                                                          BIT 8 FLAG 6
 0727   REF   1                0141          KNOWNFLG =      EGSW          LANDMARK KNOWN      LANDMARK UNKNOWN

 07275  REF   8  LAST   59      4761          KNOWNBIT =      BIT8

A0735                                                          BIT 7 FLAG 6
 0736                          0142          NOSWITCH =      098D          LATERAL ROLL        LATERAL ROLL MANUVER
 0737   REF   8  LAST   57      4762          NOSWBIT  =      BIT7          MANUVER INHIBITED   PERMITED IN ENTRY
A0737.5                                                                    IN ENTRY


A0740                                                          BIT 6 FLAG 6
 0741                          0143          HIND     =      099D          ITERATING HUNTEST   ITERATING OF HUNTEST
A0742                                                                      CALCULATIONS TO BE  CALCULATIONS TO BE
A0743                                                                      DONE AFTER RANGE    OMITTED AFTER RANGE
A0744                                                                      PREDICTION          PREDICTION

 07445  REF   7  LAST   57      4763          HINDBIT  =      BIT6

A0748                                                          BIT 5 FLAG 6
 0749                          0144          INRLSW   =      100D          INITIAL ROLL        INITIAL ROLL
A0750                                                                      V(LV)               V(LV)

 07505  REF   7  LAST   57      4764          INRLBIT  =      BIT5

A0751                                                                      ATTITUDE NOT HELD   ATTITUDE HELD

A0754                                                          BIT 4 FLAG 6
 0755                          0145          LATSW    =      101D          DOWNLIFT NOT        DOWNLIFT INHIBITED
A0756                                                                      INHIBITED

 07565  REF   6  LAST   55      4765          LATSWBIT =      BIT4

A0759                                                          BIT 3 FLAG 6
 0760                          0146          .05GSW   =      102D          DRAG OVER .05G      DRAG LESS THAN .05G

 07605  REF   7  LAST   57      4766          .05GBIT  =      BIT3

A0761                                                DO NOT SHARE BIT3  WITH PROGRAMS USING SERVICER

A0764                                                          BIT 2 FLAG 6
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 23 EQ S?

```
 0765                          0147        CM/DSTBY =      103D          ENTRY DAP ACTIVATED ENTRY DAP NOT
A0766                                                                                       ACTIVATED

 07665  REF   7  LAST   57     4767        CM/DSBIT =      BIT2

A07666                                                DO NOT SHARE BIT2  WITH PROGRAMS USING SERVICER

A0769                                                 BIT 1 FLAG 6
 0770                          0150        GYMDIFSW =      104D          CDU DIFFERENCES AND CDU DIFFERENCES AND
A0775                                                                   BODY RATES COMPUTED BODY RATES NOT
A0776                                                                                       COMPUTED

 07765  REF   7  LAST   57     4770        GYMDIBIT =      BIT1

 0777   REF   8  LAST   58     0103        FLAGWRD7 =      STATE +7      (105-119)

A0778                                                                   (SET)               (RESET)

A0779                                                 BIT 15 FLAG 7
 0780                          0151        TERMIFLG =      105D          TERMINATE R52       DO NOT TERMINATE R52
 0781   REF   7  LAST   58     4752        TERMIBIT =      BIT15

A0786                                                 BIT 14 FLAG 7
 0787                          0152        ITSWICH  =      106D          ACCEPT NEXT LAMBERT TEST LAMBERT ANSWER
A0788                                                                   TPI SEARCH SOLUTION AGAINST LIMITS

 07885  REF   8  LAST   58     4753        ITSWBIT  =      BIT14

A0789                                                 BIT 13 FLAG 7
 0790                          0153        IGNFLAG  =      107D          TIG HAS ARRIVED     TIG HAS NOT ARRIVED

 07905  REF   9  LAST   58     4754        IGNFLBIT =      BIT13

A0791                                                 BIT 12 FLAG 7
 0792                          0154        ASTNFLAG =      108D          ASTRONAUT HAS       ASTRONAUT HAS NOT
A0793                                                                   OKAYED IGNITION     OKAYED IGNITION

 07935  REF   8  LAST   58     4755        ASTNBIT  =      BIT12

A0794                                                 BIT 11 FLAG 7
 0795                          0155        TIMRFLAG =      109D          CLOKTASK OPERATING  CLOKTASK INOPERATIVE

 07955  REF   8  LAST   58     4756        TIMRBIT  =      BIT11

A0799                                                 BIT 10 FLAG 7
 0800                          0156        NORMSW   =      110D          UNIT NORMAL INPUT   LAMBERT COMPUTE ITS
A0801                                                                   TO LAMBERT.         OWN UNIT NORMAL.

 08015  REF   8  LAST   58     4757        NORMSBIT =      BIT10
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 24 EQ S?

```
A0806
 0807                    0157        RVSW     =    BIT 9 FLAG 7
A0807                                             111D          DO NOT COMPUTE FINAL COMPUTE FINAL STATE
A0807                                                           STATE VECTOR IN     VECTOR IN TIME-THETA
A0807                                                           TIME-THETA.

 080755 REF   8 LAST   59    4760        RVSWBIT  =    BIT9

A0808
 0809                    0160        GONEBY   =    BIT 8 FLAG 7
                                                  112D          PASSED TARGET       APPROACHING TARGET

 08095  REF   9 LAST   59    4761        GONBYBIT =    BIT8

A0810
A0811                                        =    BIT 7 FLAG 7
                                                  113D

A0812
 0813                    0162        V37FLAG  =    BIT 6 FLAG 7
A0814                                             114D          AVERAGEG (SERVICER) AVERAGEG (SERVICER)
                                                                RUNNING             OFF

 08145  REF   8 LAST   59    4763        V37FLBIT =    BIT6

A0815
A0816                                        =    BIT 5 FLAG 7
                                                  115D

A0819
 0820                    0164        UPLOCKFL =    BIT 4 FLAG 7
                                                  116D          K-KBAR-K FAIL       NO K-KBAR-K FAIL

 08205  REF   7 LAST   59    4765        UPLOCBIT =    BIT4

A0821
 0822                    0165        VERIFLAG =    BIT 3 FLAG 7
                                                  117D          CHANGED WHEN V33E OCCURS AT END OF P27

 08225  REF   8 LAST   59    4766        VERIFBIT =    BIT3

A0823
 0824                    0166        ATTCHFLG =    BIT 2 FLAG 7
                                                  118D          LM,CM ATTACHED      LM,CM NOT ATTACHED

 08245  REF   8 LAST   60    4767        ATTCHBIT =    BIT2

A0825
 0826                    0167        TFFSW    =    BIT 1 FLAG 7
                                                  119D          CALCULATE TPERIGEE  CALCULATE TFF

 08265  REF   8 LAST   60    4770        TFFSWBIT =    BIT1

 0827   REF   9 LAST   60    0104        FLAGWRD8 =    STATE +8D     (120-134)

A0828                                                           (SET)               (RESET)

A0829                                             BIT 15 FLAG 8
```

L ERASABLE ASSIGNMENTS

0830			0170	RPQFLAG =	120D		RPQ NOT COMPUTED	RPQ COMPUTED
08305	REF 8	LAST 60	4752	RPQFLBIT =	BIT15			
AC831					BIT 14 FLAG 8			
0832			0171	NEWLMFLG =	121D		NEW LANDMARK COORD	OLD LANDMARK COORD
0833	REF 9	LAST 60	4753	NEWLMBIT =	BIT14			
AC834					BIT 13 FLAG 8			
0835			0172	NEWIFLG =	122D		FIRST PASS THROUGH	SUCCEEDING ITERATION
AC836							INTEGRATION	OF INTEGRATION
08365	REF 10	LAST 60	4754	NEWIBIT =	BIT13			
AC837					BIT 12 FLAG 8			
0838			0173	CMOONFLG =	123D		PERMANENT CSM STATE	PERMANENT CSM STATE
0839	REF 9	LAST 60	4755	CMOONBIT =	BIT12		IN LUNAR SPHERE	IN EARTH SPHERE
AC840					BIT 11 FLAG 8			
0841			0174	LMOONFLG =	124D		PERMANENT LM STATE	PERMANENT LM STATE
0842	REF 9	LAST 60	4756	LMOONBIT =	BIT11		IN LUNAR SPHERE	IN EARTH SHPERE
AC843					BIT 10 FLAG 8			
0844			0175	ADVTRK =	125D		ADVANCE GROUND TRACK	NOT ADVANCED
AC845							SIGHTING WANTED	GROUND TRACK
08455	REF 9	LAST 60	4757	ADVTKBIT =	BIT10			
AC846					BIT 9 FLAG 8			
0847			0176	UTFLAG =	126D		UNIVERSAL TRACKING	NO UNIVERSAL TRACK
0848	REF 9	LAST 61	4760	UTBIT =	BIT9			
AC849					BIT 8 FLAG 8			
0850			0177	SURFFLAG =	127D		LM ON LUNAR SURFACE	LM NOT ON LUNAR
AC851								SURFACE
08515	REF 10	LAST 61	4761	SURFFBIT =	BIT8			
AC854					BIT 7 FLAG 8			
0855			0200	INFINFLG =	128D		NO CONIC SOLUTION	CONIC SOLUTION
AC856							(CLOSURE THROUGH	EXISTS.
AC8561							INFINITY REQUIRED).	
08565	REF 9	LAST 59	4762	INFINBIT =	BIT7			
AC857					BIT 6 FLAG 8			
0858			0201	ORDERSW =	129D		ITERATOR USES 2ND	ITERATOR USES 1ST
AC8581							ORDER MINIMUM MODE.	ORDER STANDARD MODE.

```
 08585  REF   9 LAST   61     4763          CRDERBIT =      BIT6

A0859                                      BIT 5 FLAG 8
 C860                0202     APSESW   =   130D            RDESIRED OUTSIDE   RDESIRED INSIDE
A08605                                                     PERICENTER-APOCENTER PERICENTER-APOCENTE
A0861                                                      RANGE IN TIME-RAD   RANGE IN TIME-RADIUS

 08615  REF   8 LAST   59     4764          APSESBIT =      BIT5

A0862                                      BIT 4 FLAG 8
 C8625               0203     COGAFLAG =    131D            NO CONIC  SOLUTION  CONIC SOLUTION
A0863                                                      TOO CLOSE TO        EXISTS (COGA DOES
A08631                                                     RECTILINEAR (COGA   NOT  OVERFLOW).
A0864                                                      OVERFLOWS).

 08645  REF   8 LAST   61     4765          COGAFBIT =      BIT4

A0865                                      BIT 3 FLAG 8
 0866                0204     V96ONFLG =    132D            P00 INTEGRATION HAS P00 INTEGRATION IS
A0867                                                      BEEN INHIBITED BY   PROCEEDING REGULARLY
 08675  REF   9 LAST   61     4766          V96ONBIT =      BIT3            V96

A0868                                      BIT 2 FLAG 8
 0869                0205     R67FLAG  =    133D            R67 CALLING R60     NOT R67 CALLING R60
 08695  REF   9 LAST   61     4767          R67BIT   =      BIT2

A0870                                      BIT 1 FLAG 8
 0871                0206     360SW    =    134D            TRANSFER ANGLE NEAR TRANSFER ANGLE NOT
A0872                                                      360 DEGREES         NEAR 360 DEGREES

 08725  REF   9 LAST   61     4770          360SWBIT =      BIT1

 0873   REF  10 LAST   61     0105          FLAGWRD9 =      STATE +9D       (135 - 149)

                                                           (SET)               (RESET)
A0874
A0875                                      BIT 15 FLAG 9
 0876                0207     SWTOVER  =    135D            SWITCHOVER HAS      NO SWITCHOVER YET
A0877                                                      OCCURRED

 08775  REF   9 LAST   62     4752          SWTOVBIT =      BIT15

A0878                                      BIT 14 FLAG 9
 0879                0210     P24FLAG  =    136D            P24 RUNNING         P24 NOT RUNNING
 087965 REF  10 LAST   62     4753          P24BIT   =      BIT14

A0880                                      BIT 13 FLAG 9
 0881                0211     V82EMFLG =    137D            MOON VICINITY       EARTH VICINITY
A08815
```

```
 08155 REF  11 LAST   62      4754          V82EMBIT =      BIT13

AC882                                      BIT 12 FLAG 9
 0883                        0212          MAXDBFLG =      138D          MAX DB SELECTED     MIN DB SELECTED
AC884

 08845 REF  10 LAST   62      4755          MAXDBBIT =      BIT12

AC885                                      BIT 11 FLAG 9
 0886                        0213          V94FLAG  =      139D          V94 ALLOWED DURING  V94 NOT ALLOWED
AC887                                                                    P23

 08875 REF  10 LAST   62      4756          V94FLBIT =      BIT11

AC888                                      BIT 10 FLAG 9
 0889                        0214          SAVECFLG =      140D          P23 DISPLAY AND     P23 DISPLAY AND
AC890                                                                    DATA STORAGE AFTER  DATA STORAGE BEFORE
AC891                                                                    MARK IS DONE        MARK IS DONE

 08915 REF  10 LAST   62      4757          SAVECBIT =      BIT10

AC892                                      BIT  9 FLAG 9
 0893                        0215          VHFRFLAG =      141D          ALLOW R22 TO        STOP ACCEPTANCE
AC894                                                                    ACCEPT RANGE        OF RANGE DATA
AC895                                                                    DATA

 08955 REF  10 LAST   62      4760          VHFRBIT  =      BIT9

AC896                                      BIT  8 FLAG 9
 0897                        0216          SOURCFLG =      142D          SOURCE OF INPUT     SOURCE OF INPUT
AC898                                                                    DATA IS FROM        DATA IS FROM
AC899                                                                    VHF RADAR           OPTICS MARK

 08995 REF  11 LAST   62      4761          SOURCBIT =      BIT8

AC900                                      BIT  7 FLAG 9
 0901                        0217          R22CAFLG =      143D          R22 IS PROCESSING   R22 IS NOT PROCESSING
AC902                                                                    AN OPTICS MARK      AN OPTICS MARK

 09025 REF  10 LAST   62      4762          R22CABIT =      BIT7

AC903                                      BIT  6 FLAG 9
 0904                        0220          N22ORN17 =      144D          COMPUTE TOTAL       COMPUTE TOTAL
AC905                                                                    ATTITUDE ERRORS     ATTITUDE ERRORS
AC906                                                                    WRT N22 (V62)       WRT N17 (V63)

 09065 REF  10 LAST   63      4763          N2217BIT =      BIT6

AC907                                      BIT  5 FLAG 9
 0908                        0221          QUITFLAG =      145D          TERMINATE AND EXIT  CONTINUE INTEGRATION
```

```
 09085  REF   9  LAST   63      4764          QUITBIT  =      BIT5                FROM INTEGRATION

A0909                                                       BIT  4 FLAG 9
 0910                          0222          R31FLAG  =      14OD                R31 SELECTED (V83)  R34 SELECTED (V85)

 09105  REF   9  LAST   63      4765          R31FLBIT =      BIT4

A0911                                                       BIT  3 FLAG 9
 0912                          0223          MID1FLAG =      147D                INTEGRATE TO TDEC   INTEGRATE TO THE
A0913                                                                                               THEN-PRESENT TIME

 09135  REF  10  LAST   63      4766          MID1FBIT =      BIT3

A0914                                                       BIT  2 FLAG 9
 0915                          0224          MIDAVFLG =      148D                INTEGRATION ENTERED INTEGRATION WAS
A0916                                                                            FROM ONE OF MIDTOAV NOT ENTERED VIA
A0917                                                                             PORTALS            MIDTOAV

 09175  REF  10  LAST   63      4767          MIDAVBIT =      BIT2

A0918                                                       BIT  1 FLAG 9
 0919                          0225          AVEMIDSW =      149D                AVETOMID CALLING    NO AVETOMID W INTEGR
A0920                                                                            FOR W.MATRIX INTEGR ALLOW SET UP RN,VN,
A0921                                                                            DONT WRITE OVER RN, PIPTIME
A0922                                                                            VN,PIPTIME

 09225  REF  10  LAST   63      4770          AVEMDBIT =      BIT1

A0923                                                                            (SET)               (RESET)

 0924   REF  11  LAST   63      0106          FLGWRD10 =      STATE   +10D        (150-164)
A0925

A0926                                                       BIT 15 FLAG 10
 0927                          0226          PCMANFLG =      150D                P20 MANEUVER        NOT P2  PC
A0928                                                                            AT PLANE CHANGE     MANEUVER
 09285  REF  10  LAST   63      4752          PCMANBIT =      BIT15

A0929                                                       BIT 14 FLAG 10
 0930                          0227          INTFLAG  =      151D                INTEGRATION IN      INTEGRATION NOT IN
A0931                                                                            PROGRESS            PROGRESS
 09315  REF  11  LAST   63      4753          INTFLBIT =      BIT14

A0932                                                       BIT 13 FLAG 10
 0933                          0230          REINTFLG =      152D                INTEGRATION ROUTINE INTEGRATION ROUTINE
A0933.5                                                                          TO BE RESTARTED     NOT TO BE RESTARTED
 0934   REF  12  LAST   64      4754          REINTBIT =      BIT13
```

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```
A0935
 0936                          0231        REJCTFLG =  BIT 12 FLAG 10
A0936                                     153D        MARK TO BE REJECTED   NO MARK REJECT BY
A9361                                                 IN R22                R22
 0937   REF  11  LAST  64      4755        REJCTBIT =  BIT12

A0938
 0939                          0232        HDSUPFLG =  BIT 11 FLAG 10
 0940   REF  11  LAST  64      4756        HDSUPBIT =  154D
                                           BIT11       HEADS UP ATTITUDE     HEADS DOWN ATTITUDE

A0941
 0942                          0233        BURNFLAG =  BIT 10 FLAG 10
 0943   REF  11  LAST  64      4757        BURNBIT  =  155D
                                           BIT10       CSM DID BURN          LM DID BURN

A0944
 0945                          0234        RANGFLAG =  BIT  9 FLAG 10
 0946   REF  11  LAST  64      4760        RANGBIT  =  156D
                                           BIT9        RANGE < 328 N.M.      RANGE > 328 N.M.

A0947
 0948                          0235        P35FLAG  =  BIT  8 FLAG 10
 0949   REF  12  LAST  64      4761        P35BIT   =  157D
                                           BIT8        MCC TARGETING DONE    NOT YET MCC

A0950
 0951                          0236        AUTOSEQ  =  BIT  7 FLAG 10
                                           158D        AUTOMATIC RENDEZVOUS  AUTOMATIC RENDEZ-
A0952                                                  SEQUENCE IS RUNNING   VOUS NOT RUNNING
 0525   REF  11  LAST  64      4762        AUTSQBIT =  BIT7

A0953
A0954                                      =           BIT  6 FLAG 10
                                                       159D
A0956
 0957                          0240        MANEUFLG =  BIT  5 FLAG 10
                                           160D        MANEUVER,P76,         MARK INCORPORATED
A9571                                                  OR PLANNED MANEUVER
 0958   REF  10  LAST  65      4764        MANEUBIT =  BIT5

A0959
 0960                          0241        PTV93FLG =  BIT  4 FLAG 10
                                           161D        V93 TO BE DONE        MANEUVER AND
A9601                                                  AFTER MANEUVER        V93 DONE
 0961   REF  10  LAST  65      4765        PTV93BIT =  BIT4

A0962
 0963                          0242        TPIMNFLG =  BIT  3 FLAG 10
                                           162D        TPI MANEUVER HAS
A9631                                                  BEEN DONE
 0964   REF  11  LAST  65      4766        TPIMNBIT =  BIT3

A0965
 0966                          0243        FULTKFLG =  BIT  2 FLAG 10
                                           163D        ONLY OPTICS OR VHF    OPTICS AND VHF
A9661                                                  MARKS BEING TAKEN     MARKS TAKEN
 0967   REF  11  LAST  65      4767        FULTKBIT =  BIT2
```

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```
A0968                                          BIT  1 FLAG 1
 0969                  0244    PCFLAG   =      164D          PLANE CHANGE       NOT PLANE CHANGE
A0970                                                        TARGETTING
 0971  REF  11 LAST 65 4770    PCBIT    =      BIT1
 0972  REF  12 LAST 65 0107    FLGWRD11 =      STATE +11D    (165 - 179)

A0973                                                       (SET)              (RESET)

A0974                                          BIT 15 FLAG 11
 0975                  0245    S32.1F1  =      165D          DELTAN AT CSI TIME DVT1 LESS THAN MAX
 0976  REF  11 LAST 65 4752    S32BIT1  =      BIT15         ONE EXCEEDS MAX

A0977                                          BIT 14 FLAG 11
 0978                  0246    S32.1F2  =      166D          FIRST PASS OF      REITERATION OF
 0979  REF  12 LAST 65 4753    S32BIT2  =      BIT14         NEWTON INTERATION  NEWTON

A0980                                          BIT 13 FLAG 11
 0981                  0247    S32.1F3A =      167D          BIT 13 AND BIT 12 FUNCTION AS AN ORDERED
 09811 REF  13 LAST 65 4754    S32BIT3A =      BIT13         PAIR (13,12) INDICATING THE POSSIBLE OC-
A0982                                                       CURRENCE OF 2NEWTON ITERATIONS FOR S32.1
A0983                                          BIT 12 FLAG 11 IN THE PROGRAM IN THE FOLLOWING ORDER:
 0984                  0250    S32.1F3B =      168D          (0,1) (I.E.BIT 13 RESET, BIT 12 SET)
 0985  REF  12 LAST 66 4755    S3229T3B =      BIT12               = FIRST NEWTON ITERATION BEING DONE
A0985.1                                                     (0,0)= FIRST PASS OF 2ND NEWTON ITER.
A0985.2                                                     (1,1)= 50 FPS STAGE OF 2ND NEWT ITER.
A0985.3                                                     (1,0)= REMAINDER OF 2ND NEWTON ITER.

A0986                                          BIT 11 FLAG 11
A0987                                 =        169D

A0989                                          BIT 10 FLAG 11
A0990                                 =        170D

A0992                                          BIT  9 FLAG 11
A0993                                 =        171D

A0995                                          BIT  8 FLAG 11
 0996                  0254    AZIMFLAG =      172D          3-AXIS UT          VECPOINT UT
 0997  REF  13 LAST 66 4761    AZIMBIT  =      BIT8

A0998                                          BIT  7 FLAG 11
 0999                  0255    HAFLAG   =      173D          HEIGHT ADJUST      NOT HEIGHT ADJUST
 1000  REF  12 LAST 66 4762    HABIT    =      BIT7          MANEUVER PROG

A1001                                          BIT  6 FLAG 11
 1002                  0256    CSISFLAG =      174D          MULTIPLE CSI S     NOT MULTIPLE CSI
A1003

A10031                                                      REQUESTED
 10032 REF  11 LAST 64 4763    CSISBIT  =      BIT6
```

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```
A1003
                                                BIT  5 FLAG 11
A1004
A1005                                   =       175D
A1006

                                                BIT  4 FLAG 11
A1007
A1008                                   =       176D
A1009

                                                BIT  3 FLAG 11
A1010
A1011                                   =       177D
A1012

                                                BIT  2 FLAG 11
A1013
A1014                                   =       178D
A1015

                                                BIT  1 FLAG 11
A1016
A1017                                   =       179D
A1018
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 32 ED S?

P1019 GENERAL ERASABLE ASSIGNMENTS.

```
 1020                          0061                        SETLOC 61
R1021          INTERRUPT TEMPORARY STORAGE POOL.  (11D)
R1022            (ITEMP1 THROUGH RUPTREG4)

R1023          ANY OF THESE MAY BE USED AS TEMPORARIES DURING INTERRUPT OR WITH INTERRUPT INHIBITED. THE ITEMP SERIES
R1025  IS USED DURING CALLS TO THE EXECUTIVE AND WAITLIST - THE RUPTREGS ARE NOT.

 1027                          0061    0061  ITEMP1   ERASE
 1028  REF   1                 0061          WAITEXIT EQUALS ITEMP1
 1029  REF   2  LAST   69      0061          EXECTEM1 EQUALS ITEMP1

 1030                          0062    0062  ITEMP2   ERASE
 1031  REF   1                 0062          WAITBANK EQUALS ITEMP2
 1032  REF   2  LAST   69      0062          EXECTEM2 EQUALS ITEMP2

 1033                          0063    0063  ITEMP3   ERASE
 1035  REF   1                 0063          WAITADR  EQUALS ITEMP3
 1036  REF   2  LAST   69      0063          NEWPRIO  EQUALS ITEMP3

 1037                          0064    0064  ITEMP4   ERASE
 1038  REF   1                 0064          LOCCTR   EQUALS ITEMP4
 1039  REF   2  LAST   69      0064          WAITTEMP EQUALS ITEMP4

 1040                          0065    0065  ITEMP5   ERASE
 1041  REF   1                 0065          NEWLOC   EQUALS ITEMP5

 1042                          0066    0066  ITEMP6   ERASE
A1043                                        NEWLOC+1 EQUALS ITEMP6          DP ADDRESS.

 1044                          0067                   SETLOC 67
 1045                          0067    0067  NEWJOB   ERASE                  MUST BE AT LOC 67 DUE TO WIRING.

 1046                          0070    0070  RUPTREG1 ERASE
 1047                          0071    0071  RUPTREG2 ERASE
 1048                          0072    0072  RUPTREG3 ERASE
 1049                          0073    0073  RUPTREG4 ERASE
 1050  REF   1                 0073          KEYTEMP1 EQUALS RUPTREG4
 1051  REF   2  LAST   69      0073          DSRUPTEM EQUALS RUPTREG4

R1052          FLAGWORD RESERVATIONS.                                       (12D)

 1054                          0074    0107  STATE    ERASE  +11D

R1055          UNSWITCHED DAP ERASABLE.                                     (4D)

 1057                          0110    0110  T6LOC    ERASE
 1058                          0111    0111  T6ADR    ERASE
```

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```
 1059                                   0112    0113    T5LOC    ERASE  +1


R1060           EXEC TEMPORARIES WHICH MAY BE USED BETWEEN CCS NEWJOBS.
R1061           (INTB15+ THROUGH RUPTMXM)                                    (32D)

 1063                                   0114    0114    INTB15+  ERASE
 1064   REF   1                        0114            DSEXIT   EQUALS INTB15+      RETURN FOR DSPIN
 1065   REF   2  LAST   70             0114            EXITEM   EQUALS INTB15+      RETURN FOR SCALE FACTOR ROUTINE SELECT
 1067                                   0115    0115    INTBIT15 ERASE              SIMILAR TO ABOVE.
 1069   REF   1                        0115            WDRET    EQUALS INTBIT15    RETURN FOR DSPWD
 1070   REF   2  LAST   70             0115            DECRET   EQUALS INTBIT15    RETURN FOR PUTCOM(DEC LOAD)
 1071   REF   3  LAST   70             0115            21/22REG EQUALS INTBIT15    TEMP FOR CHARIN

R1072           THE REGISTERS BETWEEN ADDRWD AND PRIORITY MUST STAY IN THE FOLLOWING ORDER FOR INTERPRETIVE TRACE.

 1074                                   0116    0116    ADDRWD   ERASE              12 BIT INTERPRETIVE OPERAND SUB-ADDRESS.
 1075                                   0117    0117    POLISH   ERASE              HOLDS CADR MADE FROM POLISH ADDRESS.
 1076   REF   1                        0117            UPDATRET EQUALS POLISH      RETURN FOR UPDATNN, UPDATVB
 1077   REF   2  LAST   70             0117            CHAR     EQUALS POLISH      TEMP FOR CHARIN
 1078   REF   3  LAST   70             0117            ERCNT    EQUALS POLISH      COUNTER FOR ERROR LIGHT RESET
 1079   REF   4  LAST   70             0117            DECOUNT  EQUALS POLISH      COUNTER FOR SCALING AND DISPLAY (DEC)

 1080                                   0120    0120    FIXLOC   ERASE              WORK AREA ADDRESS.
 1081                                   0121    0121    OVFIND   ERASE              SET NON-ZERO ON OVERFLOW.

 1082                                   0122    0127    VBUF     ERASE  +5          TEMPORARY STORAGE USED FOR VECTORS.
 1083   REF   1                        0122            SGNON    EQUALS VBUF        TEMP FOR +,- ON
 1084   REF   2  LAST   70             0122            NOUNTEM  EQUALS VBUF        COUNTER FOR MIXNOUN FETCH
 1085   REF   3  LAST   70             0122            DISTEM   EQUALS VBUF        COUNTER FOR OCTAL DISPLAY VERBS
 1086   REF   4  LAST   70             0122            DECTEM   EQUALS VBUF        COUNTER FOR FETCH (DEC DISPLAY VERBS)

 1087   REF   5  LAST   70             0123            SGNOFF   EQUALS VBUF  +1    TEMP FOR +,- ON
 1088   REF   6  LAST   70             0123            NVTEMP   EQUALS VBUF  +1    TEMP FOR NVSUB
 1089   REF   7  LAST   70             0123            SFTEMP1  EQUALS VBUF  +1    STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
 1090   REF   8  LAST   70             0123            HITEMIN  EQUALS VBUF  +1    TEMP FOR LOAD OF HRS, MIN, SEC
A1091                                                                               MUST = LOTEMIN-1.
 1092   REF   9  LAST   70             0124            CODE     EQUALS VBUF  +2    FOR DSPIN
 1093   REF  10  LAST   70             0124            SFTEMP2  EQUALS VBUF  +2    STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
 1094   REF  11  LAST   70             0124            LOTEMIN  EQUALS VBUF  +2    TEMP FOR LOAD OF HRS, MIN, SEC
A1095                                                                               MUST = HITEMIN+1.
 1096   REF  12  LAST   70             0125            MIXTEMP  EQUALS VBUF  +3    FOR MIXNOUN DATA
R1098   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

 1099                                   0130    0132    BUF      ERASE  +2          TEMPORARY SCALAR STORAGE.
 1100                                   0133    0134    BUF2     ERASE  +1
 1101   REF   1                        0130            INDEXLOC EQUALS BUF         CONTAINS ADDRESS OF SPECIFIED INDEX.
 1102   REF   2  LAST   70             0130            SWWORD   EQUALS BUF         ADDRESS OF SWITCH WORD.
 1103   REF   3  LAST   70             0131            SWBIT    EQUALS BUF +1      SWITCH BIT WITHIN SWITCH WORD.
 1104                                   0135    0135    MPTEMP   ERASE              TEMPORARY USED IN MULTIPLY AND SHIFT.
```

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```
1106                                0136    0136    DOTINC   ERASE                  COMPONENT INCREMENT FOR DOT SUBROUTINE.
1107   REF  1                      0136            DVSIGN   EQUALS DOTINC          DETERMINES SIGN OF DDV RESULT.
1108   REF  2  LAST  71            0136            ESCAPE   EQUALS DOTINC          USED IN ARCSIN/ARCCOS.
1109   REF  3  LAST  71            0136            ENTRET   EQUALS DOTINC          EXIT FROM ENTER

11095  REF  1                      0136            ENTEXIT  =      ENTRET

1110                                0137    0137    DOTRET   ERASE                  RETURN FROM DOT SUBROUTINE.
1111   REF  1                      0137            DVNORMCT EQUALS DOTRET          DIVIDEND NORMALIZATION COUNT IN DDV.
1112   REF  2  LAST  71            0137            ESCAPE2  EQUALS DOTRET          ALTERNATE ARCSIN/ARCCOS SWITCH.
1113   REF  3  LAST  71            0137            WDCNT    EQUALS DOTRET          CHAR COUNTER FOR DSPWD
1114   REF  4  LAST  71            0137            INREL    EQUALS DOTRET          INPUT BUFFER SELECTOR ( X,Y,Z, REG )

1115                                0140    0140    MATINC   ERASE                  VECTOR INCREMENT IN MXV AND VXM.
1116   REF  1                      0140            MAXDVSW  EQUALS MATINC          +0 IF DP QUOTIENT IS NEAR ONE - ELSE -1.
1117   REF  2  LAST  71            0140            POLYCNT  EQUALS MATINC          POLYNOMIAL LOOP COUNTER
1118   REF  3  LAST  71            0140            DSPMMTEM EQUALS MATINC          DSPCOUNT SAVE FOR DSPMM
1119   REF  4  LAST  71            0140            MIXBR    EQUALS MATINC          INDICATOR FOR MIXED OR NORMAL NOUN

1120                                0141    0141    TEM1     ERASE                  EXEC TEMP
1121   REF  1                      0141            POLYRET  EQUALS TEM1
1122   REF  2  LAST  71            0141            DSREL    EQUALS TEM1            REL ADDRESS FOR DSPIN

1123                                0142    0142    TEM2     ERASE                  EXEC TEMP
1124   REF  1                      0142            DSMAG    EQUALS TEM2            MAGNITUDE STORE FOR DSPIN
1126                                0143    0143    TEM3     ERASE                  EXEC TEMP
1127   REF  1                      0143            COUNT    EQUALS TEM3            FOR DSPIN

1128                                0144    0144    TEM4     ERASE                  EXEC TEMP
1130   REF  1                      0144            RELRET   EQUALS TEM4            RETURN FOR RELDSP
1132   REF  2  LAST  71            0144            DSPWDRET EQUALS TEM4            RETURN FOR DSPSIGN
1133   REF  3  LAST  71            0144            SEPSCRET EQUALS TEM4            RETURN FOR SEPSEC
1134   REF  4  LAST  71            0144            SEPMNRET EQUALS TEM4            RETURN FOR SEPMIN

1135                                0145    0145    TEM5     ERASE                  EXEC TEMP
1136   REF  1                      0145            NOUNADD  EQUALS TEM5            TEMP STORAGE FOR NOUN ADDRESS

1137                                0146    0146    NNADTEM  ERASE                  TEMP FOR NOUN ADDRESS TABLE ENTRY
1138                                0147    0147    NNTYPTEM ERASE                  TEMP FOR NOUN TYPE TABLE ENTRY
1139                                0150    0150    IDAD1TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1140                                                                               MUST = IDAD2TEM-1, = IDAD3TEM-2.
1141                                0151    0151    IDAD2TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1142                                                                               MUST = IDAD1TEM+1, = IDAD3TEM-1.
1143                                0152    0152    IDAD3TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1144                                                                               MUST = IDAD1TEM+2, = IDAD2TEM+1.
1145                                0153    0153    RUTMXTEM ERASE                  TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)

R1146          AX*SR*T STORAGE.                                                     (6D)

1148   REF  2  LAST  71            0142            DEXDEX   EQUALS TEM2            B(1)TMP
```

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```
1149   REF   2  LAST   71      0143          DEX1      EQUALS  TEM3          B(1)TMP
1150   REF   5  LAST   71      0144          DEX2      EQUALS  TEM4          B(1)TMP
1151   REF   2  LAST   71      0145          RTNSAVER  EQUALS  TEM5          B(1)TMP
1152   REF   1                 0133          TERM1TMP  EQUALS  BUF2          B(2)TMP

1153   REF   1                 0143          DEXI      =       DEX1
```

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```
P1154           DYNAMICALLY ALLOCATED CORE SETS FOR JOBS.                        (84D)

 1156                       0154    0162    MPAC     ERASE  +6                   MULTI-PURPOSE ACCUMULATOR.
 1157                       0163    0163    MODE     ERASE                       +1 FOR TP, +0 FOR DP, OR -1 FOR VECTOR.
 1158                       0164    0164    LOC      ERASE                       LOCATION ASSOCIATED WITH JOB.
 1159                       0165    0165    BANKSET  ERASE                       USUALLY CONTAINS BBANK SETTING.
 1160                       0166    0166    PUSHLOC  ERASE                       WORD OF PACKED INTERPRETIVE PARAMETERS.
 1161                       0167    0167    PRIORITY ERASE                       PRIORITY OF PRESENT JOB AND WORK AREA.

 1162                       0170    0277            ERASE  +71D                  SEVEN SETS OF 12 REGISTERS EACH.

R1163           SPECIAL DOWNLINK BUFFER.-OVERLAYED BY P27 STORAGE-

R1164           P27(UPDATE PROGRAM) STORAGE. -OVERLAYS SPEC DNLNK BUFF-          (24D)

 1166                       0300    0327    COMPNUMB ERASE           +23D        B(1)TMP NUMBER OF ITEMS TO BE UPLINKED.
 1167   REF   1             0301            UPOLDMOD EQUALS COMPNUMB +1          B(1)TMP HOLDS INTERRUPTED PROGRAM NUMBER
 1168   REF   1             0302            UPVERB   EQUALS UPOLDMOD +1          B(1) TMP VERB NUMBER
 1169   REF   1             0303            UPCOUNT  EQUALS UPVERB   +1          B(1)TMP UPBUFF INDEX
 1170   REF   1             0304            UPBUFF   EQUALS UPCOUNT  +1          B(20D)

R1171           MORE P27 STORAGE.                                                (20)

 1173                       0330    0330    UPTEMP   ERASE                       B(1)TMP SCRATCH
 1174                       0331    0331    UPVERBSV ERASE                       B(1)TMP
A1175

R1176           ENTRY DOWNLINK STORAGE

R1177                   (20 REGISTERS OF ENTRY DOWNLINK WILL GO HERE.)

A1178                                                   THE FOLLOWING ARE INDEXED FOR TM. IN ENTRY DAP.

 1179   REF   1             0304            CMTMTIME =       UPBUFF              B(1) (VEHICLE BODY RATE INFO IS
 1180   REF   1             0305            SW/NDX   =       CMTMTIME +1         B(1)  TELEMETERED EACH 0.2 SEC. DURING
 1181   REF   2 LAST   73   0324            ENDBUF   =       CMTMTIME +16D       B(1)  ENTRY.)

 1182   REF   1             0325            V1       =       ENDBUF   +1         I(2) REENTRY, P64-P65
 1183   REF   1             0327            A0       =       V1       +2         I(2) REENTRY, P64-P65
A1184                                                                            HI-ORDER WORD ONLY ON DNLNK.
R1185

R1186           ALIGNMENT STORAGE.                                               (5D)
R1188           (CANNOT SHARE WITH PRECISION INTEGRATION OR KEPLER STORAGE.)

 1189   REF   2 LAST   73   0300            QMAJ     EQUALS COMPNUMB          B(1)TMP
 1190   REF   1             0301            MARKINDX EQUALS QMAJ      +1      B(1)TMP
 1191   REF   1             0302            BESTI    EQUALS MARKINDX  +1      I(1)TMP
 1192   REF   1             0303            BESTJ    EQUALS BESTI     +1      I(1)TMP
 1193   REF   1             0304            STARIND  EQUALS BESTJ     +1      I(1)TMP
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 37 E0 S?

R1194 ALIGNMENT/S40.2,3 COMMON STORAGE. (18D)

```
 1196  REF  2 LAST  73      0306          XSMD     EQUALS UPBUFF  +2     I(6)TMP
 1197  REF  2 LAST  36      0314          YSMD     EQUALS XSMD    +6     I(6)TMP
 1198  REF  1               0322          ZSMD     EQUALS YSMD    +6     I(6)TMP

 1199  REF  3 LAST  74      0306          XSCREF   =      XSMD                 SPACE CRAFT AXES IN REF COORDS.
 1200  REF  2 LAST  74      0314          YSCREF   =      YSMD
 1201  REF  1               0322          ZSCREF   =      ZSMD
```

R12015 ALIGNMENT TEMPS IN VAC

```
 1202                       0026          ZPRIME   =      22D
 1203                       0026          PDA      =      22D
 1204                       0020          COSTH    =      16D
 1205                       0022          SINTH    =      18D
 1206                       0024          THETA    =      20D
 1207                       0040          STARM    =      32D
```

R12071 R52 AUTO-OPTICS (1)

```
120723 REF  2 LAST  74      0330          PACTEMP  EQUALS ZSMD +6D       B(1)TMP
```

R1208 DOWNLINK STORAGE. (17D)

```
 1210  REF  1               0332          DNLSTADR EQUALS DNLSTCOD       CONTENTS NO LONGER AN ADDR BUT A CODE

 1211                       0332  0332    DNLSTCOD ERASE                 B(1)PRM ID CODE OF DOWNLIST
 1212                       0333  0333    CTLIST   ERASE
 1213                       0334  0334    DNTMGOTO ERASE                 B(1)
 1214                       0335  0335    TMINDEX  ERASE                 B(1)
12145  REF  1               0335          DNECADR  EQUALS TMINDEX        B(1) ADDRESS OF CURRENT DNLST WORD
 1215  REF  2 LAST  74      0335          DUMPLOC  EQUALS TMINDEX        CONTAINS ECADR OF AGC DP WORD BEING DUMP
A1216                                                                    ED AND COUNT OF COMPLETE DUMPS ALREADY S
A1217                                                                    ENT.
 1218                       0336  0336    SUBLIST  ERASE                 B(1)
 1219                       0337  0352    DNTMBUFF ERASE   +11D          B(12) PRM DOWNLINK SNAPSHOT BUFFER
A1220
```

R1221 OPTICS MARKING . UNSHARED. (8D)

```
 1223                       0353  0353    MKNDX    ERASE
 1224                       0354  0355    MKT2T1   ERASE  +1
 1225                       0356  0356    MKCDUY   ERASE
 1226                       0357  0357    MKCDUS   ERASE
 1227                       0360  0360    MKCDUZ   ERASE
```

```
 1228                    0361    0361    MKCDUT   ERASE
 1229                    0362    0362    MKCDUX   ERASE
A1230

R1231          R52 TIME SAVE STORAGE                                  (2)
 1232                    0363    0364    AOPOLD   ERASE  +1
A1233

R1234          UNSWITCHED FOR DISPLAY INTERFACE ROUTINES.             (7D)

 1236                    0365    0365    RESTREG  ERASE               B(1)PRM FOR DISPLAY RESTARTS
 1237                    0366    0366    NVWORD   ERASE
 1238                    0367    0367    MARKNV   ERASE
 1239                    0370    0370    NVSAVE   ERASE                PURPOSES)
 1242                    0371    0371    CADRFLSH ERASE               B(1)TMP
 1243                    0372    0372    CADRMARK ERASE               B(1)TMP
 1244                    0373    0373    TEMPFLSH ERASE               B(1)TMP
A1245

R12451  CHANNEL FAIL REGISTER                                         (1D)

 12453                   0374    0374    C31FLWRD ERASE               B(1)PRM
```

R124541 C31FLWRD HAS THE FOLLOWING OCTAL FORMAT AXXBX WHERE A + B HAVE THE FOLLOWING INTERPRETATION. IF THE ASTRONAUT
R124543 DESIRES TO BYPASS THE CHANNEL REPRESENTATION, HE SHOULD LOAD C31FLWRD VIA V21 N01 TO THE VALUES SHOWN IN THE
R124545 FOLLOWING TABLES:

	A VALUE	MEANING FOR CHANNEL 31	B VALUE	MEANING FOR CHANNEL 33
R124552	0 OR 4	BITS 15,14, + 13 OF CHANNEL 31 ARE VALID	0 OR 4	BITS 4 + 5 OF CHANNEL 33
R124554	1	G&N CONTROL FREE	1 OR 5	OPTICS MODE CMC
R124556	2	G&N CONTROL ATT. HOLD	2 OR 6	OPTICS MODE ZERO
R124558	3	G&N CONTROL AUTO	3 OR 7	OPTICS MODE MANUAL
R12456	5	SCS CONTROL FREE		
R124562	6	SCS CONTROL ATT. HOLD		
R124564	7	SCS CONTROL AUTO		

```
R12457  ALARM REGISTERS                                                (3D)

 12459                   0375    0377    FAILREG  ERASE  +2           B(3)PRM ALARM ABORT CODES

 1246                    0400                     SETLOC 400
R1247          VAC AREAS. -BE CAREFUL OF PLACEMENT-                    (220D)

 1249                    0400    0400    VAC1USE  ERASE               B(1)PRM
 1250                    0401    0453    VAC1     ERASE  +42D         B(43)PRM
```

1251	0454	0454	VAC2USE	ERASE		B(1)PRM
1252	0455	0527	VAC2	ERASE	+42D	B(43)PRM
1253	0530	0530	VAC3USE	ERASE		B(1)PRM
1254	0531	0603	VAC3	ERASE	+42D	B(43)PRM
1255	0604	0604	VAC4USE	ERASE		B(1)PRM
1256	0605	0657	VAC4	ERASE	+42D	B(43)PRM
1257	0660	0660	VAC5USE	ERASE		B(1)PRM
1258	0661	0733	VAC5	ERASE	+42D	B(43)PRM

R12584 TEMP STORAGE FOR RESTARTS ROUTINE -- STARTS AT VAC5 + 19D

12585 REF 1 0705 GOLOC EQUALS VAC5 +20D B(4) GOLOC -1 THRU GOLOC +2 USED
A12586 TO SET EXEC AND WTLST CALL

R1259 V82, V90 STORAGE (1D)

1260	0734	0734	VEHRET	ERASE	

R12601 P24-RATE AIDED OPTICS (PAD LOAD)***** (3D)

12602	0735	0735	TRATE	ERASE	
12603	0736	0736	SRATE	ERASE	
126032	0737	0737	NO.PASS	ERASE	

R126034 P24-RATE AIDED OPTICS UNSHARED ERASABLES (2D)

126045	0740	0740	TOLD	ERASE	
12605	0741	0741	SOLD	ERASE	

R1261

R1263 SINGLE PRECISION SUBROUTINE TEMPORARIES. (2D)

A1265 SPSIN, SPCOS VARIABLES

A1266 DO NOT SHARE. THESE ARE USED BY DAPS IN INTERRUPT
A1267 AND CURRENTLY ARE NOT PROTECTED. IF OTHER USERS
A1268 MATERIALIZE, THEN THIS CAN BE CHANGED.

1269	0742	0742	TEMK	ERASE	
1270	0743	0743	SQ	ERASE	

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 4 ED S?

```
P1274           UNSWITCHED FOR ORBIT INTEGRATION.                       (21D)

 1276                           0744    0770   TDEC     ERASE  +20D      I(2)
 1277   REF   1                 0746           LAT      EQUALS TDEC  +2  I(2)DSP NOUN 43,67 FOR P20,22,51,R52,53.
 1278   REF   1                 0746           LANDLAT  =      LAT       NOUN 89    FOR P22.
 1279   REF   2  LAST   77      0750           LONG     EQUALS LAT   +2  I(2)DSP NOUN 43,67 FOR P20,22,51 R52,53.
 1280   REF   1                 0752           ALT      EQUALS LONG  +2  I(2)DSP NOUN 43    FOR P20,22,51 R52,53.
 1281   REF   1                 0754           YV       EQUALS ALT   +2  I(6)
 1282   REF   1                 0762           ZV       EQUALS YV    +6  I(6)
 1283   REF   1                 0770           COLREG   EQUALS ZV    +6  I(1)
R1284

R1285           MARK STORAGE.                                           (2)

 1287                           0771    0771   VHFCNT   ERASE            B(1) PRM NO. OF VHF MARKS(P20(R22)).
 1288                           0772    0772   TRKMKCNT ERASE            B(1) PRM NO. OF VHF MARKS (P20(R22))

R1289           P24 STORAGE                                             (1D)

12894  REF   1                 0771           RATETEMP EQUALS VHFCNT    B(1) TMP

R1290           MISCELLANEOUS UNSWITCHED.                               (15D)

 1292                           0773    0773   IRETURN1 ERASE            B(1) RET ADDR USED BY MIDTOAV1 AND 2
A1293                                                                    CALLED BY P40,P41,P42,  P61,P62
 1294                           0774    0774   RATEINDX ERASE             (1)   USED BY KALCMANU
 1295                           0775    0775   OPTION1  ERASE            B(1)  NOUN 06 USES THIS
 1296                           0776    0776   OPTION2  ERASE            B(1)  NOUN 06 USES THIS
12965                           0777    0777   NVWORD1  ERASE            B(1)
 1297                           1000    1003   DELAYLOC ERASE      +3
 1299                           1004    1004   TEMPR60  ERASE            B(1)
 1300                           1005    1005   PRIOTIME ERASE            B(1)
 1302                           1006    1007   TIME2SAV ERASE  +1        B(2)TMP
 1303                           1010    1011   SCALSAVE ERASE  +1        B(2)TMP
R1304           P20, CONICS   (SHARING WITH TIME 2 SAV AND SCAL SAV ONLY) (3D)

 1306   REF   1                 1006           POINTEX  EQUALS TIME2SAV  I(1) POINT AXS EXIT
 1307   REF   1                 1007           VHFTIME  EQUALS POINTEX +1 I(2) DOWNLINK OF VHF RANGE TIME +1M
A1308

R1309           MINKEY RENDEZVOUS                                       (1D)

 1311                           1012    1012   AUTPOINT ERASE            B(1) CONTROLLER RETURN
A1312

A1313
```

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```
R1314           CRS61.1 STORAGE.  -USED IN R63 (VERB 89)-                (3D)

 1316                           1013    1015   CPHIX    ERASE  +2        B(3)DSP NOUN 96 CALCULATED BY CRS61.1
A1317


R131701         NOUN 26 ERASABLES                                        (3D)

 131703                         1016    1016   N26/PRI  ERASE            B(1D)  PRIO/TIME DELAY
 131704                         1017    1020   N26/2CAD ERASE  +1        B(2D)  2CADR OF JOB/TASK


R13175  DOWNLINK TIME OF EVENT

 1318                           1021    1022   TEVENT   ERASE  +1        B(2)     TIME OF EVENT FOR DOWNLIST
 1319   REF   1                 1021           TLIFTOFF =      TEVENT


R1320           P34-P35 STORAGE                                          (1D)

 1322                           1023    1023   NORMEX   ERASE
A1323


R1324           R57 STORAGE.  -MUST BE UNSHARED EXCEPT IN BOOST OR ENTRY-  (1D)

 1326                           1024    1024   TRUNBIAS ERASE            B(1)PRM RESULT OF R57 CALIBR OF TRUNION
A1327


R1328           KEPLER  STORAGE                                          (2D)

 1330                           1025    1026   EPSILONT ERASE      +1    I(2) TMP
A1331


R1332           PERM STATE VECTORS FOR BOOST AND DOWNLINK -WHOLE MISSION-  (14D)

 1334                           1027    1034   RN       ERASE  +5        B(6)PRM
 1335                           1035    1042   VN       ERASE  +5        B(6)PRM
 1336                           1043    1044   PIPTIME  ERASE  +1        B(2)PRM (MUST BE FOLLOWED BY GDT/2)


R1337           SERVICER STORAGE.                                        (45D)

R1339           (SERVICER STORAGE AND P11 STORAGE IN UNSWITHCHED SHOULD NOT
R1340           OVERLAY EACH OTHER AND THE TOTAL ERASABLE REQUIRED SHOULD NOT
R1341           EXCEED THE ERASABLE STORAGE REQUIRED BY RENDEZVOUS GUIDANCE)

 1342   REF   1                 1045           GDT/2    EQUALS PIPTIME  +2  B(6)TMP (MUST FOLLOW PIPTIME)
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 42 EQ S?

```
 1343   REF   1                  1053          GOBL/2    EQUALS GDT/2     +6     B(6)TMP
 1344   REF   1                  1061          AVEGEXIT  EQUALS GOBL/2    +6     B(2)TMP
 1345   REF   1                  1061          AVGEXIT   =      AVEGEXIT
 1346   REF   2  LAST   79       1063          TEMX      EQUALS AVEGEXIT  +2     B(1)TMP
 1347   REF   1                  1064          TEMY      EQUALS TEMX      +1     B(1)TMP
 1348   REF   1                  1065          TEMZ      EQUALS TEMY      +1     B(1)TMP
 1349   REF   1                  1066          PIPCTR    EQUALS TEMZ      +1     B(1)TMP
 1350   REF   1                  1067          PIPAGE    EQUALS PIPCTR    +1     B(1)TMP

 1351   REF   1                  1070          RN1       EQUALS PIPAGE    +1     B(6)TMP
 1352   REF   1                  1076          VN1       EQUALS RN1       +6     B(6)TMP
 1353   REF   1                  1104          PIPTIME1  EQUALS VN1       +6     B(2)TMP
 1354   REF   1                  1106          GDT1/2    EQUALS PIPTIME1  +2     B(6)TMP
 1355   REF   1                  1114          GOBL1/2   EQUALS GDT1/2    +6     B(6)TMP
A1356
```

```
R1357          ENTRY STORAGE.                                                    (1D)

 1359   REF   1                  1122          ENTRYVN   EQUALS GOBL1/2   +6     B(1)TMP VN CODE FOR ENTRY DISPLAYS P60S.
A1360
```

```
R1361          RENDEZVOUS NAVIGATION STORAGE.(SEE COMMENT IN SERVICER STORAGE)(56D)

 1363                              1045    1134  CSMPOS    ERASE  +55D             I(6)TMP
 1364   REF   1                  1053          LEMPOS    EQUALS CSMPOS    +6     I(6)TMP
 1366   REF   1                  1061          MARKTIME  EQUALS LEMPOS    +6     B(2) TEMP MUST PRECEDE VTEMP FOR GENTRAN
 1367   REF   1                  1063          VTEMP     EQUALS MARKTIME  +2     B(6)TMP
 1368   REF   1                  1071          UM        EQUALS VTEMP     +6     I(6)TMP
 1369   REF   1                  1077          MARKDATA  EQUALS UM        +6     B(2)TMP
 1370   REF   1                  1101          USTAR     EQUALS MARKDATA  +2     I(6)TMP
 1371   REF   1                  1107          WIXA      EQUALS USTAR     +6     B(1)TMP
 1372   REF   1                  1110          WIXB      EQUALS WIXA      +1     B(1)TMP
 1373   REF   1                  1111          ZIXA      EQUALS WIXB      +1     B(1)TMP
 1374   REF   1                  1112          ZIXB      EQUALS ZIXA      +1     B(1)TMP
 1375   REF   1                  1113          DELTAX    EQUALS ZIXB      +1     I(18)TMP

 1376   REF   1                  1113          VHFRANGE  EQUALS DELTAX            (2)
 1377   REF   2  LAST   79       1127          UCL       EQUALS DELTAX    +12D    (6)     LM-CSM LINE OF SIGHT 1/2 UNIT V
```

```
R137701        P22 TEMPORARIES

 13771  REF   2  LAST   79       1053          S22UOFF   EQUALS LEMPOS            I(6)TMP  UM OFFSET
 137715 REF   3  LAST   79       1053          9DWXX     EQUALS LEMPOS            I(1)TMP QSAVE REGISTER
 13772  REF   3  LAST   79       1113          S22UUT    EQUALS DELTAX            I(18)
```

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R13773 MINKEY RENDEZVOUS *** (1D)

137731 REF 4 LAST 79 1113 TEMPMM EQUALS DELTAX B(1) MAJOR MODE DURING P20 STARTUP

R13774 USED FOR SUMMATION OF UPRUPT DURING PRELAUNCH & SYS TEST LEADIN(3D)

13775 REF 1 1116 UPSUM EQUALS EBUF2 +2 (3)

R13776 PRELAUNCH ERASEABLE PROGRAM ENTRANCE (2D)

13777 REF 2 LAST 79 1114 EBUF2 EQUALS GOBL1/2 (2)

R13778 FOR STALL ROUTINE FOR VHF RADAR

137782 REF 2 LAST 79 1063 RADTIME EQUALS VTEMP B(1)
137784 REF 1 1064 RADDEL EQUALS RADTIME +1 B(1)

R1378 P11 STORAGE. (9D)

1380 REF 1 1126 LIFTTEMP EQUALS UCL -1 (2)TMP
1381 REF 1 1130 TEPHEM1 EQUALS LIFTTEMP +2 (3)TMP
1382 REF 1 1133 PGNCSALT EQUALS TEPHEM1 +3 (2)PL ALTITUDE
1383 REF 1 1135 PADLONG EQUALS PGNCSALT +2 (2)PL LONGITUDE F LAUNCH PAD

R1384 **** CONICSEX (MEAS INC) **** (6D)

1385 REF 5 LAST 80 1113 TRIPA EQUALS DELTAX
1386 REF 6 LAST 80 1116 TEMPVAR EQUALS DELTAX +3
A1387

R13871 P24 RATE AIDED OPTICS

13872 REF 2 LAST 80 1131 PASSCNT EQUALS TEPHEM1 +1 B(1)

R13873 P20-P22 PROCESSING STORAGE (2D)

1388 1135 1136 TEMPOR1 ERASE +1 B(2)TMP

R1389 WAITLIST REPEAT FLAG. (1D)

1391 1137 1137 RUPTAGN ERASE B(1)PRM

```
1392  REF  1                  1137          KEYTEMP2 =      RUPTAGN


R1393                STARALIGN ERASABLES.                                (13D)

1395                                 1140  1140  STARCODE ERASE                 B(1)DSP NOUN 70 FOR P22,51 AND R52,53.
1396                                 1141  1154  STARALGN ERASE  +11D
1397  REF  1                         1141        SINCDU   =      STARALGN
1398  REF  2  LAST  81               1147        COSCDU   =      STARALGN +6

1399  REF  1                         1145        SINCDUX  =      SINCDU   +4
1400  REF  2  LAST  81               1141        SINCDUY  =      SINCDU
1401  REF  3  LAST  81               1143        SINCDUZ  =      SINCDU   +2
1402  REF  1                         1153        COSCDUX  =      COSCDU   +4
1403  REF  2  LAST  81               1147        COSCDUY  =      COSCDU
1404  REF  3  LAST  81               1151        COSCDUZ  =      COSCDU   +2


R1405                PHASE TABLE AND RESTART COUNTERS.                   (12D)

1407                                 1155  1155  -PHASE1  ERASE                 B(1)PRM
1408                                 1156  1156  PHASE1   ERASE                 B(1)PRM
1409                                 1157  1157  -PHASE2  ERASE                 B(1)PRM
1410                                 1160  1160  PHASE2   ERASE                 B(1)PRM
1411                                 1161  1161  -PHASE3  ERASE                 B(1)PRM
1412                                 1162  1162  PHASE3   ERASE                 B(1)PRM
1413                                 1163  1163  -PHASE4  ERASE                 B(1)PRM
1414                                 1164  1164  PHASE4   ERASE                 B(1)PRM
1415                                 1165  1165  -PHASE5  ERASE                 B(1)PRM
1416                                 1166  1166  PHASE5   ERASE                 B(1)PRM
1417                                 1167  1167  -PHASE6  ERASE                 B(1)PRM
1418                                 1170  1170  PHASE6   ERASE                 B(1)PRM


R1419                AX*SR*T STORAGE.                                    (6D)

1421                                 1171  1176  CDUSPOT  ERASE  +5             B(6)

1422  REF  1                         1171        CDUSPOTY =      CDUSPOT
1423  REF  2  LAST  81               1173        CDUSPOTZ =      CDUSPOT +2
1424  REF  3  LAST  81               1175        CDUSPOTX =      CDUSPOT +4


R1425                VERB 37 STORAGE.                                    (2D)

1427                                 1177  1177  MINDEX   ERASE                 B(1)TMP  INDEX FOR MAJOR MODE
1428                                 1200  1200  MMNUMBER ERASE                 B(1)TMP  MAJOR MODE REQUESTED VIA V37


R1429                PINBALL INTERRUPT STORAGE.                          (1D)
```

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```
 1431                       1201    1201   DSPCNT   ERASE                 B(1)PRM DSPOUT COUNTER

R1432          PINBALL EXECUTIVE ACTION.                                  (44D)

 1434                       1202    1202   DSPCOUNT ERASE                 DISPLAY POSITION INDICATOR
 1435                       1203    1203   DECBRNCH ERASE                 +DEC, - DEC, OCT INDICATOR
 1436                       1204    1204   VERBREG  ERASE                 VERB CODE
 1437                       1205    1205   NOUNREG  ERASE                 NOUN CODE
 1438                       1206    1206   XREG     ERASE                 R1 INPUT BUFFER
 1439                       1207    1207   YREG     ERASE                 R2 INPUT BUFFER
 1440                       1210    1210   ZREG     ERASE                 R3 INPUT BUFFER
 1441                       1211    1211   XREGLP   ERASE                 LO PART OF XREG (FOR DEC CONV ONLY)
 1442                       1212    1212   YREGLP   ERASE                 LO PART OF YREG (FOR DEC CONV ONLY)
 1443  REF   1              1212           HITEMOUT =       YREGLP        TEMP FOR DISPLAY OF HRS, MIN, SEC
A1444                                                                     MUST = LOTEMOUT-1.
 1445                       1213    1213   ZREGLP   ERASE                 LO PART OF ZREG (FOR DEC CONV ONLY)
 1446  REF   1              1213           LOTEMOUT =       ZREGLP        TEMP FOR DISPLAY OF HRS, MIN, SEC
A1447                                                                     MUST = HITEMOUT+1.
 1448                       1214    1214   MODREG   ERASE                 MODE CODE
 1449                       1215    1215   DSPLOCK  ERASE                 KEYBOARD/SUBROUTINE CALL INTERLOCK
 1450                       1216    1216   REQRET   ERASE                 RETURN REGISTER FOR LOAD
 1451                       1217    1217   LOADSTAT ERASE                 STATUS INDICATOR FOR LOADTST
 1452                       1220    1220   CLPASS   ERASE                 PASS INDICATOR CLEAR
 1453                       1221    1221   NOUT     ERASE                 ACTIVITY COUNTER FOR DSPTAB
 1454                       1222    1222   NOUNCADR ERASE                 MACHINE CADR FOR NOUN
 1455                       1223    1223   MONSAVE  ERASE                 N/V CODE FOR MONITOR. (= MONSAVE1-1)
 1456                       1224    1224   MONSAVE1 ERASE                 NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
 1457                       1225    1225   MONSAVE2 ERASE                 B(1)PRM NVMONOPT OPTIONS
 1458                       1226    1241   DSPTAB   ERASE  +11D          0-10D, DISPLAY PANEL BUFF. 11D, C/S LTS.
 1459                       1242    1242   NVQTEM   ERASE                 NVSUB STORAGE FOR CALLING ADDRESS
A1460                                                                     MUST = NVBNKTEM-1
 1461                       1243    1243   NVBNKTEM ERASE                 NVSUB STORAGE FOR CALLING BANK
A1462                                                                     MUST = NVQTEM+1
 1463                       1244    1244   VERBSAVE ERASE                 NEEDED FOR RECYCLE
 1464                       1245    1245   CADRSTOR ERASE                 ENDIDLE STORAGE
 1465                       1246    1246   DSPLIST  ERASE                 WAITING REG FOR DSP SYST INTERNAL USE
 1466                       1247    1247   EXTVBACT ERASE                 EXTENDED VERB ACTIVITY INTERLOCK
 1467                       1250    1252   DSPTEM1  ERASE        +2       BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
 1468                       1253    1255   DSPTEM2  ERASE        +2       BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)

 1469  REF   1              1254           DSPTEMX  EQUALS DSPTEM2  +1    B(2) S-S DISPLAY BUFFER FOR EXT. VERBS.
 1470  REF   1              1250           NORMTEM1 EQUALS DSPTEM1        B(3)DSP NORMAL DISPLAY REGISTERS.
A1471

R1472          DISPLAY FOR EXTENDED VERBS                                 (2D)

 1474  REF   1              1255           OPTIONX  EQUALS DSPTEMX +1     B(2) EXT VB OPTION CODE
```

L ERASABLE ASSIGNMENTS EQ S?

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 1475                    1256    1256   OPTIONEV ERASE

A1476

R1477          TBASE S AND PHSPRDT S.                                  (12D)

 1479                    1257    1257   TBASE1   ERASE                 B(1)PRM
 1480                    1260    1260   PHSPRDT1 ERASE                 B(1)PRM
 1481                    1261    1261   TBASE2   ERASE                 B(1)PRM
 1482                    1262    1262   PHSPRDT2 ERASE                 B(1)PRM
 1483                    1263    1263   TBASE3   ERASE                 B(1)PRM
 1484                    1264    1264   PHSPRDT3 ERASE                 B(1)PRM
 1485                    1265    1265   TBASE4   ERASE                 B(1)PRM
 1486                    1266    1266   PHSPRDT4 ERASE                 B(1)PRM
 1487                    1267    1267   TBASE5   ERASE                 B(1)PRM
 1488                    1270    1270   PHSPRDT5 ERASE                 B(1)PRM
 1489                    1271    1271   TBASE6   ERASE                 B(1)PRM
 1490                    1272    1272   PHSPRDT6 ERASE                 B(1)PRM


R14901  V37 TEMP STORAGE                                               (2D)

 14903  REF   1         1264           MMTEMP   EQUALS PHSPRDT3        B(1)TMP
 14904  REF   1         1265           BASETEMP EQUALS TBASE4          B(1)TMP

 R1491          MORE UNSWITCHED FOR DISPLAY INF                         (4D)

 1493                    1273    1273   EBANKSAV ERASE
 14935  REF   1         1273           DSPFLG   =       EBANKSAV
 1494                    1274    1274   MARKFLAG ERASE
 1495                    1275    1275   EBANKTEM ERASE
 1496                    1276    1276   MARK2PAC ERASE

R1497   MISCELLANEOUS UNSWITCHED                                        (19D)
 1499                    1277    1277   1/PIPADT ERASE                 B(1)PRM
 1500   REF   1         1277           OLDBT1   =       1/PIPADT

 1501                    1300    1301   LONGCADR ERASE  +1             B(2)   LONGCALL REGISTER
 1502                    1302    1303   LONGBASE ERASE  +1             B(2)   LONGCALL REGISTER
 1503                    1304    1305   LONGTIME ERASE  +1             B(2)   LONGCALL REGISTER
A1504

R1505          MISC. INCLUDING RESTART COUNTER, GIMBAL ANGLE SAVE AND
R1506          STANDBY VERB ERASABLES. REDOCTR BEFORE THETAD (DWNLNK)

 1508                    1306    1306   REDOCTR  ERASE                 B(1)PRM CONTAINS NUMBER OF RESTARTS.
 1509                    1307    1311   THETAD   ERASE  +2             B(3)PRM DESIRED GIM ANGLES FOR MANEUVER.
 1510   REF   1         1307           CPHI     =       THETAD                 (OUTER)
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 47 EQ S?

```
 1511  REF  2  LAST  83    1310          CTHETA   =     THETAD   +1          (INNER)
 1512  REF  3  LAST  84    1311          CPSI     =     THETAD   +2          (MIDDLE)

R1513          ENTRY VARIABLES SHARED FOR TM.                               (4D)

 1514  REF  4  LAST  84    1307          RDOTREF  =     THETAD               I(2)    P65
 1515  REF  1               1311          VREF     =     RDOTREF  +2          I(2)    P65   HI-ORDER WORD ONLY DNLNK'D
 1516                       1312  1312    DESOPTT  ERASE                     B(1)DSP NOUN 92 FOR P20,22,52, R52.
 1518                       1313  1313    DESOPTS  ERASE                     B(1)DSP NOUN 92 FOR P20,22,52, R52.

 1519                       1314  1321    DELV     ERASE  +5                 I(6)
 1520  REF  1               1314          DELVX    =      DELV
 1521  REF  2  LAST  84     1316          DELVY    =      DELV     +2
 1522  REF  3  LAST  84     1320          DELVZ    =      DELV     +4

R1523          T4RUPT ERASABLE.                                             (6D)

 1525                       1322  1322    DSRUPTSW ERASE
 1526                       1323  1323    OPTIND   ERASE
 1527                       1324  1324    LGYRO    ERASE
 1528                       1325  1326    COMMANDO ERASE  +1
 1529                       1327  1327    ZONE     ERASE                     B(1)PRM USED IN SHAFT STOP MONITOR
R1530

R1532          MODE SWITCHING ERASABLE.                                     (09D)

 1535                       1330  1330    DESOPMOD ERASE                     B(1)PRM
 1536                       1331  1331    WTOPTION ERASE                     B(1)PRM
 1537                       1332  1332    ZOPTCNT  ERASE                     B(1)PRM
A15375

 1538                       1333  1333    IMODES30 ERASE                     B(1)PRM
 153805 REF  12  LAST  67    4752          TLIMBIT  =     BIT15    IMU TEMP NOT WITHIN LIMITS    IMU TEMP WITHIN LIMITS
A153806

 15381  REF  13  LAST  67    4753          TONISSBT =     BIT14    ISS OFF                       ISS ON

 153815 REF  14  LAST  67    4754          IMUFLBIT =     BIT13    IMU OK                        IMU FAIL IS ON

 15382  REF  13  LAST  67    4755          ICDUFLBT =     BIT12    IMU CDU OK                    IMU CDU FAIL IS ON

 153825 REF  12  LAST  66    4756          CAGEBIT  =     BIT11    IMU CAGE NOT ON               IMU CAGE ON

 15383  REF  12  LAST  66    4757          PIPAFLBT =     BIT10    PIPA OK                       PIPA FAIL IS ON

 153835 REF  12  LAST  66    4760          IMUOPBIT =     BIT9     IMU OFF OR NOT OK             IMU ON AND OK

 15384  REF  14  LAST  67    4761          ITNON2BT =     BIT8     IMU TURN ON DELAYED           IMU TURN ON ALLOWED
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 48 ED S?

```
 153845 REF  13 LAST   67     4762          ITNON1BT =      BIT7     IMU TURN ON DELAYED IMU TURN ON ALLOWED
  15385 REF  12 LAST   67     4763          IMUNITBT =      BIT6     IMU INIT IN PROCESS IMU NOT BEING INIT.
 153855 REF  11 LAST   66     4764          NOACCALM =      BIT5     INHIBIT PIPA ALARM  ALLOW PIPA ALARM
  15386 REF  11 LAST   66     4765          IMUFINHT =      BIT4     INHIBIT IMU WARNING ALLOW IMU WARNING
 153865 REF  12 LAST   66     4766          ICDUINHT =      BIT3     INHIBIT CDU WARNING ALLOW CDU WARNING
  15387 REF  12 LAST   66     4767          DLAYFAIL =      BIT2     TURNON DELAY FAIL   TURN DELAY OK
 153875 REF  12 LAST   67     4770          ACCFINHT =      BIT1     INHIBIT PIPA        ALLOW PIPA WARNING
A153876                                                              WARNING

  1539                       1334    1334  IMODES33 ERASE           B(1)PRM
  15391 REF  14 LAST   84     4753          PROCDBIT =      BIT14    PROCEED OFF         PROCEED ON

 153915 REF  15 LAST   84     4754          PIP2FLBT =      BIT13    PIPA OK             PIPA FAIL IS ON
  15392 REF  14 LAST   84     4755          DNLKFAIL =      BIT12    DOWNLINK OK         DOWNLINK FAIL
 153925 REF  13 LAST   84     4756          UPLKFAIL =      BIT11    UPLINK OK           UPLINK TOO FAST

  15395 REF  13 LAST   85     4763          NOIMUDAP =      BIT6     DONT USE IMU FOR    OK TO USE IMU FOR
A153951                                                              VEHICLE ATTITUDE    VEHICLE ATTITUDE

 153955 REF  12 LAST   85     4764          IMUZROBT =      BIT5     IMU ZEROING         IMU NOT ZEROING

 153975 REF  13 LAST   85     4770          LMPTSTBT =      BIT1     LAMP TEST REQUESTED LAMP TEST NOT ON

A15399
  1540                       1335    1336  MODECADR ERASE  +1       B(2)TMP
  1541   REF  1                1335          IMUCADR  =      MODECADR
  1542   REF  2  LAST   85     1336          OPTCADR  =      MODECADR +1
A15425

  1543                       1337    1337  OPTMODES ERASE           B(1)PRM *****MUST PRECEDE HOLDFLAG
A154301                                                                        FOR DOWNLINK
  15433 REF  13 LAST   84     4757          ZROPTFIN =      BIT10    OPTICS ZERO FINISH  OPTICS BEING ZEROED

 154345 REF  14 LAST   85     4762          OCDUFBIT =      BIT7     OPTICS CDU OK       OPTICS CDU FAIL

 154355 REF  13 LAST   85     4764          OPMD1BIT =      BIT5     OPTICS MODE NOT SET OPTICS MODE SET TO
A154356                                                              TO COMPUTER CONTROL  COMPUTER CONTROL

  15436 REF  12 LAST   85     4765          OPMD2BIT =      BIT4     OPTICS MODE NOT SET OPTICS MODE SET TO
A154361                                                              TO ZERO OPTICS      ZERO OPTICS

 154365 REF  13 LAST   85     4766          ZOPTCS   =      BIT3     OPTICS MODE         OPTICS MODE NOT
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 49 EQ S?

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A154366                                                  SWITCHED TO ZERO    SWITCHED TO ZERO
A154367                                                  OPTICS              OPTICS

 15437  REF  13  LAST   85      4767          OCDUINHT =      BIT2           INHIBIT TRACKER     ALLOW TRACKER ALARM
A154371                                                                      ALARM

 15439                          1340    1340  HOLDFLAG ERASE               B(1)PRM  **** MUST FOLLOW OPTMODES
A154391                                                                                  FOR DOWNLINK
A1544

R1545           ERASABLE FOR SXTMARK CDU CHECK DELAY.  -PAD LOADED-          (1D)

 1547                          1341    1341  CDUCHKWD ERASE               B(1) PL

R1548           P37    **RETURN TO EARTH  (PAD LOAD) ****                    (2D)

 1550                          1342    1343  RTED1    ERASE        +1      I(2)PL VGAMMA POLY COEF                    B-3

R1551           P40    ***STEERING ROUTINE*** PAD LOAD                       (1D)

 1553                          1344    1344  DVTHRESH ERASE               I(1)PL  DELTA V THRESHOLD FOR LOW THRUST
A1554                                                                                ROUTINE                        B-2

R1555           P23    ***PAD LOAD****                                       (2D)

 1557                          1345    1346  HORIZALT ERASE        +1      I(2)PL  HORIZION ALTITUDE          M  B-29

R1558           P-20        ALTERNATE LOS VARIANCE     PAD LOAD*****         (1D)

A1560                                                                                                      -16
 1561                          1347    1347  ALTVAR   ERASE               I(2)PL MILLARD. SQUARED SCALED 2

R1562           PAD LAOAD FOR DAP                                             (1D)

 1564                          1350    1350  EMDOT    ERASE               I(1)PL  SPS FLOW RATE   KG/CS B+3

R15641          UNIVERSAL TRACKING STORAGE                                    (3D)

 15643                         1351    1351  OPTNTYPE ERASE               B(1)
 15644                         1352    1353  AZIMANGL ERASE        +1     B(2)
R15649
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L ERASABLE ASSIGNMENTS USER'S PAGE NO. 50 ED 5?

```
R156491          MODE SW. ERASABLE                    (1D)

 156492                          1354    1354   SWSAMPLE ERASE                    B(1)PRM


R156493          UT PERMANENT STORAGE                                              (2D)

 156495                          1355    1356   R67TIME  ERASE  +1                B(2)
 156496 REF   1                  1355           UTSTARNO EQUALS R67TIME           B(1)


R156497          MINKEY CONTROLLER TEMP RESTART STORAGE                            (1D)

 156499 REF   2 LAST   87        1356           AUTTEMP  EQUALS R67TIME  +1       B(1)


R1565            SELF-CHECK ASSIGNMENTS.                                           (17D)

R1567                                  (DO NOT MOVE, S-C IS ADDRESS SENSITIVE)

 1568                            1357    1377   SELFERAS ERASE  1357 - 1377       ***MUST NOT BE MOVED***
 1569    REF   1                 1357           SFAIL    EQUALS SELFERAS          B(1)
 1570    REF   1                 1360           ERESTORE EQUALS SFAIL     +1     B(1)
 1571    REF   1                 1361           SELFRET  EQUALS ERESTORE  +1     B(1)     RETURN
 1572    REF   1                 1362           SMODE    EQUALS SELFRET   +1     B(1)
 1573    REF   1                 1363           ALMCADR  EQUALS SMODE     +1     B(2)     ALARM-ABORT USER'S 2CADR
 1574    REF   1                 1365           ERCOUNT  EQUALS ALMCADR   +2     B(1)
 1575    REF   1                 1366           SCOUNT   EQUALS ERCOUNT   +1     B(3)
 1576    REF   1                 1371           SKEEP1   EQUALS SCOUNT    +3     B(1)
 1577    REF   1                 1372           SKEEP2   EQUALS SKEEP1    +1     B(1)
 1578    REF   1                 1373           SKEEP3   EQUALS SKEEP2    +1     B(1)
 1579    REF   1                 1374           SKEEP4   EQUALS SKEEP3    +1     B(1)
 1580    REF   1                 1375           SKEEP5   EQUALS SKEEP4    +1     B(1)
 1581    REF   1                 1376           SKEEP6   EQUALS SKEEP5    +1     B(1)
 1582    REF   1                 1377           SKEEP7   EQUALS SKEEP6    +1     B(1)

A1583
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L ERASABLE ASSIGNMENTS USER'S PAGE NO. 51 E0 S?

```
P3000                   EBANK=3 ASSIGNMENTS
 3001                       E3,1400                  SETLOC 1400
R3002           WAITLIST TASK LISTS.                                    (26D)
 3004                       E3,1400  E3,1407  LST1     ERASE  +7       B(8D)PRM  DELTA T S.
 3005                       E3,1410  E3,1431  LST2     ERASE  +17D     B(18D)PRM TASK 2CADR ADDRESSES.

R3006           RESTART STORAGE.                                        (2D)
 3008                       E3,1432  E3,1433  RSBBQ    ERASE  +1       B(2)PRM SAVE BB AND Q FOR RESTARTS.

R3009           MORE LONGCALL STORAGE. (MUST BE IN LST1 S BANK).        (2D)
 3011                       E3,1434  E3,1435  LONGEXIT ERASE  +1       B(2)TMP MAY BE SELDOM OVERLAYED.

R3012           PHASE-CHANGE LISTS PART II.                             (12D)
 3014                       E3,1436  E3,1436  PHSNAME1 ERASE           B(1)PRM
 3015                       E3,1437  E3,1437  PHSBB1   ERASE           B(1)PRM
 3016                       E3,1440  E3,1440  PHSNAME2 ERASE           B(1)PRM
 3017                       E3,1441  E3,1441  PHSBB2   ERASE           B(1)PRM
 3018                       E3,1442  E3,1442  PHSNAME3 ERASE           B(1)PRM
 3019                       E3,1443  E3,1443  PHSBB3   ERASE           B(1)PRM
 3020                       E3,1444  E3,1444  PHSNAME4 ERASE           B(1)PRM
 3021                       E3,1445  E3,1445  PHSBB4   ERASE           B(1)PRM
 3022                       E3,1446  E3,1446  PHSNAME5 ERASE           B(1)PRM
 3023                       E3,1447  E3,1447  PHSBB5   ERASE           B(1)PRM
 3024                       E3,1450  E3,1450  PHSNAME6 ERASE           B(1)PRM
 3025                       E3,1451  E3,1451  PHSBB6   ERASE           B(1)PRM

R3026           IMU COMPENSATION PARAMETERS.                            (22D)
 3028                       E3,1452  E3,1452  PBIASX   ERASE           B(1)  PIPA BIAS, PIPA SCALE FACTR TERMS
 3029  REF  1               E3,1452           PIPABIAS =      PBIASX        INTERMIXED.
 3030                       E3,1453  E3,1453  PIPASCFX ERASE
 3031  REF  1               E3,1453           PIPASCF  =      PIPASCFX
 3032                       E3,1454  E3,1454  PBIASY   ERASE
 3033                       E3,1455  E3,1455  PIPASCFY ERASE
 3034                       E3,1456  E3,1456  PBIASZ   ERASE
 3035                       E3,1457  E3,1457  PIPASCFZ ERASE
 3036                       E3,1460  E3,1460  NBDX     ERASE           GYRO BIAS DRIFTS
 3038                       E3,1461  E3,1461  NBDY     ERASE
 3039                       E3,1462  E3,1462  NBDZ     ERASE
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 52 ED 5?

```
3040                        E3,1463  E3,1463   ADIAX     ERASE                ACCELERATION SENSITIVE DRIFT ALONG THE
3041                        E3,1464  E3,1464   ADIAY     ERASE                    INPUT AXIS
3042                        E3,1465  E3,1465   ADIAZ     ERASE

3043                        E3,1466  E3,1466   ADSRAX    ERASE                ACCELERATION SENSITIVE DRIFT ALONG THE
3044                        E3,1467  E3,1467   ADSRAY    ERASE                    SPIN REFERENCE AXIS
3045                        E3,1470  E3,1470   ADSRAZ    ERASE

3046                        E3,1471  E3,1476   GCOMP     ERASE  +5             CONTAINS COMPENSATING TORQUES

3047                        E3,1477  E3,1477   GCOMPSW   ERASE
3048  REF   1               E3,1471            COMMAND   EQUALS GCOMP
3049  REF   2  LAST   89    E3,1474            CDUIND    EQUALS GCOMP   +3


R3050          STATE VECTORS FOR ORBIT INTEGRATION.                          (44D)

R3052                              (DIFEQCNT THRU XKEP MUST BE IN SAME
R3053                                EBANK AS RRECTCSM, RRECTLEM ETC
R3054                                BECAUSE THE COPY-CYCLES (ATOPCSM,
R3055                                PTOACSM ETC) ARE EXECUTED IN BASIC.
R3056                                  ALL OTHER REFERENCES TO THIS GROUP
R3057                                ARE BY INTERPRETIVE INSTRUCTIONS.)

3058                        E3,1500  E3,1553   DIFEQCNT ERASE  +43D            B(1)TMP
R3059                                (UPSVFLAG...XKEP MUST BE KEPT IN ORDER)

3060  REF   1               E3,1501            UPSVFLAG  EQUALS DIFEQCNT +1    B(1)PRM UPDATE FLAG
3061  REF   2  LAST   36    E3,1502            RRECT     EQUALS UPSVFLAG +1    B(6)TMP POS AT RECT          KM*2(-14)
3062  REF   1               E3,1510            VRECT     EQUALS RRECT    +6    B(6)TMP VEL AT RECT       KM(-1/2)*2(6)
3063  REF   1               E3,1516            TET       EQUALS VRECT    +6    B(2)TMP TIME OF STATE VECT  CSECS*2(-28)
3064  REF   1               E3,1520            TDELTAV   EQUALS TET      +2    B(6)TMP POSITION DEVIATION   KM*2(14)
3065  REF   1               E3,1526            TNUV      EQUALS TDELTAV  +6    B(6)TMP VEL DEVIATION     KM(-1/2)*2(14)
3066  REF   1               E3,1534            RCV       EQUALS TNUV     +6    B(6)TMP CONIC POSITION       KM*2(-14)
3068  REF   1               E3,1542            VCV       EQUALS RCV      +6    B(6)TMP CONIC VELOCITY    KM(-1/2)*2(6)
3070  REF   1               E3,1550            TC        EQUALS VCV      +6    B(2)TMP TIME SINCE RECTIFICATION
3071  REF   1               E3,1552            XKEP      EQUALS TC       +2    B(2)TMP ROOT OF KEPLER EQ KM(1/2.*2(-10)

30715 REF   1               E3,1552            XPREV     =      XKEP           I(2)TMP
R3072          **** TEMP - IN VAC AREA ****
3073                           0022            RRECT1    EQUALS 18D
3074                           0030            VRECT1    EQUALS 24D
3075                           0036            TET1      EQUALS 30D
A3076

R3077          PERMANENT STATE VECTORS AND TIMES.                            (99D)

R3079          (DO NOT OVERLAY WITH ANYTHING AFTER BOOST)
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 53 EQ S?

```
R3080           (RRECTCSM ...XKEPCSM MUST BE KEPT IN THIS ORDER)

 3081                       E3,1554  E3,1561  RRECTCSM ERASE  +5          B(6)PRM CSM VARIABLES.
 3082  REF   1              E3,1554           RRECTHIS =      RRECTCSM
 3083                       E3,1562  E3,1567  VRECTCSM ERASE  +5          B(6)PRM
 3084                       E3,1570  E3,1571  TETCSM   ERASE  +1          B(2)PRM
 3085  REF   1              E3,1570           TETTHIS  =      TETCSM
 3086                       E3,1572  E3,1577  DELTACSM ERASE  +5          B(6)PRM
 3087                       E3,1600  E3,1605  NUVCSM   ERASE  +5          B(6)PRM
 3088                       E3,1606  E3,1613  RCVCSM   ERASE  +5          B(6)PRM
 3089                       E3,1614  E3,1621  VCVCSM   ERASE  +5          B(6)PRM
 3090                       E3,1622  E3,1623  TCCSM    ERASE  +1          B(2)PRM
 3091                       E3,1624  E3,1625  XKEPCSM  ERASE  +1          B(2)PRM

R3092           (RRECTLEM ...XKEPLEM MUST BE KEPT IN THIS ORDER)

 3093                       E3,1626  E3,1633  RRECTLEM ERASE  +5          B(6)PRM LEM VARIABLES
 3094  REF   1              E3,1626           RRECTOTH =      RRECTLEM
 3095                       E3,1634  E3,1641  VRECTLEM ERASE  +5          B(6)PRM
 3096                       E3,1642  E3,1643  TETLEM   ERASE  +1          B(2)PRM
 3097  REF   1              E3,1642           TETOTHER =      TETLEM
 3098                       E3,1644  E3,1651  DELTALEM ERASE  +5          B(6)PRM
 3099                       E3,1652  E3,1657  NUVLEM   ERASE  +5          B(6)PRM
 3100                       E3,1660  E3,1665  RCVLEM   ERASE  +5          B(6)PRM
 3101                       E3,1666  E3,1673  VCVLEM   ERASE  +5          B(6)PRM
 3102                       E3,1674  E3,1675  TCLEM    ERASE  +1          B(2)PRM
 3103                       E3,1676  E3,1677  XKEPLEM  ERASE  +1          B(2)PRM

 3104                       E3,1700  E3,1705  X789     ERASE  +5
 3105                       E3,1706  E3,1710  TEPHEM   ERASE       +2
 3107                       E3,1711  E3,1716  UNITW    ERASE       +5
 3108  REF   1              E3,1711           -AYO     EQUALS UNITW      (2)
 3109  REF   2  LAST  90    E3,1713           AXO      EQUALS UNITW +2   (2)
A3109 5

R3110           STATE VECTORS FOR DOWNLINK.                              (12D)

 3112                       E3,1717  E3,1724  R-OTHER  ERASE  +5          B(6)PRM POS VECT (OTHER VECH) FOR DNLINK
 3113                       E3,1725  E3,1732  V-OTHER  ERASE  +5          B(6)PRM VEL VECT (OTHER VECH) FOR DNLINK

 3114  REF   2  LAST  90    E3,1642           T-OTHER  =      TETLEM                TIME (OTHER VECH) FOR DNLINK

R3115           REFSMMAT.                                                (18D)

 3117                       E3,1733  E3,1754  REFSMMAT ERASE  +17D         I(18D)PRM

R3118           AVERAGEG INTEGRATOR STORAGE.                             (6D)
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 54 E0 S?

```
 3120                    E3,1755  E3,1762   UNITR    ERASE  +5
A3121

R31211          TEMP STORAGE FOR N90 DISPLAY IN RENDEZVOUS TARGETING PROGRAMS  (6D)
 31213  REF  1          E3,1755            YCSM     EQUALS UNITR
 31214  REF  1          E3,1757            YDOTC    EQUALS YCSM     +2
 31215  REF  1          E3,1761            YDOTL    EQUALS YDOTC    +2

R3122           P40 PAD LOADS                                          (3D)

 3124                    E3,1763  E3,1763   EIMP1SEC ERASE                 I(1)PL E-2 B-14 NEWT-SEC BR-PT AT 1 SEC
 31241                   E3,1764  E3,1764   EFIMP01  ERASE                 I(1)PL E-2 B-14 NEWT SLOPE 0-1 SEC SEG
 31242                   E3,1765  E3,1765   EFIMP16  ERASE                 I(1)PL E-2 B-14 NEWT SLOPE 1-6 SEC SEG
A31251

R31255  *********LUNAR MODULE CHANGE  ***********                          (2D)

 31256  REF  1          E3,1766            E3J22R2M EQUALS EFIMP16 +1
 31257  REF  1          E3,1767            E32C31RM EQUALS E3J22R2M +1
R31258
```

```
R3126           **** CONICSEX (PLANETARY INERT. ORIEN.) ****

 3127   REF  1          E3,1706            TIMSUBO  EQUALS TEPHEM          CSEC B-42 (TRIPLE PREC)
A31275

R3128             P23 PAD LOAD (2D)

R3129   ** P24  PAD LOADS **    (2D)

 3130   REF  1          E3,1770            TRUNSF   EQUALS E32C31RM +1     I(1)PL
 3131   REF  1          E3,1771            SHAFTSF  EQUALS TRUNSF   +1     I(1)PL
```

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P4000 EBANK-4 ASSIGNMENTS

```
 4001                    E4,1400                 SETLOC 2000

 40015                   E4,1400         ERASPIP EQUALS                  ENTRANCE TO ERASABLE PIPA TEST PROGRAM
R4002       P20 STORAGE.            -PAD LOADED-                        (4D)

 4004                    E4,1400 E4,1400 WRENDPOS ERASE                  B(1)PL                          M B-14
 4005                    E4,1401 E4,1401 WRENDVEL ERASE                  B(1)PL                          M/CSECB0
 4006                    E4,1402 E4,1402 RMAX     ERASE                  B(1)PL                          METERS*2(-19)
 4007                    E4,1403 E4,1403 VMAX     ERASE                  B(1)PL                          M/CSEC*2(-7)

R4008       P22 STORAGE.            -PAD LOADED-                        (5D)

 4010                    E4,1404 E4,1404 WORBPOS  ERASE                  B(1)PL                          M B-14
 4011                    E4,1405 E4,1405 WORBVEL  ERASE                  B(1)PL                          M/CSECB0
 4012                    E4,1406 E4,1406 S22WSUBL ERASE                  B(1)PL                          M B-14
 40125                   E4,1407 E4,1410 RPVAR    ERASE          +1      B(2)PL

R4013       CONISEX STORAGE.        -PAD LOADED-                        (6D)

 4015                    E4,1411 E4,1416 504LM    ERASE          +5      I(6)MOON LIBRATION VECTOR
A4016

R4017       ENTRY STORAGE.          -PAD LOADED-                        (2D)

 4019                    E4,1417 E4,1420 EMSALT   ERASE  +1              I(2)PL

R4020       P35 CONSTANTS.          -PAD LOADED-                        (4D)

 4022                    E4,1421 E4,1422 ATIGINC  ERASE  +1              B(2)PL
 4023                    E4,1423 E4,1424 PTIGINC  ERASE  +1              B(2)PL

R40341      LUNAR LANDING SIGHT DATA. -PAD LOADED-                      (6D)
R40342      (USED BY INTEGRATION INITIALIZATION,LAT-LONG SUBROUTINES, P30'S)

 40343                   E4,1425 E4,1432 RLS      ERASE          +5      I(6) PL  LUNAR LANDING SIGHT VECTOR
A40345

R4035   CONISEX (LUNAR AND SOLAR EPHEM)STORAGE. -PAD LOADED-             (77D)

 4037                    E4,1433 E4,1547 TIMEMO   ERASE          +76D
 4038   REF   1          E4,1436         VECOEM   EQUALS TIMEMO +3
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4039  REF  1                E4,1532              RESQ      EQUALS VECQEM +60D
4040  REF  1                E4,1540              VESQ      EQUALS RESQ +6
4041  REF  1                E4,1546              OMEGAES   EQUALS VESQ +6

R4043          FULL INTEGRATION STORAGE.                                  (88D)

4045                        E4,1550  E4,1550     PBODY     ERASE                 I(1)
4046  REF  1                E4,1551              ALPHAV    EQUALS PBODY   +1     I(6)TMP
4047  REF  1                E4,1557              BETAV     EQUALS ALPHAV  +6     I(6)TMP
4048  REF  1                E4,1565              PHIV      EQUALS BETAV   +6     I(6)TMP
4049  REF  1                E4,1573              PSIV      EQUALS PHIV    +6     I(6)TMP
4050  REF  1                E4,1601              FV        EQUALS PSIV    +6     I(6)TMP
4051  REF  1                E4,1607              BETAM     EQUALS FV      +6     I(6)TMP
4052  REF  1                E4,1611              H         EQUALS BETAM   +2     I(2)TMP
4054  REF  1                E4,1613              IRETURN   EQUALS H       +2     I(1) TMP
4055  REF  1                E4,1614              NORMGAM   EQUALS IRETURN +1     I(1)TMP
4056  REF  1                E4,1615              VECTAB    EQUALS NORMGAM +1     I(36)TMP
4057  REF  1                E4,1661              RPQV      EQUALS VECTAB  +36D    (6)TMP VECTOR PRIMARY TO SECONDARY BODY
4058  REF  1                E4,1667              ORIGEX    EQUALS RPQV    +6     B(1)TMP QSAVE FOR COORD. SWITCH. ROUTINE
4059  REF  1                E4,1667              KEPRTN    EQUALS ORIGEX         QSAVE FOR KEPLER
4061  REF  2  LAST   93     E4,1670              RPSV      EQUALS ORIGEX  +1     I(6) TMP SUN TO PRIMARY BODY VECTOR
4062  REF  1                E4,1676              XKEPNEW   EQUALS RPSV    +6     (2)TMP ROOT OF KEPLERS EQU FOR TIME TAU

R4064          THESE PROBABLY CAN SHARE INTEGRATION VARIABLES.                (3D)

R4066          LAT-LONG STORAGE

4069  REF  2  LAST   93     E4,1637              ERADM     EQUALS VECTAB  +18D    I(2)TMP
4070  REF  1                E4,1641              INCORPEX  EQUALS ERADM   +2     I(1)TMP

R4071          R31(V83) STORAGE. -SHARES WITH INTEGRATION STORAGE-            (24D)
A4074

4075  REF  3  LAST   93     E4,1623              BASEOTP   EQUALS VECTAB  +6     I(6)    BASE POS VECTOR OTHER VEH
4076  REF  4  LAST   93     E4,1637              BASEOTV   EQUALS VECTAB  +18D    I(6)    BASE VEL VECTOR OTHER VEH
4077  REF  5  LAST   93     E4,1653              BASETHP   EQUALS VECTAB  +30D    I(6)    BASE POS VECTOR THIS VEH
4078  REF  2  LAST   93     E4,1661              BASETHV   EQUALS RPQV           I(6)    BASE VEL VECTOR THIS VEH
R4081

R4082          CONIC INTEGRATION STORAGE.    -MAY NOT SHARE WITH SERVICER-    (6D)

4085  REF  1                E4,1700              ALPHAM    EQUALS XKEPNEW +2     I(2)TMP
4086  REF  1                E4,1702              TAU.      EQUALS ALPHAM  +2     I(2)TMP
4088  REF  1                E4,1704              DT/2      EQUALS TAU.    +2     I(2)TMP

R4089          R61 STORAGE                                                    (2D)
```

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 4091   REF   1                E4,1706          R63TIME  EQUALS DT/2 +2          I(2)TMP
A4092

R4093                INTEGRATION STORAGE                                          (1D)
 4095   REF   1                E4,1710          EGRESS   EQUALS R63TIME +2

R4096                VERB 83(N54)AND VERB 90 (N96) DISPLAYS                       (6D)
 4098   REF   1                E4,1711          RANGE    EQUALS EGRESS   +1      I(2)DSP NOUN 54 DISTANCE TO OPTICAL SUBJ
 4099   REF   1                E4,1713          RRATE    EQUALS RANGE    +2      I(2)DSP NOUN 54 RATE OF APPROACH
 4100   REF   1                E4,1715          RTHETA   EQUALS RRATE    +2      I(2)DSP NOUN 54
 41001  REF   1                E4,1715          RRATE2   EQUALS RTHETA            I(2) N96 LM OUT-OF-PLANE RATE

R41002  VERB 83  STORAGE                                                          (14D)

 4101   REF   2  LAST   94     E4,1717          RONE     EQUALS RTHETA   +2      I(6)TMP VECTOR STORAGE. (SCRATCH)
 4102   REF   1                E4,1725          VONE     EQUALS RONE     +6      I(6)TMP VECTOR STORAGE (SCRATCH)
 4103   REF   1                E4,1733          BASETIME EQUALS VONE     +6      I(2)    BASE TIME  ASSOC WITH BASE VECS
A4104

R4108                V 67 STORAGE                                                 (6D)
 4110   REF   2  LAST   94     E4,1711          WWPOS    EQUALS RANGE           I(2)TMP
 4111   REF   2  LAST   94     E4,1713          WWVEL    EQUALS RRATE           I(2)TMP
 4112   REF   3  LAST   94     E4,1715          WWOPT    EQUALS RTHETA          I(2)TMP

R4117                S-BAND ANTENNA GIMBAL ANGLES. DISPLAYED BY R05 (EXT.VB.64)   (4D)
R4119                OPERATION DURING P00 ONLY.

 4120   REF   3  LAST   94     E4,1711          RHOSB    EQUALS RANGE           B(2)DSP NOUN 51.  PITCH ANGLE
 4121   REF   1                E4,1713          GAMMASB  EQUALS RHOSB    +2      B(2)DSP NOUN 51.  YAW ANGLE

R4122                R 36 SCRATCHPAD STORAGE                                      (18D)

 4124   REF   2  LAST   94     E4,1717          VPASS36  EQUALS RONE            I (6)S-S
 4125   REF   1                E4,1725          UNP36    EQUALS VPASS36 +6      I (6)S-S
 41251  REF   1                E4,1733          UNA36    EQUALS UNP36 +6        I (6)S-S
A4126

R4127                EXTENDED VERB 82 STORAGE.                                    (6D)

 4130   REF   4  LAST   94     E4,1711          HPERMIN  EQUALS RANGE           I(2) SET TO 300KFT OR 35KFT FOR SR30.1
 4131   REF   1                E4,1713          RPADTEM  EQUALS HPERMIN  +2      I(2) PAD OR LANDING RADIUS FOR SR30.1
 4132   REF   1                E4,1715          TSTART82 EQUALS RPADTEM  +2      I(2) TEMP TIME STORAGE FOR V82.
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 58 E0 S?

A4133

R4134 MORE VERB 82 NOT SHARING WITH VERB 83 (7D)

4136	REF	2	LAST	94	E4,1733	V82FLAGS	EQUALS	VONE +6	(1) FOR V 82 BITS
4137	REF	1			E4,1734	TFF	EQUALS	V82FLAGS +1	I(2) DSP NOUN 50,44
4138	REF	1			E4,1736	-TPER	EQUALS	TFF +2	I(2)DSP NOUN 32
4139	REF	1			E4,1740	THETA(1)	EQUALS	-TPER +2	I(2) TMP SET AT END OF V82
4140	REF	1			E4,1746	RSP-RREC	EQUALS	AOPTIME	DSP NOUN 50 FOR V82 DURING P30 AND P11

A41405

R4141 REENTRY CONICS (6D)

4143	REF	2	LAST	95	E4,1733	URONE	EQUALS	V82FLAGS	I(6) SAVE ACTUAL FOR CALCULATIONS

A4144

R4145 V 82 DISPLAY (4D)

4147	REF	1			E4,1742	HAPOX	EQUALS	THETA(1) +2	I(2) DSP NOUN 44
4148	REF	1			E4,1744	HPERX	EQUALS	HAPOX +2	I(2) DSP NOUN 44

A4149

R4150 MINKEY RENDEZVOUS STORAGE (2D)

4152	REF	1			E4,1750	TCSI2	EQUALS	RSP-RREC +2	I(2) TIME OF NEXT CSI

R4154 P22 DISPLAY REGISTERS (06D)

4156	REF	1			E4,1746	AOPTIME	EQUALS	HPERX +2	I(2)TMP FOR SR52.1,ADVTRACK
4157	REF	2	LAST	95	E4,1750	LANDLONG	EQUALS	AOPTIME +2	I(2) DSP NOUN 89 FOR P22
4158	REF	1			E4,1752	LANDALT	EQUALS	LANDLONG +2	I(2)DSP NOUN 89 FOR P22.

R4159

R4160 S34/35.5,P34-P35 STORAGE. (5D)

4162	REF	1			E4,1754	KT	EQUALS	LANDALT +2	B(2)
4164	REF	1			E4,1756	QSAVED	EQUALS	KT +2	B(1)TMP HOLDS RETURN
4165	REF	1			E4,1757	RTRN	EQUALS	QSAVED +1	B(1) RETURN
4166	REF	1			E4,1760	SUBEXIT	EQUALS	RTRN +1	B(1) TMP
41665	REF	2	LAST	95	E4,1756	ANEXIT	EQUALS	QSAVED	I(1)

R4169 P 30 DISPLAY (4D)

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 59 E0 S?

```
 4171   REF   2  LAST   95   E4,1754          HAPO     EQUALS KT            I(2) DSP NOUN 42, FOR P30.
 4172   REF   1               E4,1756          HPER     EQUALS HAPO    +2    I(2) DSP NOUN 42, FOR P30.
A4173

R4174            SOME P34 STORAGE.     (OVERLAYS P35.1 STORAGE)              (2D)

 4176   REF   3  LAST   96   E4,1754          NOMTPI   EQUALS KT            I(2)TMP NOMINAL TPI TIME FOR RECYCLE

R41761           P15 PAD LOADS                                              (3D)

 41763  REF   4  LAST   96   E4,1754          DTF      EQUALS KT            I(1)
 41764  REF   1               E4,1755          VC/D     EQUALS DTF +1        I(2)

R4177   THE FOLLOWING ARE ERASABLES USED BY THE SYSTEM TESTS. 205 USES TRANSM1  GS ARE NOT USED IN 205 NOR ARE THEY
R4179   WHILE 504 USES TRANSM1 AND ALFDK .

 4180                          E4,1400          TRANSM1  EQUALS 2000           (18) INITIALIZATION FOR IMU TESTS
 4181   REF   1               E4,1422          ALFDK    =      TRANSM1 +18D   (144) ERASABLE LOAD IN 504
 41815  REF   1               E4,1641          ENDSYS-4 EQUALS ALFDK +143D    LAST SYS.TEST STORAGE IN E-4

R4182   END OF PERF. TEST ERASABLE IN BANK 4

R4183        *-*-* V82 *-*-*                                                 (6D)

 4185   REF   1               E4,1761          VONE'    EQUALS SUBEXIT +1     I(6)TMP NORMAL VELOCITY VONE/ SQRT MU
A4186

R41865      MINKEY PAD LOADS                                                 (8D)

 41867  REF   1               E4,1767          HAMDELH  EQUALS VONE' +6       I(2)PL
 418673 REF   1               E4,1771          WRDTIME  EQUALS HAMDELH +2     I(1)PL
 418675 REF   1               E4,1772          MINBLKTM EQUALS WRDTIME +1     I(1)PL
 418677 REF   1               E4,1773          TBEFCOMP EQUALS MINBLKTM +1    I(1)PL
 418679 REF   1               E4,1774          BRNBLKTM EQUALS TBEFCOMP +1    I(1)PL
 418681 REF   1               E4,1775          MAXWTIME EQUALS BRNBLKTM +1    I(1)PL
 418683 REF   1               E4,1776          FINCMPTM EQUALS MAXWTIME +1    I(1)PL

R4187            PAD LOAD INTEGRATION ERROR INCLUDED IN VARIANCE BY P20       (1D)

 4188   REF   1               E4,1777          INTVAR   EQUALS FINCMPTM +1    I(1)PL  SQUARE OF EXPECTED INTEGRATION
A4189                                                                                   POSITION EXTRAPOLATION ERROR.
A4190                                                                                   SCALED METERS(2) 2(15)
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 60 EQ S?

```
P5000   EBANK=5 ASSIGNMENTS
 5001                       E5,1400                 SETLOC 2400

R5002           *-*-*-*-  OVERLAY 1 IN EBANK 5 -*-*-*-*

R5003           W-MATRIX STORAGE.                                       (162D)

 5005                       E5,1400          W      EQUALS 2400         B(162)

 50051                      E5,1444          9X9LOC1  EQUALS 2444
 50052                      E5,1532          9X9LOC2  EQUALS 2532

R50053          P22 TEMP STORAGE            (6D)

 50054  REF  1             E5,1554          S22RL  EQUALS W +108D      TMP RL IN UNKNOWN LMK W INIT

 5006   REF  2 LAST  97    E5,1570          EMATRIX  =      W     +120D  B(42E   USED TO CONVERT W TO 6X6
 5007   REF  3 LAST  97    E5,1642          END-W  EQUALS W      +162D  **NEXT AVAILABLE LOC AFTER W MATRIX**

R5008           AUTO-OPTICS STORAGE -R52-

R5009   DC NOT MOVE FROM E5,1554. A DELICATE BALANCE EXISTS BETWEEN THIS AND P03
 5010   REF  4 LAST  97    E5,1554          XNB1   EQUALS W      +108D  B(6D) TMP
 5011   REF  1             E5,1562          YNB1   EQUALS XNB1   +6     B(6)TMP
 5012   REF  1             E5,1570          ZNB1   EQUALS YNB1   +6     B(6)TMP
 5013   REF  1             E5,1576          SAVQR52  EQUALS ZNB1 +6     I(2)TMP

 50131  REF  1             E5,1577          R52BNKSV EQUALS SAVQR52 +1  USED TO SAVE EBANK IN R52
 5014   REF  2 LAST  97    E5,1600          PLANVEC  EQUALS SAVQR52 +2  B(6) S-S SIGHTING VECTOR IN REF. COOR.
 5015   REF  1             E5,1606          TSIGHT   EQUALS PLANVEC +6  B(2) S-S TIME OF SIGHTING
A5016

R50161          RENDEZVOUS TARGETTING STORAGE                           (6D)

 501612 REF  2 LAST  97    E5,1600          AUTOY  EQUALS PLANVEC       I(2)
 501613 REF  1             E5,1602          CMYDOT EQUALS AUTOY +2      I(2)
 501614 REF  1             E5,1604          LMYDOT EQUALS CMYDOT +2     I(2)

R50165          RENDEZVOUS -P34-35                                      (26D)

 5018   REF  1             E5,1610          DVLOS  EQUALS TSIGHT +2     I(6) S-S DELTA VELOCITY,LOS COORD-DISPL1
 5022   REF  1             E5,1616          UNRM   EQUALS DVLOS  +6     I(6) S-S
 5023   REF  1             E5,1624          ULOS   EQUALS UNRM   +6     I(6) S-S UNIT LINE OF SIGHT VECTOR
 5024   REF  1             E5,1632          ACTCENT  EQUALS ULOS +6     I(2) S-S CENTRAL ANGLE BETWEEN ACTIVE
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 61 EQ S?

```
A5025                                                                   VEH AT TPI IGNITION TIME AND
A5026                                                                   TARGET VECTOR.
 5027   REF   1              E5,1634    DELVTPI   EQUALS ACTCENT  +2    I(2)    NOUN 58 FOR P34.
 5028   REF   1              E5,1636    DELVTPF   EQUALS DELVTPI  +2    I(2)    NOUN 58,59 FOR P34,35.
 5029   REF   1              E5,1640    POSTTPI   EQUALS DELVTPF  +2    I(2)    NOUN 58 FOR P34.
 5030   REF   2 LAST   98    E5,1634    TDEC2     EQUALS DELVTPI        (2)

 50302  REF   1              E5,1640    T3TOT4    EQUALS POSTTPI        I(2) DSP NOUN 39 FOR P34,P35. TPI TO TIN
A50303                                                                  T (CAN NOT SHARE WITH RETURN TO EARTH)
R5031          ALIGNMENT                                                (12D)

 5033   REF   2 LAST   97    E5,1610    STARSAV1  EQUALS DVLOS         I(6)TMP RESTART STAR SAVE.
 5034   REF   1              E5,1616    STARSAV2  EQUALS STARSAV1 +6   I(6)TMP RESTART STAR SAVE.
 5035   REF   1              E5,1616    US        =       STARSAV2              (CISLUNAR TAG FOR STARSAV2).
A5036

R5037          P24-RATE AIDED OPTICS                                    (2)

 5039   REF   1              E5,1656    TRTEMP    EQUALS R1VEC          B(1)TMP
 5040   REF   1              E5,1657    SRTEMP    EQUALS TRTEMP  +1     B(1)TMP  ALSO USED AS RETURN SAVE BY R51
A5041                                                                   AND P23.
```

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 62 E S?

```
P5050           ALIGNMENT/SYSTEST/CALCSMSC/CRS61.1 COMMON STORAGE.          (36D)
R5052           (CALCSMSC IS A SUBSET OF S41.1 AT LEAST)
R5053           (CRS61.1  IS A SUBSET OF P20)

 5054  REF  1          E5,1671    XSM    EQUALS END-W  +23D   B(6)
 5055  REF  1          E5,1677    YSM    EQUALS XSM    +6     B(6)TMP
 5056  REF  1          E5,1705    ZSM    EQUALS YSM    +6     B(6)TMP

 5057  REF  1          E5,1713    XDC    EQUALS ZSM    +6     B(6)TMP
 5058  REF  1          E5,1721    YDC    EQUALS XDC    +6     B(6)TMP
 5059  REF  1          E5,1727    ZDC    EQUALS YDC    +6     B(6)TMP

 5060  REF  2 LAST 99  E5,1713    XNB    =      XDC
 5061  REF  2 LAST 99  E5,1721    YNB    =      YDC
 5062  REF  1          E5,1727    ZNB    =      ZDC

R5066           ALIGNMENT/SYSTEST COMMON STORAGE.                           (18D)

 5068  REF  2 LAST 99  E5,1735    STARAD EQUALS ZDC    +6     I(18D)TMP

R5069           ALIGNMENT/SYSTEST/AUTO OPTICS COMMON STORAGE.               (17D)

 5071  REF  1          E5,1757    OGC    EQUALS STARAD +18D   I(2)TMP
 5072  REF  1          E5,1761    IGC    EQUALS OGC    +2     I(2)TMP
 5073  REF  1          E5,1763    MGC    EQUALS IGC    +2     I(2)TMP
 5074  REF  1          E5,1765    STAR   EQUALS MGC    +2     I(6)TMP
 5075  REF  1          E5,1773    SAC    EQUALS STAR   +6     I(2)TMP
 5076  REF  1          E5,1775    PAC    EQUALS SAC    +2     I(2)TMP
 5077  REF  1          E5,1777    QMIN   EQUALS PAC    +2     B(1)TMP
R5078

R5079           **** COLP50S ****                                           (1D)

 5081  REF  1          E5,1735    CULTRIX EQUALS VEARTH                  VEARTH, VSUN, VMOON

R5082           OVERLAYS WITHIN ALIGNMENT/SYSTEST COMMON STORAGE.           (24D)

 5084  REF  2 LAST 99  E5,1735    VEARTH EQUALS STARAD        (6)TMP
 5085  REF  2 LAST 99  E5,1743    VSUN   EQUALS VEARTH  +6    (6)TMP
 5086  REF  1          E5,1751    VMOON  EQUALS VSUN    +6    (6)TMP
 5087  REF  1          E5,1757    SAX    EQUALS VMOON   +6    (6)TMP
```

P5088 *-*-*-*- OVERLAY 2 IN EBANK 5 -*-*-*-*

R5089 CONIC ROUTINES STORAGE. (87D)

```
 5091  REF  2  LAST  99   E5,1642   DELX      EQUALS  END-W          I(2)TMP
 5092  REF  1             E5,1644   DELT      EQUALS  DELX     +2   I(2)TMP
 5093  REF  1             E5,1646   URRECT    EQUALS  DELT     +2   I(6)TMP
 5094  REF  1             E5,1654   RCNORM    EQUALS  URRECT   +6   I(2)TMP
 5096  REF  1             E5,1656   R1VEC     EQUALS  RCNORM   +2   I(6)TMP
 5097  REF  2  LAST  98   E5,1664   R2VEC     EQUALS  R1VEC    +6   I(6)TMP
 5098  REF  1             E5,1672   TDESIRED  EQUALS  R2VEC    +6   I(2)TMP
 5099  REF  1             E5,1674   GEOMSGN   EQUALS  TDESIRED +2   I(1)TMP
 5100  REF  1             E5,1675   UN        EQUALS  GEOMSGN  +1   I(6)TMP
 5101  REF  1             E5,1703   VTARGTAG  EQUALS  UN       +6   I(1)TMP
 5102  REF  1             E5,1704   VTARGET   EQUALS  VTARGTAG +1   I(6)TMP
 5103  REF  1             E5,1712   RTNLAMB   EQUALS  VTARGET  +6   I(1)TMP
 5104  REF  1             E5,1713   U2        EQUALS  RTNLAMB  +1   I(6)TMP
 5105  REF  1             E5,1721   MAGVEC2   EQUALS  U2       +6   I(2)TMP
 5106  REF  1             E5,1723   UR1       EQUALS  MAGVEC2  +2   I(6)TMP
 5107  REF  1             E5,1731   SNTH      EQUALS  UR1      +6   I(2)TMP
 5108  REF  1             E5,1733   CSTH      EQUALS  SNTH     +2   I(2)TMP
 5109  REF  1             E5,1735   1-CSTH    EQUALS  CSTH     +2   I(2)TMP
 5110  REF  1             E5,1737   CSTH-RHO  EQUALS  1-CSTH   +2   I(2)TMP
 5111  REF  1             E5,1741   P         EQUALS  CSTH-RHO +2   I(2)TMP
 5112  REF  1             E5,1743   R1A       EQUALS  P        +2   I(2)TMP
 5113  REF  3  LAST  100  E5,1656   RVEC      EQUALS  R1VEC         I(6)TMP
 5114  REF  1             E5,1745   VVEC      EQUALS  R1A      +2   I(6)TMP
 5115  REF  2  LAST  100  E5,1712   RTNTT     EQUALS  RTNLAMB       I(1)TMP
 5116  REF  1             E5,1753   ECC       EQUALS  VVEC     +6   I(2)TMP
 5117  REF  3  LAST  100  E5,1712   RTNTR     EQUALS  RTNLAMB       I(1)TMP
 5118  REF  4  LAST  100  E5,1712   RTNAPSE   EQUALS  RTNLAMB       I(1)TMP
 5119  REF  2  LAST  100  E5,1721   R2        EQUALS  MAGVEC2       I(2)TMP
 5120  REF  1             E5,1755   RTNPRM    EQUALS  ECC      +2   I(1)TMP
 5121  REF  1             E5,1756   SGNRDOT   EQUALS  RTNPRM   +1   I(1)TMP
 5122  REF  1             E5,1757   RDESIRED  EQUALS  SGNRDOT  +1   I(2)TMP
 5123  REF  1             E5,1761   DELDEP    EQUALS  RDESIRED +2   I(2)TMP
 5124  REF  1             E5,1763   DEPREV    EQUALS  DELDEP   +2   I(2)TMP
 5125  REF  2  LAST  100  E5,1761   TERRLAMB  EQUALS  DELDEP       I(2)TMP
 5126  REF  1             E5,1763   TPREV     EQUALS  DEPREV       I(2)TMP
A5127
```

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P5128 *-*-*-*- OVERLAY 3 IN EBANK 5 -*-*-*-*

R5129 MEASUREMENT INCORPORATION STORAGE. (54D)
R5131 (CALLED BY P20, P22, P23)

```
 5132   REF   3  LAST  100    E5,1642          OMEGAM1  EQUALS  END-W          I(6)TMP
 5133   REF   1                E5,1650          OMEGAM2  EQUALS  OMEGAM1  +6   I(6)TMP
 5134   REF   1                E5,1656          OMEGAM3  EQUALS  OMEGAM2  +6   I(6)TMP
 5135   REF   1                E5,1664          HOLDW    EQUALS  OMEGAM3  +6   I(18)TMP
 5138   REF   1                E5,1706          ZI       EQUALS  HOLDW +18D    I(18)
```

L ERASABLE ASSIGNMENTS

```
P5157            *-*-*-*-  OVERLAY 0 IN EBANK 5 -*-*-*-*

R5158            SYSTEM TEST STORAGE.                                          (174)

 5160                        E5,1400  E5,1401   AZIMUTH  ERASE  +1
 5161                        E5,1402  E5,1403   LATITUDE ERASE  +1

 5164                        E5,1404  E5,1411   ERVECTOR ERASE  +5
 5165                        E5,1412  E5,1412   LENGTHOT ERASE
 5166                        E5,1413  E5,1420   LOSVEC   ERASE  +5

 5167  REF   1               E5,1413            SXTOPTN  =      LOSVEC
 5168                        E5,1421  E5,1421   NDXCTR   ERASE

 5169                        E5,1422  E5,1422   SYSTSPR1 ERASE                UNUSED

 5170                        E5,1423  E5,1423   POSITON  ERASE
 5171                        E5,1424  E5,1424   QPLAC    ERASE
 5172                        E5,1425  E5,1425   QPLACE   ERASE
 5173                        E5,1426  E5,1426   QPLACES  ERASE
 5174                        E5,1427  E5,1427   RUN      ERASE

 5175                        E5,1430  E5,1430   SYSTSPR2 ERASE                UNUSED

 5176                        E5,1431  E5,1431   SOUTHDR  ERASE
 5177  REF   1               E5,1431            TARG1/2  =      SOUTHDR
 5178                        E5,1432  E5,1437   TAZEL1   ERASE  +5

 5179                        E5,1440  E5,1441   TEMPTIME ERASE  +1
 5180                        E5,1442  E5,1443   TMARK    ERASE  +1
 5181                        E5,1444  E5,1657   AINLA    ERASE  +139D          OPTIMUM CALIB. AND ALIGNMENT
 5182  REF   1               E5,1444            GENPL    =      AINLA
 5183  REF   2  LAST  102    E5,1453            COULIMIT =      AINLA +7
 5184  REF   3  LAST  102    E5,1552            COUNTPL  =      AINLA +70D

 5209  REF   4  LAST  102    E5,1444            WANGO    EQUALS AINLA
 5210  REF   5  LAST  102    E5,1446            WANGI    EQUALS AINLA +2D
 5211  REF   6  LAST  102    E5,1450            WANGT    EQUALS AINLA +4D
 5212  REF   1               E5,1450            TORQNDX  =      WANGT
 5213  REF   7  LAST  102    E5,1452            DRIFTT   EQUALS AINLA +6D
 5214  REF   8  LAST  102    E5,1454            ALXIS    EQUALS AINLA +8D

 5215  REF   9  LAST  102    E5,1455            CMPXI    EQUALS AINLA +9D
 5216  REF  10  LAST  102    E5,1456            ALK      EQUALS AINLA +10D
 5217  REF  11  LAST  102    E5,1472            VLAUNS   EQUALS AINLA +22D
 5218  REF   1               E5,1460            THETAX   =      ALK +2
 5219  REF  12  LAST  102    E5,1474            WPLATO   EQUALS AINLA +24D
 5220  REF  13  LAST  102    E5,1500            INTY     EQUALS AINLA +28D

 5221  REF   1               E5,1466            THETAN   =      THETAX +6
 5222  REF  14  LAST  102    E5,1502            ANGZ     EQUALS AINLA +30D
 5223  REF  15  LAST  102    E5,1504            INTZ     EQUALS AINLA +32D
 5224  REF  16  LAST  102    E5,1506            ANGY     EQUALS AINLA +34D
 5225  REF  17  LAST  102    E5,1510            ANGX     EQUALS AINLA +36D
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5226   REF  18  LAST  102   E5,1512    DRIFTO    EQUALS AINLA +38D
5227   REF  19  LAST  103   E5,1514    DRIFTI    EQUALS AINLA +40D
5228   REF  20  LAST  103   E5,1520    VLAUN     EQUALS AINLA +44D
5229   REF   1               E5,1474    FILDELV   =      THETAN +6
5230   REF  21  LAST  103   E5,1522    ACCWD     EQUALS AINLA +46D
5231   REF   1               E5,1476    INTVEC    =      FILDELV +2
5232   REF  22  LAST  103   E5,1530    POSNV     EQUALS AINLA +52D
5233   REF  23  LAST  103   E5,1532    DPIPAY    EQUALS AINLA +54D
5234   REF  24  LAST  103   E5,1536    DPIPAZ    EQUALS AINLA +58D
5235   REF  25  LAST  103   E5,1540    ALTIM     EQUALS AINLA +60D
5236   REF  26  LAST  103   E5,1541    ALTIMS    EQUALS AINLA +61D
5237   REF  27  LAST  103   E5,1542    ALDK      EQUALS AINLA +62D
5238   REF  28  LAST  103   E5,1560    DELM      EQUALS AINLA +76D
5239   REF  29  LAST  103   E5,1570    WPLATI    EQUALS AINLA +84D
5240   REF  30  LAST  103   E5,1577    RESTARPT  =      AINLA + 91D
5241   REF  31  LAST  103   E5,1631    GEOSAVED  =      AINLA +117D
5242   REF  32  LAST  103   E5,1632    PREMTRXC  =      AINLA +118D
5243   REF  33  LAST  103   E5,1633    LAUNCHAZ  =      AINLA +119D
5244   REF  34  LAST  103   E5,1635    NEWAZMTH  =      AINLA +121D
5245   REF  35  LAST  103   E5,1637    OLDAZMTH  =      AINLA +123D
5246   REF  36  LAST  103   E5,1641    TOLDAZMT  =      AINLA +125D
5247   REF  37  LAST  103   E5,1643    GEOCOMPS  =      AINLA +127D
5248   REF  38  LAST  103   E5,1644    1SECXT    =      AINLA +128D
5249   REF  39  LAST  103   E5,1645    GTSWTLST  =      AINLA +129D
5250   REF  40  LAST  103   E5,1646    ERECTIME  =      AINLA +130D
5251   REF  41  LAST  103   E5,1647    ERCOMP    =      AINLA +131D
5252   REF  42  LAST  103   E5,1655    ZERONDX   =      AINLA +137D
5253   REF   1               E5,1655    GTSOPNDZ  =      ZERONDX

R5254  THE FOLLOWING TAGS ARE USED BY THE 504 IMU CALIBRATION AND ALIGNMENT PROGRAM ONLY.

5256   REF   2  LAST  102   E5,1460    THETAX1   EQUALS ALK      +2
5257   REF   1               E5,1466    THETAN1   EQUALS THETAX1  +6
5258   REF   1               E5,1474    FILDELV1  EQUALS THETAN1  +6
5259   REF   1               E5,1476    INTVEC1   EQUALS FILDELV1 +2
5260   REF  43  LAST  103   E5,1631    GEOSAVE1  EQUALS AINLA    +117D
5261   REF  44  LAST  103   E5,1632    PREMTRX1  EQUALS AINLA    +118D
5262   REF  45  LAST  103   E5,1633    LUNCHAZ1  EQUALS AINLA    +119D
5263   REF   1               E5,1635    NEWAZ1    EQUALS LUNCHAZ1 +2
5264   REF   2  LAST  103   E5,1637    OLDAZ1    EQUALS LUNCHAZ1 +4
5265   REF   3  LAST  103   E5,1641    TOLDAZ1   EQUALS LUNCHAZ1 +6
5266   REF  46  LAST  103   E5,1643    GEOCOMP1  EQUALS AINLA    +127D
5267   REF  47  LAST  103   E5,1644    1SECXT1   EQUALS AINLA    +128D
5268   REF  48  LAST  103   E5,1645    GTSWTLT1  EQUALS AINLA    +129D
5269   REF  49  LAST  103   E5,1646    ERECTIM1  EQUALS AINLA    +130D
5270   REF  50  LAST  103   E5,1647    ERCOMP1   EQUALS AINLA    +131D  I(6)
5271   REF  51  LAST  103   E5,1655    ZERONDX1  EQUALS AINLA    +137D
52715  REF  52  LAST  103   E5,1656    PERFDLAY  EQUALS AINLA    +138D  B(2).........
52719  REF  53  LAST  103   E5,1657    ENDSYS-5  EQUALS AINLA +139D     LAST SYS.TEST STORAGE IN E-5
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R5272 END OF 504 CAL + ALIGN ERASE.

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 68 E 5?

P5273 *-*-*-*- OVERLAY 4 IN EBANK 5 -*-*-*-*

R5274 P32 -- P33 (20D)

5276	REF	3	LAST 98	E5,1610	UP1	EQUALS	DVLOS	I(6)
5277	REF	1		E5,1616	VPASS2	EQUALS	UP1 +6	I(6)
5278	REF	1		E5,1624	RPASS2	EQUALS	VPASS2 +6	I(6)
5279	REF	1		E5,1632	DIFFALT	EQUALS	RPASS2 +6	I(2)

A5283

R5284 P32,P33 STORAGE OVERLAYING 9X9 W-MATRIX LOCATIONS (32D)

5286	REF	1		E5,1444	DELVEET1	EQUALS	9X9LOC1	I(6) DELV FOR CSI
5287	REF	1		E5,1452	RACT2	EQUALS	DELVEET1 +6	I(6) POS. ACTIVE VEH. AT CDH TIME
52871	REF	1		E5,1460	TCDH	EQUALS	RACT2 +6	I(2)
52872	REF	1		E5,1462	TCSI	EQUALS	TCDH +2	I(2)
52873	REF	1		E5,1464	TTPI0	EQUALS	TCSI +2	I(2)
5288	REF	1		E5,1532	VACT2	EQUALS	9X9LOC2	I(6) VEL. ACTIVE VEH. AT CDH TIME
5289	REF	1		E5,1540	RACT1	EQUALS	VACT2 +6	I(6) POS. ACTIVE VEH. AT CSI TIME
5290	REF	1		E5,1546	T1TOT2	EQUALS	RACT1 +6	I(2) TCDH - TCSI

A52915

R52916 MARK COUNT FOR MINKEY R22, Q RETURN FOR N90/N81 DSP P31,P36. (2D)

52918	REF	1		E5,1550	COUNT3MK	EQUALS	T1TOT2 +2	I(1)
52919	REF	1		E5,1551	N90RET	EQUALS	COUNT3MK +1	I(1)

R5292 MINKEY AFTERBURN TEMPORARIES FOR RESTART (24D)

5294	REF	1		E5,1552	BURNTMP1	EQUALS	N90RET +1	I(6)
5295	REF	1		E5,1560	BURNTMP2	EQUALS	BURNTMP1 +6	I(6)
5296	REF	1		E5,1566	BURNTMP3	EQUALS	BURNTMP2 +6	I(6)
5297	REF	1		E5,1574	BURNTMP4	EQUALS	BURNTMP3 +6	I(6)

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P6000                    EBANK=6 ASSIGNMENTS
 6001                        E6,1400                    SETLOC 3000

R6002          P23   PAD LOADS***                                        (20).

 6004                    E6,1400  E6,1400   WMIDPOS  ERASE              I(1) PL  INITIAL VALUES FOR W-MATRIX IN
 6005                    E6,1401  E6,1401   WMIDVEL  ERASE              I(1) PL  CISLUNAR (P23) NAVIGATION
A6006

R6007          R22 PAD LOADS                                             ( 5D ).

 6009                    E6,1402  E6,1403   RVAR     ERASE      +1      I(2) PL  VHF RADAR
 6010                    E6,1404  E6,1406   RVARMIN  ERASE      +2      I(3) PL  VHF RADAR
A6011

R6012    ******** PAD LOADED ENTRY DAP STEERING VARIABLES ********       (3D)

 6014                    E6,1407  E6,1407   LADPAD   ERASE              I(1) PL  FOR ENTRY.HOLDS CM  NOMINAL L/D
 6015                    E6,1410  E6,1410   LODPAD   ERASE              I(1) PL  FOR ENTRY.HOLDS CM  NOMINAL LOD
 6016                    E6,1411  E6,1411   ALFAPAD  ERASE              B(1) PL  ALFA TRIM / 180
A6017

R60175         P37  PAD LOAD

 60177                   E6,1412  E6,1412   P37RANGE ERASE              I(1)PL

R6018    ******** PAD LOADED TVC DAP VARIABLES.**********************************(25D)

 6020                    E6,1413  E6,1413   ETDECAY  ERASE              I(1)PL
 6022                    E6,1414  E6,1415   EKPRIME  ERASE      +1      B(2)PL
 6023                    E6,1416  E6,1420   EKTLX/I  ERASE      +2      B(3)PL
 6024                    E6,1421  E6,1422   EREPFRAC ERASE      +1      B(2)PL

 6025                    E6,1423  E6,1423   PACTOFF  ERASE              B(1)PL, DSP N48 R01 = PTRIM, R02 = YTRIM
 6026                    E6,1424  E6,1424   YACTOFF  ERASE              B(1)PL, CONSECUTIVE WITH PACTOFF

 6027                    E6,1425  E6,1425   HBN10    ERASE              B(1)
 6028                    E6,1426  E6,1426   HBN11/2  ERASE              B(1)
 6029                    E6,1427  E6,1427   HBN12    ERASE              B(1)
 6030                    E6,1430  E6,1430   HBD11/2  ERASE              B(1)
 6031                    E6,1431  E6,1431   HBD12    ERASE              B(1)

 6032                    E6,1432  E6,1432   HBN20    ERASE              B(1)
 6033                    E6,1433  E6,1433   HBN21/2  ERASE              B(1)
 6034                    E6,1434  E6,1434   HBN22    ERASE              B(1)
 6035                    E6,1435  E6,1435   HBD21/2  ERASE              B(1)
 6036                    E6,1436  E6,1436   HBD22    ERASE              B(1)
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 6037                    E6,1437  E6,1437  HBN30    ERASE                  B(1)
 6038                    E6,1440  E6,1440  HBN31/2  ERASE                  B(1)
 6039                    E6,1441  E6,1441  HBN32    ERASE                  B(1)
 6040                    E6,1442  E6,1442  HBD31/2  ERASE                  B(1)
 6041                    E6,1443  E6,1443  HBD32    ERASE                  B(1)

R6042  ******** EXCLUSIVE TVC DAP VARIABLES. **********************************(4D)

 6045                    E6,1444  E6,1445  TEMPDAP  ERASE  +1              B(2)
 6046  REF   1           E6,1444           MRKRTMP  =       TEMPDAP                ((B(1)))
 6047                    E6,1446  E6,1446  CNTR     ERASE                  B(1)
 6048                    E6,1447  E6,1447  CGAD     ERASE                  B(1)
A6049


R6050  ******** EXCLUSIVE RCS DAP VARIABLES.  **********************************(13D)

 6052                    E6,1450  E6,1464  RWORD1   ERASE          +12D    B(1)
 6053  REF   1           E6,1451           RWORD2   EQUALS RWORD1  +1      B(1)
 6054  REF   1           E6,1452           PWORD1   EQUALS RWORD2  +1      B(1)
 6055  REF   1           E6,1453           PWORD2   EQUALS PWORD1  +1      B(1)
 6056  REF   1           E6,1454           YWORD1   EQUALS PWORD2  +1      B(1)
 6057  REF   1           E6,1455           YWORD2   EQUALS YWORD1  +1      B(1)
 6058  REF   1           E6,1456           BLAST    EQUALS YWORD2  +1      B(2)
 6059  REF   1           E6,1460           BLAST1   EQUALS BLAST   +2      B(2)
 6060  REF   1           E6,1462           BLAST2   EQUALS BLAST1  +2      B(2)
 6061  REF   1           E6,1464           T5PHASE  EQUALS BLAST2  +2      B(1)
A6062


R6063  ******** RCS/TVC DAP COMMON STORAGE.**********************************(17D)

 6065                    E6,1465  E6,1465  DAPDATR1 ERASE                  B(1)DSP NOUN 46(R1)
 6066                    E6,1466  E6,1466  DAPDATR2 ERASE                  B(1)DSP NOUN 46(R2)

 60665 REF   1             4076           DPCONFIG =       OCT60000       DAP CONFIG BITS

 6067                    E6,1467  E6,1467  IXX      ERASE                  B(1) CONSECUTIVE WITH IAVG, IAVG/TLX FOR
 6068                    E6,1470  E6,1470  IAVG     ERASE                  B(1)                                MASSPROP
 6069                    E6,1471  E6,1471  IAVG/TLX ERASE                  B(1)

 6070                    E6,1472  E6,1472  LEMMASS  ERASE                  B(1)DSP NOUN 47(R2)
 6071                    E6,1473  E6,1474  CSMMASS  ERASE  +1              B(2)
 6072                    E6,1475  E6,1475  WEIGHT/G ERASE
 6074                    E6,1476  E6,1476  AK       ERASE
 6075                    E6,1477  E6,1477  AK1      ERASE
 6076                    E6,1500  E6,1500  AK2      ERASE

 6077                    E6,1501  E6,1501  RCSFLAGS ERASE                  B(1) CONSECUTIVE WITHAK2 DOWNLINK
 6078                    E6,1502  E6,1502  T5TEMP   ERASE                  B(1)
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 6079                    E6,1503  E6,1503   EDRIVEX  ERASE
 6080                    E6,1504  E6,1504   EDRIVEY  ERASE
 6081                    E6,1505  E6,1505   EDRIVEZ  ERASE

R6082           INTEMP THRU INTEMP+14D  ARE RESERVED FOR OVERLAYED TVC/RCS INTERUP TRUE TEMPORIES
 6084                    E6,1506  E6,1524   INTTEMP  ERASE          +14D    (15)

R6085           TVC/RCS THRU TVCRCS +11D RESERVED FOR DOWNLINKED VARIABLES

 6086                    E6,1525  E6,1540   TVCRCS   ERASE          +11D    (12)
A6087                                                                     RCS (WBODYS,ADOTS)
A6088                                                                     TVC(OMEGACS,OMEGABS)

R6089           TVC DAP TEMPORARY VARIABLES**********************************

R6090           TVC DAP INTERUPT TRUE TEMPORARIES****************************

 6091   REF  1                  E6,1506          PHI333   EQUALS INTTEMP          B(1)    COUNTING REGISTER
 6092   REF  1                  E6,1507          PSI333   EQUALS PHI333   +1      B(1)    COUNTING REGISTER
 6093   REF  1                  E6,1510          TEMP333  EQUALS PSI333   +1      B(1)    MASS TEMPORARY
 6094   REF  1                  E6,1511          VARST0   EQUALS TEMP333  +1      B(8)    BREAKPOINTS AND SLOPES
 6095   REF  1                  E6,1516          VARST5   =      VARST0   +5
 6096   REF  2  LAST  108       E6,1522          LASTMASP EQUALS VARST0 +9D               LAST VARST0 WORD

A6098

R6099           *******REGULAR TVC TEMPORARIES*************

R6100           TVC ZEROING LOOP STARTS HERE

 6101   REF  1                  E6,1525          OMEGAC   EQUALS TVCRCS           I(6)
 6102   REF  1                  E6,1525          OMEGAXC  =      OMEGAC
 6103   REF  2  LAST  108       E6,1527          OMEGAYC  =      OMEGAC   +2
 6104   REF  3  LAST  108       E6,1531          OMEGAZC  =      OMEGAC   +4

 6105   REF  2  LAST  108       E6,1533          OMEGAB   EQUALS TVCRCS   +6      B(6)
 6106   REF  1                  E6,1533          OMEGAXB  =      OMEGAB
 6107   REF  2  LAST  108       E6,1535          OMEGAYB  =      OMEGAB +2
 6108   REF  3  LAST  108       E6,1537          OMEGAZB  =      OMEGAB +4

 6109   REF  4  LAST  108       E6,1541          PTMP1    EQUALS OMEGAC +12D      B(2)
 6110   REF  1                  E6,1543          PTMP2    EQUALS PTMP1 +2         B(2)
 6111   REF  1                  E6,1545          PTMP3    EQUALS PTMP2 +2         B(2)
 6112   REF  1                  E6,1547          PTMP4    EQUALS PTMP3 +2         B(2)
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6113  REF  1   E6,1551   PTMP5    EQUALS PTMP4 +2        B(2)
6114  REF  1   E6,1553   PTMP6    EQUALS PTMP5 +2        B(2)

6115  REF  1   E6,1555   YTMP1    EQUALS PTMP6 +2        B(2)
6116  REF  1   E6,1557   YTMP2    EQUALS YTMP1 +2        B(2)
6117  REF  1   E6,1561   YTMP3    EQUALS YTMP2 +2        B(2)
6118  REF  1   E6,1563   YTMP4    EQUALS YTMP3 +2        B(2)
6119  REF  1   E6,1565   YTMP5    EQUALS YTMP4 +2        B(2)
6120  REF  1   E6,1567   YTMP6    EQUALS YTMP5 +2        B(2)

6121  REF  1   E6,1571   ROLLFIRE EQUALS YTMP6 +2        B(1)
6122  REF  1   E6,1572   ROLLWORD EQUALS ROLLFIRE +1     B(1)
6123  REF  1   E6,1573   TEMREG   EQUALS ROLLWORD +1     B(1)

6124  REF  1   E6,1574   TVCDUMMY EQUALS TEMREG   +1     DUMMY (NEED EVEN NUMBER OF LOCATIONS)
6125  REF  1   E6,1575   PERRB    EQUALS TVCDUMMY +1     B(2)
6126  REF  1   E6,1577   YERRB    EQUALS PERRB    +2     B(2)

6127  REF  1   E6,1601   DELPBAR  EQUALS YERRB    +2     B(2)
6128  REF  1   E6,1603   DELYBAR  EQUALS DELPBAR +2      B(2)

6129  REF  1   E6,1605   PDELOFF  EQUALS DELYBAR  +2     B(2)
6130  REF  1   E6,1607   YDELOFF  EQUALS PDELOFF  +2     B(2)
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R6131 TVC ZEROING LOOP ENDS HERE

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6132  REF  1   E6,1611   TTMP1    EQUALS YDELOFF +2      B(2)
6133  REF  1   E6,1613   TTMP2    EQUALS TTMP1 +2        B(2)

6134  REF  1   E6,1615   DAP1     EQUALS TTMP2 +2        B(2)
6135  REF  1   E6,1617   DAP2     EQUALS DAP1 +2         B(2)
6136  REF  1   E6,1621   DAP3     EQUALS DAP2 +2         B(2)

6137  REF  1   E6,1623   PCMD     EQUALS DAP3 +2         B(1)
6138  REF  1   E6,1624   YCMD     EQUALS PCMD     +1     B(1),  CONSECUTIVE WITH PCMD
6139  REF  1   E6,1625   T5TVCDT  EQUALS YCMD     +1     B(1)
6141  REF  1   E6,1626   KPRIMEDT EQUALS T5TVCDT  +1     I(2)
6142  REF  1   E6,1630   KTLX/I   EQUALS KPRIMEDT +2     B(1)
6144  REF  1   E6,1631   1/CONACC EQUALS KTLX/I   +1     B(1)
6145  REF  1   E6,1632   VARK     EQUALS 1/CONACC +1     B(1)
6146  REF  1   E6,1633   REPFRAC  EQUALS VARK     +1     B(1)
6147  REF  1   E6,1634   VCNTR    EQUALS REPFRAC  +1     B(1)
6148  REF  1   E6,1635   TVCPHASE EQUALS VCNTR +1        B(1)
6149  REF  1   E6,1636   PCDUYPST EQUALS TVCPHASE +1     B(1)
6150  REF  1   E6,1637   PCDUZPST EQUALS PCDUYPST +1     B(1)
61501 REF  1   E6,1640   YCDUYPST EQUALS PCDUZPST +1     B(1)
61502 REF  1   E6,1641   YCDUZPST EQUALS YCDUYPST +1     B(1)
6151  REF  1   E6,1642   MCDUYDOT EQUALS YCDUZPST +1     B(1)
6152  REF  1   E6,1643   MCDUZDOT EQUALS MCDUYDOT +1     B(1)
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 6153   REF   1                E6,1644          TVCEXPHS EQUALS MCDUZDOT +1     B(1)
R6164             TVC ROLL DAP VARIABLES

R6165   (8D)
 6166   REF   1                E6,1645          OGANOW   EQUALS TVCEXPHS +1
 6167   REF   1                E6,1646          OGAPAST  EQUALS OGANOW   +1     B(1)
 6168   REF   1                E6,1647          OGA      EQUALS OGAPAST  +1     B(1)TMP
 6169   REF   1                E6,1647          OGAERR   =      OGA             (ROLL DAP USES OGA, MEANS OGAERROR)
 6170   REF   2  LAST  110     E6,1650          DELOGART EQUALS OGA      +1     B(1)TMP
 6171   REF   1                E6,1651          SGNRT    EQUALS DELOGART +1     SIGN OF OGA RATE
 6172   REF   1                E6,1652          DELOGA   EQUALS SGNRT    +1     USED IN ROLL LOGIC
 6173   REF   1                E6,1653          I        EQUALS DELOGA   +1     USED IN ROLL LOGIC
 6174   REF   1                E6,1654          IOGARATE EQUALS I        +1     USED IN ROLL LOGIC

R6175             TVC DAP RESTART TEMPORARIES.

 6176   REF   1                E6,1655          PACTTMP  EQUALS IOGARATE +1     B(2)
 6177   REF   1                E6,1657          YACTTMP  EQUALS PACTTMP  +2     B(2)
 6178   REF   1                E6,1661          CNTRTMP  EQUALS YACTTMP  +2     B(1)
 6180   REF   1                E6,1662          DELBRTMP EQUALS CNTRTMP  +1     B(2)
 6181   REF   1                E6,1664          ERRBTMP  EQUALS DELBRTMP +2     B(2)
 6182   REF   1                E6,1666          CMDTMP   EQUALS ERRBTMP  +2     B(2)

 6183   REF   1                E6,1670          TMP1     EQUALS CMDTMP   +2     B(2)
 6184   REF   1                E6,1672          TMP2     EQUALS TMP1     +2     B(2)
 6185   REF   1                E6,1674          TMP3     EQUALS TMP2     +2     B(2)
 6186   REF   1                E6,1676          TMP4     EQUALS TMP3     +2     B(2)
 6187   REF   1                E6,1700          TMP5     EQUALS TMP4     +2     B(2)
 6188   REF   1                E6,1702          TMP6     EQUALS TMP5     +2     B(2)

R6189             TVC DAP FILTER COEFFICIENTS TEMPORARIES

 6190   REF   1                E6,1704          COEFFADR EQUALS TMP6 +2         B(1)
 6191   REF   1                E6,1705          N10      EQUALS COEFFADR +1     I(15)

R6192             OVERLAYS WITHIN TVC DAP

 6193   REF   4  LAST  108     E6,1533          CGARATE  =      CMEGAB          B(2)

 6194   REF   2  LAST  109     E6,1611          PHASETMP =      TTMP1           B(1) RESTART FOR CSM/LM V46 SWITCH-OVER
 6195   REF   2  LAST  109     E6,1613          RTRNLOC  =      TTMP2           B(1) RESTART FOR CSM/LM V46 SWITCH-OVER
R6200

R6201             540.9 STORAGE..........

 6202   REF   1                E6,1724          NBRCYCLS EQUALS N10      +150   B(1) COUNTER FOR P40,41 STEERING
 6203   REF   1                E6,1725          NBRCYCLP EQUALS NBRCYCLS +1     B(1) MAINTAIN ORDER
 6204   REF   1                E6,1726          DELVSUM  EQUALS NBRCYCLP +1     I(6)  P40,P41
 6205   REF   1                E6,1734          DELVSUMP EQUALS DELVSUM  +6     I(6) P40,P41
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R620501 S40.8 TEMPORARY

620502 REF 1 E6,1734 MASSTMP EQUALS DELVSUMP I(2)

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P6206 ******** RCS DAP TEMPORARY VARIABLES.**********(95D)

R6208 **RCS INTERUPT TRUE TEMPS********** 15D

6210	REF	2	LAST 108	E6,1506	SPNDX	EQUALS	INTTEMP		B(1)	
6211	REF	1		E6,1507	DPNDX	EQUALS	SPNDX	+1	B(1)TMP	
6212	REF	1		E6,1510	KMPAC	EQUALS	DPNDX	+1	B(2)TMP	
6213	REF	1		E6,1512	KMPTEMP	EQUALS	KMPAC	+2	B(1)TMP	
6214	REF	1		E6,1513	XNDX1	EQUALS	KMPTEMP	+1	B(1)TMP	XNDX1 THRU NYJETS ARE OVERLAYED
6215	REF	1		E6,1514	XNDX2	EQUALS	XNDX1	+1	B(1)TMP	BY OTHER DAP ERASABLES SO
6216	REF	1		E6,1515	YNDX	EQUALS	XNDX2	+1	B(1)TMP	SHOULD ALWAYS BE DEFINED IN
6217	REF	1		E6,1516	ZNDX	EQUALS	YNDX	+1	B(1)TMP	A BLOCK
6218	REF	1		E6,1517	RINDEX	EQUALS	ZNDX	+1	B(1)TMP	
6219	REF	1		E6,1520	PINDEX	EQUALS	RINDEX	+1	B(1)TMP	
6220	REF	1		E6,1521	YINDEX	EQUALS	PINDEX	+1	B(1)TMP	
6221	REF	1		E6,1522	NRJETS	EQUALS	YINDEX	+1	B(1)TMP	
6222	REF	1		E6,1523	NPJETS	EQUALS	NRJETS	+1	B(1)TMP	
6223	REF	1		E6,1524	NYJETS	EQUALS	NPJETS	+1	B(1)TMP	
6224	REF	2	LAST 112	E6,1513	WTEMP	EQUALS	XNDX1		B(2)TMP	WTEMP THRU DELTEMPZ OVERLAY
6225	REF	1		E6,1515	DELTEMPX	EQUALS	WTEMP	+2	B(2)TMP	XNDX1 THRU NRJETS AND EDOT THRU
6226	REF	1		E6,1517	DELTEMPY	EQUALS	DELTEMPX	+2	B(2)TMP	ADBVEL
6227	REF	1		E6,1521	DELTEMPZ	EQUALS	DELTEMPY	+2	B(2)TMP	
6228	REF	2	LAST 112	E6,1515	EDOT	EQUALS	YNDX		B(2)TMP	EDOT THRU ADBVEL OVERLAY
6229	REF	1		E6,1517	AERR	EQUALS	EDOT	+2	B(1)TMP	YNDX THRU NPJETS AND DELTEMPX
6230	REF	1		E6,1520	EDOTVEL	EQUALS	AERR	+1	B(2)TMP	THRU DELTEMPZ
6231	REF	1		E6,1522	AERRVEL	EQUALS	EDOTVEL	+2	B(1)TMP	
6232	REF	1		E6,1523	ADBVEL	EQUALS	AERRVEL	+1	B(1)TMP	

R6233 *** REGULAR RCS TEMPS********** ( ).

R6235 RCS ZEROING LOOP STARTS HERE**** ** ** ** *** *** * * (37)

6237	REF	3	LAST 108	E6,1525	WBODY	EQUALS	TVCRCS		B(2)TMP	
6238	REF	1		E6,1527	WBODY1	EQUALS	WBODY	+2	B(2)TMP	
6239	REF	2	LAST 112	E6,1531	WBODY2	EQUALS	WBODY	+4	B(2)TMP	
6240	REF	1		E6,1533	ADOT	EQUALS	WBODY2	+2	B(2)TMP	
6241	REF	1		E6,1535	ADOT1	EQUALS	ADOT	+2	B(2)TMP	
6242	REF	1		E6,1537	ADOT2	EQUALS	ADOT1	+2	B(2)TMP	
6243	REF	1		E6,1541	MERRORX	EQUALS	ADOT2	+2	(2)	
6244	REF	1		E6,1543	MERRORY	EQUALS	MERRORX	+2	(2)	
6245	REF	1		E6,1545	MERRORZ	EQUALS	MERRORY	+2	(2)	
6246	REF	1		E6,1547	DFT	EQUALS	MERRORZ	+2		B(1)TMP
6247	REF	1		E6,1550	DFT1	EQUALS	DFT	+1	B(1)TMP	
6248	REF	1		E6,1551	DFT2	EQUALS	DFT1	+1	B(1)TMP	
6249	REF	1		E6,1552	DRHO	EQUALS	DFT2	+1	B(2)TMP	
6250	REF	1		E6,1554	DRHO1	EQUALS	DRHO	+2	B(2)TMP	

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 6251   REF   1          E6,1556     DRHO2    EQUALS DRHO1    +2     B(2)TMP
 6252   REF   1          E6,1560     ATTSEC   EQUALS DRHO2    +2     B(1)TMP
 6253   REF   1          E6,1561     TAU      EQUALS ATTSEC   +1     B(1)TMP
 6254   REF   1          E6,1562     TAU1     EQUALS TAU      +1     B(1)TMP
 6255   REF   1          E6,1563     TAU2     EQUALS TAU1     +1     B(1)TMP
 6256   REF   1          E6,1564     BIAS     EQUALS TAU2     +1     B(1)TMP
 6257   REF   1          E6,1565     BIAS1    EQUALS BIAS     +1     B(1)TMP
 6258   REF   1          E6,1566     BIAS2    EQUALS BIAS1    +1     B(1)TMP
 6259   REF   1          E6,1567     ERRORX   EQUALS BIAS2    +1     B(1)TMP
 6260   REF   1          E6,1570     ERRORY   EQUALS ERRORX   +1     B(1)TMP
 6261   REF   1          E6,1571     ERRORZ   EQUALS ERRORY   +1     B(1)TMP
A6262

R6263                RCS ZERO LOOP ENDS HERE

R6264                MORE RCS                                        (69D)

 6266   REF   1          E6,1572     THETADX  EQUALS ERRORZ   +1     B(1)TMP  MUST BE CONSECUTIVE WITH ERRORZ
 6267   REF   1          E6,1573     THETADY  EQUALS THETADX  +1     B(1)TMP
 6268   REF   1          E6,1574     THETADZ  EQUALS THETADY  +1     B(1)TMP

 6269   REF   1          E6,1575     DELCDUX  EQUALS THETADZ  +1     B(2)TMP
 6270   REF   1          E6,1577     DELCDUY  EQUALS DELCDUX  +2     B(2)TMP
 6271   REF   1          E6,1601     DELCDUZ  EQUALS DELCDUY  +2     B(2)TMP

 6272   REF   1          E6,1603     DCDU     EQUALS DELCDUZ  +2     B(6)TMP USED DURING P20
 6273   REF   1          E6,1611     DTHETASM EQUALS DCDU     +6     B(6)TMP STEER LOW OUTPUT.

 6274   REF   1          E6,1617     ATTKALMN EQUALS DTHETASM +6     B(1)TMP
 6275   REF   1          E6,1620     KMJ      EQUALS ATTKALMN +1     B(1)TMP
 6276   REF   1          E6,1621     KMJ1     EQUALS KMJ      +1     B(1)TMP
 6277   REF   1          E6,1622     KMJ2     EQUALS KMJ1     +1     B(1)TMP
 6278   REF   1          E6,1623     J/M      EQUALS KMJ2     +1     B(1)TMP
 6279   REF   1          E6,1624     J/M1     EQUALS J/M      +1     B(1)TMP
 6280   REF   1          E6,1625     J/M2     EQUALS J/M1     +1     B(1)TMP
 6281   REF   1          E6,1626     RACFAIL  EQUALS J/M2     +1     B(1)TMP
 6282   REF   1          E6,1627     RBDFAIL  EQUALS RACFAIL  +1     B(1)TMP
 6283   REF   1          E6,1630     ACORBD   EQUALS RBDFAIL  +1     B(1)TMP
 6284   REF   1          E6,1631     XTRANS   EQUALS ACORBD   +1     B(1)TMP
 6285   REF   1          E6,1632     CH31TEMP EQUALS XTRANS   +1     B(1)TMP
 6286   REF   1          E6,1633     CHANTEMP EQUALS CH31TEMP +1     B(1)TMP
 6287   REF   1          E6,1634     T5TIME   EQUALS CHANTEMP +1     B(1)TMP
 6288   REF   1          E6,1635     RHO      EQUALS T5TIME   +1     B(1)TMP
 6289   REF   1          E6,1636     RHO1     EQUALS RHO      +1     B(1)TMP
 6290   REF   1          E6,1637     RHO2     EQUALS RHO1     +1     B(1)TMP
 6291   REF   1          E6,1640     AMGB1    EQUALS RHO2     +1     B(1)TMP
 6292   REF   1          E6,1641     AMGB4    EQUALS AMGB1    +1     B(1)TMP
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6293  REF  1        E6,1642    AMGB5    EQUALS AMGB4    +1    B(1)TMP
6294  REF  1        E6,1643    AMGB7    EQUALS AMGB5    +1    B(1)TMP
6295  REF  1        E6,1644    AMGB8    EQUALS AMGB7    +1    B(1)TMP
6296  REF  1        E6,1645    CAPSI    EQUALS AMGB8    +1    B(1)TMP
6297  REF  1        E6,1646    CDUXD    EQUALS CAPSI    +1    B(2)TMP
6298  REF  1        E6,1650    CDUYD    EQUALS CDUXD    +2    B(2)TMP
6299  REF  1        E6,1652    CDUZD    EQUALS CDUYD    +2    B(2)TMP
6300  REF  1        E6,1654    SLOPE    EQUALS CDUZD    +2    B(1)TMP
6301  REF  1        E6,1655    ADB      EQUALS SLOPE    +1    B(1)TMP
6302  REF  1        E6,1656    RMANNDX  EQUALS ADB      +1    B(1)TMP
6303  REF  1        E6,1657    PMANNDX  EQUALS RMANNDX  +1    B(1)TMP
6304  REF  1        E6,1660    YMANNDX  EQUALS PMANNDX  +1    B(1)TMP  MUST BE LAST VARIABLE IN RCS
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P6305   ******** ENTRY DAP TEMPORARY VARIABLES.**********************************(69D)

R6307    ANGLE REGISTERS FOR ENTRY DAPS

 6308   REF   1          E6,1661      AOG       EQUALS BCDU          1P
 6309   REF   1          E6,1662      AIG       EQUALS AOG +1        1P
 6310   REF   1          E6,1663      AMG       EQUALS AIG +1        1P
 6311   REF   1          E6,1664      ROLL/180  EQUALS AMG      +1  1P
 6312   REF   1          E6,1665      ALFA/180  EQUALS ROLL/180 +1  1P
 6313   REF   1          E6,1666      BETA/180  EQUALS ALFA/180 +1  1P
 6314   REF   1          E6,1667      AOG/PIP   EQUALS BETA/180 +1  1P
 6315   REF   1          E6,1670      AIG/PIP   EQUALS AOG/PIP  +1  1P
 6316   REF   1          E6,1671      AMG/PIP   EQUALS AIG/PIP  +1  1P
 6317   REF   1          E6,1672      ROLL/PIP  EQUALS AMG/PIP  +1  1P
 6318   REF   1          E6,1673      ALFA/PIP  EQUALS ROLL/PIP +1  1P
 6319   REF   1          E6,1674      BETA/PIP  EQUALS ALFA/PIP +1  1P

R6320   GYMBAL DIFFERENCES OVER INTERVAL TCDU = .1 SEC.

 6321   REF   1          E6,1675      -DELAOG   EQUALS BETA/PIP +1  1P
 6322   REF   1          E6,1676      -DELAIG   EQUALS -DELAOG +1   1P
 6323   REF   1          E6,1677      -DELAMG   EQUALS -DELAIG +1   1P

R6324   ESTIMATED BODY RATES

 6325   REF   1          E6,1700      CMDAPMOD  EQUALS -DELAMG +1   1P  GOES BEFORE PREL FOR TM.

 6326   REF   1          E6,1701      PREL      EQUALS CMDAPMOD +1  1P  P TCDU/180      (ROLLDOT)
 6327   REF   1          E6,1702      QREL      EQUALS PREL +1      1P  Q TCDU/180      (PITCHDOT)
 6328   REF   1          E6,1703      RREL      EQUALS QREL +1      1P  R TCDU/180      (YAWDOT)

 6329   REF   1          E6,1704      BETADOT   EQUALS RREL     +1  1P  MUST FOLLOW RREL. BETADOT TCDU/180
 6330   REF   1          E6,1705      PHIDOT    EQUALS BETADOT  +1  1P

R6331   OLD (UNAVERAGED) BODY RATE MEASURE

 6332   REF   1          E6,1706      OLDELP    EQUALS PHIDOT   +1  1P
 6333   REF   1          E6,1707      OLDELQ    EQUALS OLDELP +1    1P
 6334   REF   1          E6,1710      OLDELR    EQUALS OLDELQ +1    1P

 6335   REF   1          E6,1711      JETAG     EQUALS OLDELR  +1   1P
 6336   REF   1          E6,1712      TUSED     EQUALS JETAG +1     1P  ELAPSED TIME SINCE NOMINAL UPDATE.
A6337

R6338            FOLLOWING 3 SP WORDS IN DOWNLINK. ROLLTM SENT EACH 1 SEC.

 6339   REF   1          E6,1713      PAXERR1   EQUALS TUSED    +1  1P  INTEGRATED ROLL ERROR/360.
 6340   REF   1          E6,1714      ROLLTM    EQUALS PAXERR1  +1  1P  ROLL/180 FOR TM.
 6341   REF   1          E6,1715      ROLLC     EQUALS ROLLTM   +1  2P  ROLLCOM/360 FROM ENTRY (FOR TM)
A6342                                                                >> KEEP ROLLC & ROLLHOLD ADJACENT FOR TP
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 6343   REF   1              E6,1717          ROLLHOLD EQUALS ROLLC    +2     1P FOR ATTITUDE HOLD IN CMDAPMOD = +1
A6344
R6345                ENTRY DAP QUANTITIES THAT SHARE WITH RCS DAP.

 6346   REF   2  LAST  113   E6,1603          ALFACOM  EQUALS DCDU             1P  KEEP ADJACENT TO BETACOM.  <<
 6347   REF   1              E6,1604          BETACOM  EQUALS ALFACOM +1       1P

R6348   JET LIST:    DT, JETBITS  IN THIS ORDER.

 6349   REF   1              E6,1605          TOFF     EQUALS BETACOM +1       1P   DP PAIR
 6350   REF   1              E6,1606          TBITS    EQUALS TOFF +1          1P
 6351   REF   1              E6,1607          TON2     EQUALS TBITS +1         1P   DP PAIR
 6352   REF   1              E6,1610          T2BITS   EQUALS TON2 +1          1P

R6353    MISCELLANEOUS PERMANENT ERASEABLE.

 6354   REF   1              E6,1611          OUTTAG   EQUALS T2BITS  +1       1P
 6355   REF   1              E6,1612          NUJET    EQUALS OUTTAG +1        1P
R6356      MORE  ENTRY DAP QUANTITIES THAT  DO NOT SHARE WITH RCS DAP.

 6357   REF   1              E6,1720          JETEM    EQUALS ROLLHOLD +1      2P  THIS DP USED IN RATEAVG.
 6358   REF   1              E6,1722          GAMA     EQUALS JETEM   +2       1P
 6359   REF   1              E6,1723          GAMDOT   EQUALS GAMA     +1      1P
 6360   REF   1              E6,1724          POSEXIT  EQUALS GAMDOT   +1      1P
 6361   REF   1              E6,1725          CM/GYMDT EQUALS POSEXIT  +1      1P
 6362   REF   1              E6,1726          HEADSUP  EQUALS CM/GYMDT +1      1P  DSP NOUN 61 FOR P62,63,64,67.
 6363   REF   1              E6,1727          P63FLAG  EQUALS HEADSUP  +1      1P  INTERLOCK FOR WAKEP62
A6364

A6365                                                    >> SHARE BELOW WITH RCS RUPT TEMPS (< 15D) <<<
 6366   REF   2  LAST  112   E6,1506          CALFA    EQUALS SPNDX            1P
 6367   REF   1              E6,1507          SALFA    EQUALS CALFA +1         1P

 6368   REF   1              E6,1510          SINM     EQUALS SALFA +1         1P
 6369   REF   1              E6,1511          COSM     EQUALS SINM +1          1P
 6370   REF   1              E6,1512          SINO     EQUALS COSM +1          1P
 6371   REF   1              E6,1513          COSO     EQUALS SINO +1          1P
 6372   REF   1              E6,1514          SINOCOSM EQUALS COSO +1          1P
 6373   REF   1              E6,1515          COSOCOSM EQUALS SINOCOSM +1      1P
A6374                                                    >> SHARE ABOVE WITH RCS RUPT TEMPS          <<<
A6375
R6376                THE FOLLOWING FEW REGISTERS USED ONCE EACH 2 SEC.

 6377   REF   1              E6,1613          -VT/180  EQUALS NUJET   +1      1P
 6378   REF   1              E6,1614          LCX/360  EQUALS -VT/180 +1      1P
 6379   REF   1              E6,1615          XD/360   EQUALS LCX/360 +1      1P
 6380   REF   1              E6,1616          VSQ/4API EQUALS XD/360  +1      1P
 6381   REF   1              E6,1617          JNDX     EQUALS VSQ/4API +1     1P
 6382   REF   1              E6,1620          JNDX1    EQUALS JNDX +1         1P
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 6383   REF   1              E6,1621          TON1     EQUALS JNDX1 +1          1P   DP PAIR
 6384   REF   1              E6,1622          T1BITS   EQUALS TON1     +1      1P
R6385                MISCELLANEOUS REGISTERS USED EACH UPDATE.
 6386   REF   1              E6,1623          CM/SAVE  EQUALS T1BITS   +1      1P
 6387   REF   1              E6,1624          JETEM2   EQUALS CM/SAVE +1       1P   TEMPORARY STORAGE
A6388
R6389                DAP   QUANTITIES SHARED WITH RCS DAP FOR TM & FLIGHT RECORDER.
 6390   REF   2 LAST 113    E6,1567          VDT/180  =       ERRORX           1P   (EDIT)
 6391   REF   2 LAST 113    E6,1570          -VT/180E =       ERRORY           1P   (EDIT)
 6392   REF   1              E6,1476          PAXERR   EQUALS AK               1P   ROLL ERROR FOR NEEDLES
 6393   REF   2 LAST 113    E6,1572          QAXERR   =       THETADX          1P   SINCE AK1 IS ZEROED IN ATM DAP.
 6394   REF   1              E6,1573          RAXERR   =       QAXERR   +1      1P   SINCE AK2 IS ZEROED IN TM DAP.
A6395
R6396                **** COLMANU (R60,R62) ****
 6397   REF   1              E6,1710          VECQTEMP EQUALS COFSKEW
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P6398   ******** KALCMANU VARIABLES. (71D) ************************************
 6399   REF   1              E6,1661    BCDU     EQUALS YMANNDX  +1     B(3) TMP
 6400   REF   2  LAST  115   E6,1664    KSPNDX   EQUALS BCDU +3        B(1)TMP
 6401   REF   1              E6,1665    KDPNDX   EQUALS KSPNDX   +1     B(1)TMP

 6402   REF   1              E6,1666    TMIS     EQUALS KDPNDX   +1     I(18) MUST BE IN SAME BANK AS RCS DAP
 6403   REF   1              E6,1710    COFSKEW  EQUALS TMIS     +18D   I(6)  MUST BE IN SAME BANK AS RCS DAP
 6404   REF   2  LAST  117   E6,1716    CAM      EQUALS COFSKEW  +6     I(2)  MUST BE IN SAME BANK AS RCS DAP

 6405   REF   1              E6,1720    MIS      EQUALS CAM      +2     I(18)  (THE REST MAY GO ANYWHERE)
 6406   REF   1              E6,1742    COF      EQUALS MIS      +18D   I(6)TMP
 6407   REF   1              E6,1750    SCAXIS   EQUALS COF      +6     I(6)TMP
 6408   REF   1              E6,1756    POINTVSM EQUALS SCAXIS   +6     I(6)TMP
 6409   REF   1              E6,1764    AM       EQUALS POINTVSM +6     I(2)TMP
 6410   REF   1              E6,1766    RAD      EQUALS AM       +2     I(2)TMP

R6411   FIRST-ORDER OVERLAYS IN KALCMANU                                (12D+8D)

 6413   REF   2  LAST  118   E6,1666    MFISYM   EQUALS TMIS            I    TMP
 6414   REF   3  LAST  118   E6,1666    TMFI     EQUALS TMIS            I    TMP
 6415   REF   4  LAST  118   E6,1666    NCDU     EQUALS TMIS            B    TMP
 6416   REF   5  LAST  118   E6,1671    NEXTIME  EQUALS TMIS     +3     B    TMP
 6417   REF   6  LAST  118   E6,1672    TTEMP    EQUALS TMIS     +4     B    TMP
 6419   REF   7  LAST  118   E6,1674    BIASTEMP EQUALS TMIS     +6     B    TMP
 6422   REF   3  LAST  118   E6,1710    BRATE    EQUALS COFSKEW         B    TMP
 6423   REF   2  LAST  118   E6,1716    TM       EQUALS CAM             B    TMP

R64281          UT TEMPS

 64285  REF   2  LAST  118   E6,1750    UTX      EQUALS SCAXIS          I(6)
 64286  REF   2  LAST  118   E6,1756    UTY      EQUALS POINTVSM        I(6)

R6429           SATURN BOOST STORAGE. SAVE TILL RCS DAP OPERATION.      (17D)

 6431   REF   3  LAST  118   E6,1661    POLYNUM  EQUALS BCDU            B(15) PAD LOADED
 6432   REF   1              E6,1673    POLYLOC  =      POLYNUM  +10D
 6433   REF   2  LAST  118   E6,1700    SATRLRT  EQUALS POLYNUM  +15D   B(2)  PAD LOADED
A6434

R6435           MORE P11 STORAGE -PAD LOADED-                           (2D)

R6437           (NOTE: THIS PAD LOAD WILL NOT BE PRESERVED THROUGHOUT THE MISSION AS IT SHARES STORAGE WITH KALCMANU,
R6439            ENTRY DAP AND TVC DAP)

 6440   REF   1              E6,1702    RPSTART  EQUALS SATRLRT  +2     B(1) PITCH ROLL START TIME
 6441   REF   1              E6,1703    POLYSTOP EQUALS RPSTART  +1     B(1) POLY CUTOFF MINUS RPSTART SEC
A6442
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R6443           P11 STORAGE                                                 (4D)

 6444  REF  1          E6,1704    SPOLYARG EQUALS POLYSTOP +1    B(1)TMP ARG FOR POLY
 6455  REF  1          E6,1705    BOOSTEMP EQUALS SPOLYARG +1    B(3)TEMP


R64551 P11 SATURN I/F                                                       (9D)

 64553 REF  1          E6,1710    SATRATE  EQUALS BOOSTEMP +3    B(4)PL MANEUVER RATES FOR SATURN STICK
 64554 REF  1          E6,1714    SATSW    EQUALS SATRATE  +4    B(1)TEM STATUS SW FOR BOOST TAKEOVER
 64555 REF  1          E6,1715    BIASAK   EQUALS SATSW    +1    B(3)TEM STORE AK BIAS FOR BOOST TAKEOVER
 64556 REF  1          E6,1720    SATSCALE EQUALS BIASAK   +3    B(1) SCALE FACTOR FOR SATURN STEERING
A64557


R6456           P21 STORAGE.                                                (1D)

 6458  REF  1          E6,1770    GENRET   EQUALS RAD      +2    B(1)TMP


R6459           R61CSM STORAGE.                                             (1D)

 6461  REF  1          E6,1771    SAVBNK   EQUALS GENRET   +1    B(1) S-S SAVE EBANK FOR R61 SUBROUTINE


R6462  R67 STORAGE                                                          (1D)
A64631
 6464  REF  1          E6,1772    RATEPTC  EQUALS SAVBNK   +1    B(1)
A64641

R64642          PERMANENT STORAGE FOR P20 DEADBAND                          (1D)

 6465  REF  1          E6,1773    DBPTC    EQUALS RATEPTC +1     B(1)
A64651

R6466  R61,R67 STORAGE                                                      (1D)


 6468  REF  1          E6,1774    R61CNTR  EQUALS DBPTC   +1     B(1)
R6469           ENTRY RESTART PROTECTION STORAGE. -KEEP TEMPS IN ORDER-     (12D)

 6471  REF  2 LAST 119 E6,1770    TEMPROLL EQUALS GENRET         B(1)TMP COPY CYCLE REGISTER
 6472  REF  1          E6,1771    TEMPALFA EQUALS TEMPROLL +1    B(1)TMP COPY CYCLE REGISTER
 6473  REF  1          E6,1772    TEMPBETA EQUALS TEMPALFA +1    B(1)TMP COPY CYCLE REGISTER
 6474  REF  1          E6,1773    60GENRET EQUALS TEMPBETA +1    B(1)TMP QSAVE FOR S61.1 AND ENTRY.
 6475  REF  1          E6,1774    S61DT    EQUALS 60GENRET +1    B(1)TMP VARIABLE DT FOR S61.1 RESTART.
A6476


R6477           ENTRY TM SHARING FOR ACCELERATION PROFILE.
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 6478   REF   2 LAST  112   E6,1533          XPIPBUF  EQUALS ADOT            B(1) PIPA BUFFER FOR TM DURING ENTRY.
 6479   REF   1               E6,1534          YPIPBUF  EQUALS XPIPBUF  +1    B(1) PIPS FILED HERE EACH .5 SEC APPEAR
 6480   REF   1               E6,1535          ZPIPBUF  EQUALS YPIPBUF  +1    B(1) ON DOWNLIST ONCE PER SECOND DURING
 6481   REF   1               E6,1536          XOLDBUF  EQUALS ZPIPBUF  +1    B(1) ENTRY AFTER RCS DAP HAS BEEN DIS-
 6482   REF   1               E6,1537          YOLDBUF  EQUALS XOLDBUF  +1    B(1) ABLED. NEWEST PIP VALUE REPLACES
 6483   REF   1               E6,1540          ZOLDBUF  EQUALS YOLDBUF  +1    B(1) PIPBUF,WHICH IS MOVED INTO OLDBUF.
R6484

R6485           REENTRY VARIABLES SHARED WITH RCS DAP FOR TM & FLIGHT RECORDER.

 6486   REF   2 LAST  113   E6,1574          Q7       =       THETADZ         I(2)  HI-WORD ONLY ON DNLIST.

 6487   REF   3 LAST  112   E6,1525          ASPS(TM) =       WBODY           I(6) DWN
A6488                                                                              ASKEP,ASP1,ASPUP,ASPDN,ASP3,ASP3+1

R64885          P23 PAD LOAD (2D)                                            (1)

 64887  REF   1               E6,1775          HORISLP  EQUALS R61CNTR  +1    I(2)PL
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P7000                    EBANK-7 ASSIGNMENTS
 7001                          E7,1400                    SETLOC 3400

R7002            *-*-*-*-  OVERLAY 0 IN EBANK 7 -*-*-*-*
R7003            EXTERNAL DELTA-V UPDATE.                                  (21D)
R7005            (MUST BE IN ORDER FOR UPDATE PROGRAM. ALSO ENTRY PROGRAMS PICK UP 'LAT(SPL)' WITH A VLOAD.)

 7007                          E7,1400  E7,1424  LAT(SPL)  ERASE            +20D   I(2)      DSP NOUN 61 FOR P62,63,64,67
 7008  REF   2  LAST   36      E7,1402           LNG(SPL)  EQUALS LAT(SPL)  +2     I(2)DSP NOUN 61 FOR P62,63,64,67

 7009  REF   1                 E7,1404           DELVSLV   EQUALS LNG(SPL)  +2     I(6)TMP DELTA VEL VECT, LOC VER COORDS
 7010  REF   2  LAST   36      E7,1412           TIG       EQUALS DELVSLV   +6     B(2)DSP NOUN 33 FOR X-V84(R32),P30,40.
 7011  REF   2  LAST   36      E7,1414           RTARG     EQUALS TIG       +2     I(6)IN  DESIRED VEHICHE RADIUS VECTOR
 7012  REF   1                 E7,1422           DELLT4    EQUALS RTARG     +6     I(2)IN  TIME DIFFERENCE FOR INITVEL
 7013  REF   1                 E7,1424           ECSTEER   EQUALS DELLT4    +2     I(1)PL   FOR P40 S
 7014  REF   3  LAST  121      E7,1404           DELVLVC   =       DELVSLV
 7015                          E7,1425  E7,1425  END-DELV  ERASE                  *NEXT AVAIL LOC AFTER UNSHARED E7*
A7015S

R7016            SERVICER STORAGE.                                         (12D)

 7018  REF   1                 E7,1425           DVTOTAL   EQUALS END-DELV        B(2) DSP NOUN 40,99 FOR P30,34,35,40
 7019  REF   1                 E7,1427           TGO       EQUALS DVTOTAL   +2     B(2)
 7021  REF   1                 E7,1431           DELVREF   EQUALS TGO       +2     I(6)TMP
 7022  REF   1                 E7,1447           NOMTIG    EQUALS END-KALC        I(2) (CAN NOT SHARE WITH KALCMANU
A7023                                                                             OR DELVREF)
 7024  REF   1                 E7,1451           END-SVCR  EQUALS NOMTIG    +2     ***NEXT AVAILABLE AFTER SERVICER
A7025

R7026            ALIGNMENT STORAGE.                                        (7D)

 7031  REF   1                 E7,1451           VEL/C     EQUALS END-SVCR        I(6)TMP
 7032  REF   1                 E7,1457           R53EXIT   EQUALS VEL/C     +6     I(1)TMP

R7033            ALIGNMENT  MARKDATA  (DOWNLNK)******                      (7D)
 7035  REF   1                 E7,1460           MARK2DWN  EQUALS R53EXIT   +1     (7)  USED BY ALLIGNMENT P52 S
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P7036                *-*-*-*-  OVERLAY 1 IN EBANK 7 -*-*-*-*

R7037   REENTRY ERASABLES                                              (181D+4D)

 7039   REF   2  LAST  121   E7,1451        RTINIT   EQUALS END-SVCR        6P
 7040   REF   1              E7,1457        RTEAST   EQUALS RTINIT +6       6P
 7041   REF   1              E7,1465        RTNORM   EQUALS RTEAST +6       6P
 7042   REF   1              E7,1473        RT       EQUALS RTNORM +6       6P
 7043   REF   1              E7,1501        UNI      EQUALS RT +6           6P
 7044   REF   1              E7,1507        UNITV    EQUALS UNI +6          6P
 7045   REF   1              E7,1515        VEL      EQUALS UNITV +6        6P

 7046   REF   1              E7,1523        TIME/RTO EQUALS VEL      +6    2P   TIME OF INITIAL TARGET, RTO.
 7047   REF   1              E7,1525        -VREL    EQUALS TIME/RTO +2    6P
 7048   REF   1              E7,1533        OLDUYA   EQUALS -VREL +6       6P   USED BY CM/POSE    (ENTRY DAP)
 7049   REF   1              E7,1541        UXA/2    EQUALS OLDUYA +6      6P   USED BY CM/POSE  (ENTRY DAP)  -UVA
 7050   REF   1              E7,1541        URH      =      UXA/2                P61 DISPLAY NOUN
 7051   REF   2  LAST  122   E7,1547        UYA/2    EQUALS UXA/2 +6       6P   USED BY CM/POSE  (ENTRY DAP)   UYA
 7052   REF   1              E7,1555        UZA/2    EQUALS UYA/2 +6       6P   USED BY CM/POSE  (ENTRY DAP)   UNA
 7053   REF   1              E7,1563        UBX/2    EQUALS UZA/2 +6       6P   USED BY CM/POSE  (ENTRY DAP)
 7054   REF   1              E7,1571        UBY/2    EQUALS UBX/2 +6       6P   USED BY CM/POSE  (ENTRY DAP)
 7055   REF   1              E7,1577        UBZ/2    EQUALS UBY/2 +6       6P   USED BY CM/POSE  (ENTRY DAP)

 7056   REF   1              E7,1605        DTEAROT  EQUALS UBZ/2 +6       2P
 7057   REF   1              E7,1607        DIFF     EQUALS DTEAROT +2     2P
 7058   REF   1              E7,1611        DIFFOLD  EQUALS DIFF +2        2P
 7059   REF   1              E7,1613        FACTOR   EQUALS DIFFOLD +2     2P
 7060   REF   1              E7,1615        FACT1    EQUALS FACTOR  +2     2P
 7061   REF   1              E7,1617        FACT2    EQUALS FACT1   +2     2P
A7062                                      Q7       =      THETADZ         2P   SHARED FOR TM.   P64-P66
 7063   REF   1              E7,1621        VSQUARE  EQUALS FACT2 +2       2P
 7064   REF   1              E7,1623        LAD      EQUALS VSQUARE +2     2P
 7065   REF   1              E7,1625        LOD      EQUALS LAD     +2     2P
 7066   REF   1              E7,1627        L/DCMINR EQUALS LOD     +2     2P
 7067   REF   1              E7,1631        KLAT     EQUALS L/DCMINR +2    2P
 7068   REF   1              E7,1633        L/D      EQUALS KLAT +2        2P
 7069   REF   1              E7,1635        L/D1     EQUALS L/D +2         2P
 7070   REF   1              E7,1724        LEWD     =      VIO             2P   SHARED FOR TM.  P64-P65
 7071   REF   1              E7,1637        D        EQUALS L/D1    +2     2P   DSP NOUN 64,66,68 FOR P63,64,67
A7072                                      V1       =      ENDBUF +1       2P   SHARED FOR TM.  P64-P65
 7073   REF   1              E7,1641        DLEWD    EQUALS D       +2     2P
 7074   REF   1              E7,1643        K2ROLL   EQUALS DLEWD   +2     2 P
 7075   REF   1              E7,1645        GOTOADDR EQUALS K2ROLL +2      1P
 7076   REF   1              E7,1646        TEM1B    EQUALS GOTOADDR +1    2 P
 7077   REF   1              E7,1650        MM       EQUALS TEM1B   +2     2 P
 7078   REF   1              E7,1651        GRAD     EQUALS MM +1          1P
 7079   REF   1              E7,1652        FX       EQUALS GRAD    +1     1P   OVERWRITES NEXT 5 LOCS IN P67
 7080   REF   1              E7,1653        LEQ      EQUALS FX +1          2P
 7081   REF   1              E7,1655        DHOOK    EQUALS LEQ +2         2P
 7082   REF   1              E7,1657        AHOOKDV  EQUALS DHOOK +2       2P
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 7083   REF  1              E7,1661    DVL      EQUALS AHOOKDV +2     2P
A7084                                  AO       =      ENDBUF +3      2P    SHARED FOR TM.(HI-WD ) P64-P65
 7085   REF  1              E7,1663    A1       EQUALS DVL     +2     2P
 7086   REF  1              E7,1665    VBARS    EQUALS A1 +2          2P
 7087   REF  1              E7,1667    COSG/2   EQUALS VBARS +2       2P
 7089                 0026             GAMMAL1  =      22D            2P
 7090   REF  1              E7,1671    VS1      EQUALS COSG/2  +2     2P
 7092   REF  1              E7,1673    V        EQUALS VS1     +2     2P
A7093                                  VREF     =      THETAD  +2     2P    SHARED FOR TM    P65
 7094   REF  1              E7,1675    LATANG   EQUALS V       +2     2P    ADJACENT FOR TM.
 7095   REF  1              E7,1677    RDOT     EQUALS LATANG  +2     2P    ADJACENT FOR TM.
 7096   REF  1              E7,1701    THETAH   EQUALS RDOT    +2     2P    DSP NOUN 64,67 FOR P63,64,67
A7097                                  RDOTREF  =      THETAD         2P    SHARED FOR TM     P65
 7098   REF  1              E7,1703    ALP      EQUALS THETAH  +2     2P

 7099   REF  1              E7,1730    ASKEP    =      ASPS           2P)                 THESE ARE STORED IN
 7100   REF  2 LAST 123     E7,1731    ASP1     =      ASPS    +1     2P)                 SEQUENCE,OVERLAPPING
 7101   REF  3 LAST 123     E7,1732    ASPUP    =      ASPS    +2     2P)>HI-WD OF EACH<  HI-WORD ONLY APPEARS
 7102   REF  4 LAST 123     E7,1733    ASPDWN   =      ASPS    +3     2P)                 ON DOWNLIST, EXCEPT
 7103   REF  5 LAST 123     E7,1734    ASP3     =      ASPS    +4     2P)                 ASP3 IS COMPLETE.

 7104   REF  1              E7,1705    C/DO     EQUALS ALP     +2     2P   -1/DO
 7105   REF  1              E7,1707    DO       EQUALS C/DO     +2    I(2)    CONSTANT DRAG
 7106   REF  1              E7,1711    Q2       EQUALS DO      +2     2P
A7107
R7108                 ROLLC IS LOCATED IN EBANK= AOG TO AID ENTRY DAP.
 7109   REF  1              E7,1713    RTGO     EQUALS Q2      +2     2P   DSP NOUN 66 FOR P64,P67.
 7110   REF  1              E7,1715    DNRNGERR EQUALS RTGO    +2     2P DSP NOUN 66 FOR P64,67.
 7111   REF  2 LAST 123     E7,1675    XRNGERR  =      LATANG         2P      FOR DISKY DISPLAY
 7112   REF  1              E7,1717    KAT      EQUALS DNRNGERR +2    2P
 7113   REF  1              E7,1721    GMAX     EQUALS KAT     +2     1P  DSP NOUN 60 FOR P61,62,63.
A7114                                                                 GMAX IS LOADED IN  DOUBLE PRECISION
 7115   REF  1              E7,1726    L/DCALC  =      TTE            2P  CALCULATED L/D FOR TM:  P64 - P67.
A71155

 71159  REF  1              E7,1756    VL       =      VPRED          2P  SHARED FOR TM  P64-P65
 7116   REF  1              E7,1760    GAMMAL   =      GAMMAEI        2P  SHARED FOR TM   P64
 7117   REF  2 LAST 123     E7,1760    PREDANG  =      GAMMAEI            FOR TM IN P67.
 7118   REF  1              E7,1761    JJ       =      PREDANG +1         FOR TM IN P67.
A71185

R71186      ENTRY P11  P15

 7119   REF  1              E7,1722    VMAGI    EQUALS GMAX    +1     2P DSP NOUN 62,64,68 FOR P11,63,64.
R71195
 7120   REF  1              E7,1724    VIO      EQUALS VMAGI   +2     2P  DSP NOUN 63 FOR P61.
 7121   REF  2 LAST 122     E7,1726    TTE      EQUALS VIO     +2     2P  DSP NOUN 63 FOR P61.

 7122   REF  2 LAST 123     E7,1730    ASPS     EQUALS TTE      +2    I(2)     HI-WORD ONLY ON DNLIST FOR TEMP
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 7123   REF   6 LAST  123   E7,1732          TTE1     EQUALS ASPS     +2     I(2ETMP HOLDS UNDECREMENTED TTE VALUE

 71235  REF   1             E7,1734          TTE2     EQUALS TTE1  +2        I(2) HOLDS COMPENSATED TTE VALUE DURING
A71236                                                                          P61 THRU P63 FOR  N63 DISPLAY

R7124           **** P60S ****                                               (2D)

 7125   REF   2 LAST  123   E7,1713          RTGON64  EQUALS RTGD             RANGE ERRORS NEGATIVE IF FALLS SHORT
 7126   REF   3 LAST  124   E7,1713          RTGON67  EQUALS RTGO               DSP NOUN 67
A7127

R7128           REENTRY, RETURN TO EARTH COMMOM DISPLAY.                      (4D)

 7130   REF   1             E7,1756          VPRED    EQUALS BETA12   +2     DSP NOUN 60 FOR P61,   ,62,63.
 7131   REF   2 LAST  123   E7,1760          GAMMAEI  EQUALS VPRED    +2     DSP NOUN 60 FOR P61,   ,62,63.
A7132

R71323          DISPLAY REGISTER FOR VG                                       (2D)

 71325  REF   3 LAST  123   E7,1762          VGDISP   EQUALS GAMMAEI  +2     B(2)DSP N.40,42,99 FOR P30,34,35,37,40,
A71326                                                                          41 VG DISPLAY

R7133           SOME P11 DISPLAY REGISTERS.                                   (4D)

 7135   REF   1             E7,1736          ALTI     EQUALS TTE2     +2     2P DSP NOUN 62 FOR P11
 7136   REF   1             E7,1740          HDOT     EQUALS ALTI     +2     2P DSP NOUN 62 FOR P11.
A7137
R71371          P15,S11.1 INTERFACE                                           (4D)

 71373  REF   2 LAST  123   E7,1722          VNOW     =      VMAGI

 71374  REF   3 LAST  124   E7,1724          VGTLI    EQUALS VMAGI +2        I(2)TMP
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P7138                *-*-*-*-  OVERLAY 2 IN EBANK 7 -*-*-*-*

R7139                KALCMANU STORAGE.                                          (18D)

 7141  REF  2 LAST 121  E7,1425   MFS      EQUALS END-DELV          I(18)
 7142  REF  1           E7,1425   MFI      EQUALS MFS               I   TMP
 7143  REF  2 LAST 125  E7,1425   DEL      EQUALS MFS               I   TMP
 7144  REF  3 LAST 125  E7,1447   END-KALC EQUALS MFS      +18D     **NEXT AVAIL LOC AFTER KALCMANU **

R7145                MEASUREMENT INCORPORATION STORAGE(R22) STORAGE.             (56D)

 7147  REF  2 LAST 121  E7,1447   TX789    EQUALS END-KALC          I(6)TMP
 7148  REF  1           E7,1455   GAMMA    EQUALS TX789     +6      I(2)TMP
 7149  REF  1           E7,1457   OMEGA    EQUALS GAMMA     +2      I(18)TMP
 7150  REF  1           E7,1501   BVECTOR  EQUALS OMEGA     +18D    I(18)TMP
 7151  REF  1           E7,1523   DELTAQ   EQUALS BVECTOR   +18D    I(2)TMP
 7152  REF  1           E7,1525   VARIANCE EQUALS DELTAQ +2         I(3)TMP
 7153  REF  1           E7,1530   RCLP     EQUALS VARIANCE +3      I(6)TMP
 7154  REF  1           E7,1536   GRP2SVQ  EQUALS RCLP      +6     I(1)TMP QSAVE FOR RESTARTS

R71542               P22 TEMP

 71545 REF  2 LAST 125  E7,1501   S22UMRL  EQUALS BVECTOR           I(18)

R7155                P20, P22, P23 DSP NOUN                                     (5D)

 7157  REF  3 LAST 125  E7,1501   N49DISP  EQUALS BVECTOR           B(5)TMP

R7158                S22.1 STORAGE.                                             (36D)

 7160  REF  1           E7,1537   SVMRKDAT EQUALS GRP2SVQ  +1      I(36)TMP 5 SETS OF MARK DATA +PAD OF ONE

R7161                **** CISLUNAR NAV. ERAS. (P20S) ****                       (42D)

 7165  REF  1           E7,1603   UBAR0    EQUALS SVMRKDAT +36D
 7166  REF  1           E7,1611   UBAR1    EQUALS UBAR0 +6
 7167  REF  1           E7,1617   UBAR2    EQUALS UBAR1 +6
 7168  REF  1           E7,1625   RZC      EQUALS UBAR2 +6
 7169  REF  1           E7,1633   VZC      EQUALS RZC +6
 7170  REF  1           E7,1641   UCLSTAR  EQUALS VZC +6
 7171  REF  1           E7,1647   USSTAR   EQUALS UCLSTAR +6
A7175
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L ERASABLE ASSIGNMENTS

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P7176                *-*-*-*-  OVERLAY 3 IN EBANK 7 -*-*-*-*
R7177                RENDEZVOUS GUIDANCE STORAGE.  - P32...P35 -                (8D)

 7179  REF  3  LAST 125  E7,1447          DELTEED  EQUALS END-KALC        I(2) S-S BACK VALUES OF DELTA TIME
 7180  REF  1            E7,1451          DELEL    EQUALS DELTEED  +2     I(2) S-S
 7181  REF  1            E7,1453          SECMAX   EQUALS DELEL    +2     I(2) S-S MAX STOP SIZE FOR ROUTINE
 7182  REF  1            E7,1455          XXXALT   EQUALS SECMAX   +2     I(2)
A7183

R7184                S40.9 STORAGE.                                          (16D)

 7186  REF  1            E7,1457          VG       EQUALS XXXALT   +2     I(6)TMP
 7187  REF  1            E7,1465          VRPREV   EQUALS VG       +6     I(6)
 7188  REF  1            E7,1473          TNIT     EQUALS VRPREV   +6     I(2)
 7189  REF  1            E7,1475          TNITPREV EQUALS TNIT     +2     I(2)

R7193                P30'S COMMON STORAGE                                    (24D)

 7195  REF  2  LAST 125  E7,1537          RACT3    EQUALS GRP2SVQ  +1     I(6)TMP POSITION OF ACTIVE AT TPI TIME.
 7196  REF  1            E7,1545          VACT3    EQUALS RACT3    +6     I(6)TMP VELOCITY OF ACTIVE AT  TPI TIME.
 7197  REF  1            E7,1553          RPASS3   EQUALS VACT3    +6     I(6)TMP POSITION OF PASSIVE AT TPI TIME.
 7198  REF  1            E7,1561          VPASS3   EQUALS RPASS3   +6     I(6)TMP VELOCITY OF PASSIVE AT TPI TIME.

R7199                P76  N84 DISPLAY  -  P32  N82 DISPLAY                   (6D)
 7201  REF  2  LAST 126  E7,1537          DELVOV   EQUALS RACT3           I(6)DSP NOUN 84 FOR X-V84, P34-35
A7202

R72025               P76 - P77           STORAGE                             (1D)

 72027 REF  1            E7,1545          OPTFLAG  EQUALS DELVOV   +6     B(1)TMP FLAG FOR P76 OR P77 BRANCHING
R7203                INITVEL/MIDGIM STORAGE.                                 (34D)
R7205                     (CALLED BY S34.1,2,  S35.1,2, AND S40.9)
R7206                     (CALLS LAMBERT, CONIC SUBROUTINES)

 7207  REF  1            E7,1567          RINIT    EQUALS VPASS3   +6     I(6)IN  ACTIVE VEHICLE RADIUS VECTOR
 7208  REF  1            E7,1575          VINIT    EQUALS RINIT    +6     I(6)IN  ACTIVE VEHICLE VELOCITY VECTOR
 7209  REF  1            E7,1603          RTARG1   EQUALS VINIT    +6     I(6)TMP SHIFTED RTARG
 7210  REF  1            E7,1611          VIPRIME  EQUALS RTARG1   +6     I(6)OUT   NEW VEL REQ AT INITIAL RADIUS
 7211  REF  1            E7,1617          VTPRIME  EQUALS VIPRIME  +6     I(6)OUT TOTAL VELOCITY AT DESIRED RADIUS
 7212  REF  1            E7,1625          +MGA     EQUALS VTPRIME  +6     I(2)DSP NOUN 45 FOR P30,34,35. +MID GIM.
 7213  REF  1            E7,1627          COZY4    EQUALS +MGA     +2     I(2)TMP COSINE OF ANGLE WHEN ROT STARTS

R7214    (THE FOLLOWING OVERLAYS MEASUREMENT INCORP AND CAN NOT SHARE WITH TPI

 7215  REF  1            E7,1502          INTIME   EQUALS INITPREV +5
 7216  REF  1            E7,1504          ITCTR    EQUALS INTIME   +2     I(1) TMP ITERATION COUNTER
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 7217   REF  1                E7,1631          END-IN/M EQUALS COZY4    +2     **NEXT AVAIL LOC AFTER INITVEL/MIDGIM**

R7218                P34 AND P33 STORAGE.  (OVERLAYS INITVEL/MIDGIM)              (24D)

 7220   REF  2  LAST  126    E7,1567          VAPREC   EQUALS RINIT               I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
 7221   REF  2  LAST  126    E7,1575          RAPREC   EQUALS VINIT               I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
 7222   REF  2  LAST  126    E7,1611          VPPREC   EQUALS VIPRIME             I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
 7223   REF  2  LAST  126    E7,1617          RPPREC   EQUALS VTPRIME             I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
R7224

R7225                P30, P40 INTERFACE.                                          (20D)

 7227   REF  1                E7,1631          RTIG     EQUALS END-IN/M          I(6)TMP
 7228   REF  1                E7,1637          VTIG     EQUALS RTIG      +6      I(6)TMP
 7229   REF  1                E7,1645          DELVSIN  EQUALS VTIG      +6      I(6)TMP
 7230   REF  1                E7,1645          DELVEET3 EQUALS DELVSIN           TMP DELTA VEL VECT INERTIAL COORDS.
 7231   REF  1                E7,1645          VGTEMP   EQUALS DELVEET3
 7232   REF  2  LAST  127     E7,1653          DELVSAB  EQUALS DELVSIN  +6      I(2)TMP
A7233

R7234                P35-P40 INTERFACE STORAGE. (OVERLAYS P30-P40 I/F STORAGE)     (6D)

 7237   REF  2  LAST  127     E7,1637          VPASS4   EQUALS VTIG              I(6)TMP VELOCITY OF PASSIVE AT INTERCEPT
R7242                P30-P40 COMMON STORAGE.                                      (3D)

 7244   REF  1                E7,1655          TPASS4   EQUALS DELVSAB  +2      I(2)TMP
 7246   REF  1                E7,1657          QTEMP    EQUALS TPASS4   +2      I(1) TMP
A7247

R7248                P30-P40 STORAGE.                                             (4D)

 7250   REF  1                E7,1660          TTOGO    EQUALS QTEMP    +1      B(2)DSP NOUN 35,40,45,59,99
A7251                                                                                 FOR P30,34,35,40,41,47,  R3
 7252   REF  1                E7,1662          TTPI     EQUALS TTOGO    +2      B(2)DSP NOUN 37 FOR P34 TPI TIME, CSECS.

 7253   REF  1                E7,1664          END-P30S EQUALS TTPI     +2      **NEXT AVAIL LOC AFTER P30-40 STORAGE.**

R7254                P40 STORAGE.                                                 (8D)

 7256   REF  1                E7,1664          VGBODY   EQUALS END-P30S          B(6)DSP NOUN 85 FOR P40,41,42 VG-SC COOR
 7257   REF  1                E7,1664          DELVCTL  =       VGBODY
 7258   REF  2  LAST  127     E7,1672          P40TMP   EQUALS VGBODY   +6      B(2)TMP

R7259                P47 STORAGE.
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 7260   REF   2  LAST  126   E7,1457          DV47TEMP EQUALS VG              B(6)TMP
 7261   REF   1               E7,1674          DELVIMU  EQUALS P40TMP   +2     I(6)  DSP  NOUN 83 FOR P47 DELTAV(IMU)
A7262
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R7263 S40.1 STORAGE. (23D)

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 7265   REF   1               E7,1702          CSTEER   EQUALS DELVIMU  +6     I(2)IN
 7266   REF   1               E7,1704          BDT      EQUALS CSTEER   +2     I(6)IN
 7267   REF   1               E7,1712          UT       EQUALS BDT      +6     I(6)OUT THRUST DIRECTION
 7268   REF   1               E7,1720          VGTIG    EQUALS UT       +6     I(6)OUT
 7269   REF   1               E7,1720          VGPREV   =      VGTIG
 7270   REF   2  LAST  128    E7,1726          F        EQUALS VGTIG    +6     I(2)OUT S40.3 NEEDS THIS

 7271   REF   1               E7,1730          QTEMP1   EQUALS F        +2     I(1)TMP HOLDS RETURN
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R7272 P15 TEMPORARY STORAGE (6D)

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 72722  REF   1               E7,1457          AVEGDT   EQUALS DV47TEMP        B(2)
 72723  REF   1               E7,1461          VPAST    EQUALS AVEGDT +2       I(2)
 72724  REF   1               E7,1463          TLITMP   EQUALS VPAST  +2       B(2)
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R7273 R41 (2D)

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 7275   REF   2  LAST  128    E7,1465          T-TO-ADD EQUALS DV47TEMP +6     I(2) FOR MIDTOAVE
A7276
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P7277           *-*-*-*-  OVERLAY 4 IN EBANK 7 -*-*-*-*
R7278           S35.1 STORAGE.                                          (2D)
 7280   REF  2  LAST  127  E7,1664          TSTRT    EQUALS END-P30S    I(2)IN  MIDCOURSE START TIME

R7281           S34.1 STORAGE.          (OVERLAYS S35.1 STORAGE)        (1D)
 7283   REF  1              E7,1664          TITER    EQUALS TSTRT       I(1)TMP ITERATION COUNTER

R7288           P22 STORAGE.                                            (5D)
 7291   REF  1              E7,1667          S22TOFF  EQUALS DELVEET2 +1 2   T SUB OFF
A7291                                                                   *USED IN SUBROUTINE COMMON TO P22 & P23.
 7292   REF  1              E7,1671          S22TPRIM EQUALS S22TOFF +2  2       SAVE TF
 7293   REF  1              E7,1673          S22EORM  EQUALS S22TPRIM +2 0 = EARTH -- NON-ZERO = MOON
A7294

R7295           DOWNLINK ERASABLES FOR P22,P20 MARK DATA.               (8D)
 7297   REF  1              E7,1674          MARKDOWN EQUALS S22EORM  +1 B(7)
 7298   REF  1              E7,1703          RM       EQUALS S22RTNEX    DOWNLINK OF VHF RANGE
A7299

R7300           S22.1                                                   (1D)
 7302   REF  1              E7,1703          S22RTNEX EQUALS MARKDOWN +7 B(1)
A7303

R73031          P22 STORAGE                                             (6D)
 73033  REF  2  LAST  129  E7,1704          STARSAV3 EQUALS S22RTNEX +1 I(6)TMP

R7304           CRS61.1 STORAGE.        -A SUBSET OF P20-               (14D)
 7306   REF  1              E7,1704          Q611     EQUALS RM      +1 I(1) TMP QSAVE
 7307   REF  1              E7,1705          Q6111    EQUALS Q611    +1 I(1)TMP QSAVE
 7308   REF  1              E7,1706          SAVEPOS  EQUALS Q6111   +1 I(6)TMP LEM POSITION VECTOR-
 7309   REF  1              E7,1714          SAVEVEL  EQUALS SAVEPOS +6 I(6)TMP LEM VELOCITY VECTOR-

R7313           MARK STORAGE AND W MATRIX INIT STORAGE (UNSHARED)       (13D)
 7315   REF  1              E7,1722          MRKBUF1  EQUALS SAVEVEL +6  B(7)
 73151  REF  1              E7,1731          CNT3TEMP EQUALS MRKBUF1 +7  I(2)
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 73152  REF   1              E7,1733     OLDMKTME EQUALS CNT3TEMP +2     I(2)
 73153  REF   1              E7,1735     AGEOFW   EQUALS OLDMKTME +2     I(2)
A73155


R7317                MORE CONICS STORAGE.                                (4)
 7319   REF   1              E7,1767     COGA     EQUALS NN +2           I(2) COTAN OF INITIAL FLT PATH ANGLE
 7320   REF   1              E7,1767     INDEP    EQUALS COGA            I(1) USED BY SUBROUTINE:ITERATOR:
 7321   REF   2  LAST  130   E7,1771     EPSILONL EQUALS COGA     +2     I(2) TMP
A7322

R732205              UNIVERSAL TRACKING STORAGE                          (10D)

 73221  REF   2  LAST  130   E7,1731     PLANVCUT EQUALS CNT3TEMP        I(6) PLANET VECTOR UT
 73222  REF   1              E7,1737     UTPIT    EQUALS PLANVCUT +6     I(2)  N78 PITCH
 73223  REF   1              E7,1741     UTYAW    EQUALS UTPIT +2           I(2)  N78 YAW
R73224


R7323                RENDEZVOUS GUIDANCE STORAGE.  - P32...P35 -         (10D)

 7325   REF   1              E7,1743     ELEV     EQUALS UTYAW +2        I(2)TMP
 7326   REF   1              E7,1745     RTX1     EQUALS ELEV      +2     (1)
 7327   REF   1              E7,1746     RTX2     EQUALS RTX1      +1     (1)
 7328   REF   1              E7,1747     RTMU     EQUALS RTX2      +1     (2)
 7329   REF   1              E7,1751     RTSR1/MU EQUALS RTMU      +2     (2)
 7330   REF   1              E7,1753     CENTANG  EQUALS RTSR1/MU  +2     I(2) S-S CENTRAL ANGLE COVERED(TPI-TPF)
A7331
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L ERASABLE ASSIGNMENTS

P7339 *-*-*-*- OVERLAY 5 IN EBANK 7 -*-*-*-*

R7340 P34 (2D)

7342 REF 2 LAST 130 E7,1765 NN1 = NN I(2) DSP NOUN 55, R1

R7343 ********** THE FOLLOWING ARE FOR FLIGHT 504 ONLY **********

R7344 RETURN-TO-EARTH STORAGE. (93D)

7346	REF	2	LAST 127	E7,1631	RTEDVD	EQUALS	END-IN/M	I(2)IN DELTA VELOCITY DESIRED	M/CS B7
7347	REF	1		E7,1633	RTEGAM2D	EQUALS	RTEDVD +2	I(2)IN REENTRY ANGLE DESIRED	REVS B0
7348	REF	1		E7,1635	RCON	EQUALS	RTEGAM2D +2	I(2)TMP CONIC R2 RADIUS	M B29
7349	REF	1		E7,1637	R(T1)/	EQUALS	RCON +2	I(6)TMP POSITION VECTOR AT TIG	M B29/B27
7350	REF	1		E7,1645	R(T1)	EQUALS	R(T1)/ +6	I(2)TMP MAGNITUDE OF R(T1)/	M B29/B27
7351	REF	1		E7,1647	DT21PR	EQUALS	R(T1) +2	I(2) TMP PREVOUS DT21	CS B30
7352	REF	1		E7,1651	MAMAX1	EQUALS	DT21PR +2	I(2) TMP MAJ AXIS LOW BOUND LMT	M B30
7353	REF	1		E7,1653	MAMAX2	EQUALS	MAMAX1 +2	I(2) TMP MAJ AXIS UP BOUND LMT	M B30
7354	REF	1		E7,1655	R(T2)/	EQUALS	MAMAX2 +2	I(6)TMP FINAL POSITION VECTOR	M B29/B27
7355	REF	1		E7,1663	RD	EQUALS	R(T2)/ +6	I(2)TMP FINAL R DESIRED	M B29/B27
7356	REF	1		E7,1665	DRCON	EQUALS	RD +2	I(2)TMP RCON SLOPE ITERATOR	M B29/B27
7357	REF	1		E7,1667	RPRE,	EQUALS	DRCON +2	I(2)TMP PREVISOUS RPRE	M B29/B27
7358	REF	1		E7,1671	V(T1)/	EQUALS	RPRE, +2	I(6)TMP VEL VECTOR AT TIG	M/CS B7/B5
7359	REF	1		E7,1677	V2(T1)/	EQUALS	V(T1)/ +6	I(6)TMP POST IMP VEL AT TIG	M/CS B7/B5
7360	REF	1		E7,1705	DV	EQUALS	V2(T1)/ +6	I(2)TMP DELTA VELOCITY AT TIG	M/CS B7/B5
7361	REF	1		E7,1707	V(T2)/	EQUALS	DV +2	I(6)TMP FINAL VELOCITY VECTOR	M/CS B7/B5
7362	REF	1		E7,1715	T1	EQUALS	V(T2)/ +6	I(2)TMP INITIAL VECTOR TIME	CS B28
7363	REF	1		E7,1717	PCON	EQUALS	T1 +2	I(2)TMP SEMI-LATUS RECTUM	M B29
7364	REF	1		E7,1721	X(T1)	EQUALS	PCON +2	I(2)TMP COTANGENT GAMMA1	B5
7365	REF	1		E7,1723	T12	EQUALS	X(T1) +2	I(2)TMP INIT TO FINL POSIT TIME	CS B28
7366	REF	1		E7,1725	DELTAT	EQUALS	T12 +2	I(2) TMP DELTA T IN SAFE PERILUNE	CS B28
7367	REF	1		E7,1727	NN1A	EQUALS	DELTAT +2	I(2) TMP ITERATION COUNTER 1	

A73675

7368	REF	2	LAST 126	E7,1545	NN2	EQUALS	DELVOV +6	I(2) TMP ITERATION COUNTER	
7369	REF	1		E7,1547	RTENCKEX	EQUALS	NN2 +2	I(1)TMP RTENCK RETURN ADDRESS	
7370	REF	1		E7,1550	CONICX1	EQUALS	RTENCKEX +1	I(1) TMP CONICS MU TABLE INDEX	
7371	REF	1		E7,1551	T2	EQUALS	CONICX1 +1	I(2)TMP FINAL TIME	CS B28
7372	REF	1		E7,1553	UR1/	EQUALS	T2 +2	I(6)TMP UNIT R(T1)/	B1
7373	REF	1		E7,1561	UV1/	EQUALS	UR1/ +6	I(6)TMP UNIT V(T1)/	B1

A73735

7374	REF	2	LAST 130	E7,1743	BETA1	EQUALS	UTYAW +2	I(2) TEMP 1+X(T2)**2	B1
7375	REF	1		E7,1745	P(T1)	EQUALS	BETA1 +2	I(1)TMP PRIMARY BODY STATE TIME 1	B14
7376	REF	1		E7,1746	CFPA	EQUALS	P(T1) +1	I(2) TMP COSINE FLIGHT PATH ANGLE	B1
7377	REF	1		E7,1750	PHI2	EQUALS	CFPA +2	I(2) TMP PERI OR APO INDICATOR	B2
7378	REF	1		E7,1752	SPRTEX	EQUALS	PHI2 +2	I(1)TMP ROUTINE RETURN ADDRESS	

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 7379  REF  1            E7,1753          VNSTORE  EQUALS SPRTEX   +1     I(1)TMP VERBNOUN STORAGE
 7380  REF  1            E7,1754          BETA12   EQUALS VNSTORE  +1     I(2)TMP SIGN FOR TIMERAD
R7381                OVERLAYS WITHIN RETURN-TO-EARTH STORAGE.

R73815           TEMPS WITHIN VAC

 7382                        0030          RPRE     EQUALS 24D            I(2)TMP COMPUTED PREC RADIUS   M B29/B27
 7383                        0032          P/RPRE   EQUALS 26D            I(2)TMP P/R                        B4
 7384                        0034          R/APRE   EQUALS 28D            I(2)TMP R/A                        B6
A73845

 7385  REF  2 LAST 131     E7,1723          X(T2)PRE EQUALS T12            I(2)TMP PREC COTAN GAMMA2          B0
 7386  REF  2 LAST 131     E7,1725          X(T2)    EQUALS DELTAT         I(2)TMP COTAN GAMMA2               B0
 7387  REF  1              E7,1561          UH/      EQUALS UV1/           I(2)TMP UNIT HORIZONTAL VECTOR.    B1
 7388  REF  3 LAST 121     E7,1412          SPRTETIG EQUALS TIG            I(2)IN  TIME OF IGNITION       CS B28
R7389
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P7390 *-*-*-*- OVERLAY 6 IN EBANK 7 -*-*-*-*

R7391 P32,P33

R7392 THE FOLLOWING OVERLAY MEAS. INCORP. AND ARE IN USE ONLY WHEN(32D)

7394	REF	3	LAST 128	E7,1457	POSTCSI	EQUALS	VG		I(2)
7395	REF	1		E7,1461	DELVCSI	EQUALS	POSTCSI	+2	I(2)
7396	REF	1		E7,1463	DELDV	EQUALS	DELVCSI	+2	I(2)
7397	REF	1		E7,1465	GAMPREV	EQUALS	DELDV	+2	I(2)
7398	REF	1		E7,1467	DVPREV	EQUALS	GAMPREV	+2	I(2)
7399	REF	1		E7,1471	POSTCDH	EQUALS	DVPREV	+2	I(2)
7400	REF	1		E7,1471	HAFPA1	EQUALS	POSTCDH		
7401	REF	2	LAST 133	E7,1473	VACT4	EQUALS	POSTCDH	+2	I(6)
7402	REF	1		E7,1501	RDOTV	EQUALS	VACT4	+6	I(2)
7403	REF	1		E7,1503	VACT1	EQUALS	RDOTV	+2	I(6)
7405	REF	1		E7,1511	VPASS1	EQUALS	VACT1	+6	I(6) VEL. PASSIVE VEH, AT CSI TIME
7406	REF	2	LAST 126	E7,1545	UNVEC	EQUALS	VACT3		I(6)
7407	REF	2	LAST 127	E7,1655	T2TOT3	EQUALS	TPASS4		I(2) TPI - TCDH
7408	REF	1		E7,1664	CSIALRM	EQUALS	TITER		I(2) ALARM INDEX
74085	REF	1		E7,1666	DELVEET2	EQUALS	CSIALRM	+2	I(6) VACT3-VACT2 = DVCDH REF.COORD.
R74086			P21 STORAGE						(2D)
74088	REF	3	LAST 126	E7,1537	P21TIME	EQUALS	RACT3		I(2)
R7409			ADDITIONAL CSI - CDH STORAGE.						(10D)
7411	REF	1		E7,1755	RPASS1	EQUALS	CENTANG	+2	I(6) POS. PASSIVE VEH. AT CSI TIME.
7412	REF	1		E7,1763	LOOPCT	EQUALS	RPASS1	+6	I(2) ITERATION COUNTER
7413	REF	1		E7,1765	NN	EQUALS	LOOPCT	+2	I(2)
R7414			P21 STORAGE						(19D)
7416	REF	2	LAST 125	E7,1603	P21ORIG	EQUALS	UBARO		I(1)
7417	REF	1		E7,1604	P21BASER	EQUALS	P21ORIG	+1	I(6)
7418	REF	1		E7,1612	P21BASEV	EQUALS	P21BASER	+6	I(6)
74181	REF	1		E7,1620	P21ALT	EQUALS	P21BASEV	+6	I(2) NOUN 73 R1 ALTITUDE
74182	REF	1		E7,1622	P21VEL	EQUALS	P21ALT	+2	I(2) NOUN 73 R2 VELOCITY
74183	REF	1		E7,1624	P21GAM	EQUALS	P21VEL	+2	I(2) NOUN 73 R3 FLIGHT PATH ANGLE

A7419

R74191 P29 ERASABLES (32D)

L ERASABLE ASSIGNMENTS USER'S PAGE NO. 97 E7 S?

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 74193  REF   1              E7,1541    PASSTIME EQUALS P21TIME  +2     B(2)TMP
 74203  REF   1              E7,1543    LONGFOR  EQUALS PASSTIME +2     B(2)TMP
 74213  REF   1              E7,1545    DELTLONG EQUALS LONGFOR  +2     I(2)TMP
 74223  REF   1              E7,1547    FUDGE    EQUALS DELTLONG +2     I(2)TMP
 74233  REF   1              E7,1551    MUSUBE   EQUALS FUDGE    +2     I(6)TMP
 74243  REF   1              E7,1557    MUSUBC   EQUALS MUSUBE   +6     I(6)TMP
 74253  REF   1              E7,1565    MUSUBS   EQUALS MUSUBC   +6     I(6)TMP
 74263  REF   1              E7,1573    MUSUBN   EQUALS MUSUBS   +6     I(6)TMP

 74273  REF   2  LAST  134  E7,1537    P29BASET =      P21TIME
 74283  REF   2  LAST  133  E7,1604    P29BASER =      P21BASER
 74293  REF   2  LAST  133  E7,1612    P29BASEV =      P21BASEV

R74303  P22-P23 STORAGE.                                              (9D)

 74323  REF   2  LAST  130  E7,1743    22SUBSCL EQUALS ELEV           B(1) DE OF ABCDE LANDMARK ID NO
 74333  REF   1              E7,1744    CXOFF    EQUALS 22SUBSCL +1    B OF ABCDE OFFSET INDICATOR.
 74343  REF   1              E7,1745    8KK      EQUALS CXOFF    +1    B (2)  TMP   INDEX OF PRESENT MARK.
 74353  REF   1              E7,1747    8NN      EQUALS 8KK      +2    B(1) TMP NO OF MARKS TAKEN IN SXTMARK
 74363  REF   1              E7,1750    S22LOC   EQUALS 8NN      +1    I(1)TMP MARK DATA LOC
 74373  REF   1              E7,1751    LANDMARK EQUALS S22LOC   +1    B(1)DSP NOUN 70 FOR P22,51,R52,53
 74383  REF   1              E7,1752    HORIZON  EQUALS LANDMARK +1    B(1)DSP NOUN 70 FOR P22,51,R52,53
 74393  REF   1              E7,1753    P22DEX   EQUALS HORIZON  +1    B(1) INDEX FOR SXTMARK IN P22
R74403          P23 TRUNION BIAS STORAGE.

R74413  9(1D)
 74423  REF   1              E7,1754    TRUNION  EQUALS P22DEX   +1     B(1)
 74433                       E7,1777    WHOCARES =      3777           A DUMMY FOR E-BANK INSENSITIVE 2CADRS.

 74434  REF   1              E7,1777    END-E7   =      WHOCARES       TAG NEEDED FOR EDITS
```

L CHECK EQUALS LIST USER'S PAGE NO. 1 E 5?

P0001 ********** CHECK EQUALS LIST **********

R0002 THIS LIST IS MAINTAINED TO ENSURE THAT CERTAIN ERASABLE LOCATIONS
R0003 ARE LOCATED AT A SPECIFIED DISTANCE FROM ANOTHER ERASABLE LOCATION
R0004 AS REQUIRED BY THE STRUCTURE OF THE DOWNLINK LISTS:
R0005 1. IF A LOCATION IS THE SECOND PART OF A DOWNLINK WORD, IT MUST
R0006 BE CONTIGUOUS TO THE LOCATION THAT IS THE FIRST PART.
R0007 2. IF A LOCATION IS NOT THE FIRST WORD OF AN NONADR IT
R0008 MUST BE AT A SPECIFIC NUMBER OF LOCATIONS FROM THE FIRST
R0009 LOCATION IN THE INSTRUCTION.
R0010 3. OTHER NAMES MAY BE GIVEN TO LOCATIONS IN THE DOWNLINK LISTS
R0011 THAT ARE NOT REFERENCED IN THE LISTS.THESE MUST NOT BE MOVED.
R0012 THIS IS ACCOMPLISHED USING THE INSTRUCTION CHECK= .
R0013 THIS INSTRUCTION GIVES A CUSS IN THE ASSEMBLY IF THE LOCATION OF THE
R0014 FIRST TAG FIELD IS NOT EQUAL TO THE LOCATION OF THE SECOND TAG FIELD.
R0015 THE INSTRUCTION HAS NO OTHER EFFECT ON THE ASSEMBLY OR CODE.

R0016 THIS LIST SHOULD BE UPDATED FOR ANY CHANGES TO THE DOWNLINK LISTS.

R0017 THIS LIST IS MAINTAINED BY SUMNER ROSENBERG

0018	REF	1			0025	TIME1	CHECK= TIME2 +1
0019	REF	1			0033	CDUY	CHECK= CDUX +1
0020	REF	1			0035	CDUT	CHECK= CDUZ +1
0021	REF	1			0037	PIPAX	CHECK= CDUS +1
0022	REF	1			0040	PIPAY	CHECK= PIPAX +1
0023	REF	1			0041	PIPAZ	CHECK= PIPAY +1
0024	REF	3	LAST	73	0301	UPOLDMOD	CHECK= COMPNUMB +1
0025	REF	2	LAST	73	0302	UPVERB	CHECK= UPOLDMOD +1
0026	REF	2	LAST	73	0303	UPCOUNT	CHECK= UPVERB +1
0027	REF	2	LAST	73	0303	BESTJ	CHECK= BESTI +1
0028	REF	1			0375	FAILREG	CHECK= C31FLWRD +1
0029	REF	2	LAST	77	0772	TRKMKCNT	CHECK= VHFCNT +1
0030	REF	1			0776	OPTION2	CHECK= OPTION1 +1
0031	REF	1			1307	THETAD	CHECK= REDOCTR +1
0032	REF	1			1334	IMODES33	CHECK= IMODES30 +1
0033	REF	1			1340	HOLDFLAG	CHECK= OPTMODES +1
0034	REF	5	LAST	94	E4,1713	RRATE	CHECK= RANGE +2
0035	REF	2	LAST	95	E4,1744	HPERX	CHECK= HAPOX +2
0036	REF	2	LAST	105	E5,1462	TCSI	CHECK= TCDH +2
0037	REF	2	LAST	99	E5,1761	IGC	CHECK= OGC +2
0038	REF	2	LAST	99	E5,1763	MGC	CHECK= IGC +2
0039	REF	1			E6,1424	YACTOFF	CHECK= PACTOFF +1
0040	REF	1			E6,1466	DAPDATR2	CHECK= DAPDATR1 +1
0041	REF	1			E6,1473	CSMMASS	CHECK= LEMMASS +1
0042	REF	2	LAST	117	E6,1477	AK1	CHECK= AK +1
0043	REF	1			E6,1500	AK2	CHECK= AK1 +1
0044	REF	1			E6,1501	RCSFLAGS	CHECK= AK2 +1

L CHECK EQUALS LIST USER'S PAGE NO. 2 E? S?

0045	REF	5	LAST	108	E6,1525	WBODY	CHECK= OMEGAC
0046	REF	1			E6,1533	ADOT	CHECK= OGARATE
0047	REF	3	LAST	120	E6,1535	ADOT1	CHECK= ADOT +2
0048	REF	2	LAST	112	E6,1537	ADOT2	CHECK= ADOT1 +2
0049	REF	3	LAST	117	E6,1570	ERRORY	CHECK= ERRORX +1
0050	REF	3	LAST	117	E6,1571	ERRORZ	CHECK= ERRORY +1
0051	REF	2	LAST	113	E6,1572	THETADX	CHECK= ERRORZ +1
0052	REF	3	LAST	117	E6,1573	THETADY	CHECK= THETADX +1
0053	REF	2	LAST	113	E6,1574	THETADZ	CHECK= THETADY +1
0054	REF	2	LAST	109	E6,1624	YCMD	CHECK= PCMD +1
0055	REF	2	LAST	115	E6,1666	BETA/180	CHECK= ALFA/180 +1
0056	REF	2	LAST	115	E6,1701	PREL	CHECK= CMDAPMOD +1
0057	REF	2	LAST	115	E6,1702	QREL	CHECK= PREL +1
0058	REF	2	LAST	115	E6,1703	RREL	CHECK= QREL +1
0059	REF	2	LAST	115	E6,1714	ROLLTM	CHECK= PAXERR1 +1
0060	REF	2	LAST	115	E6,1715	ROLLC	CHECK= ROLLTM +1
0061	REF	3	LAST	121	E7,1402	LNG(SPL)	CHECK= LAT(SPL) +2
0062	REF	2	LAST	129	E7,1703	RM	CHECK= MARKDOWN +7
0063	REF	3	LAST	123	E7,1677	RDOT	CHECK= LATANG +2
0064	REF	2	LAST	123	E7,1701	THETAH	CHECK= RDOT +2
0065	REF	3	LAST	124	E7,1760	GAMMAEI	CHECK= VPRED +2
0066	REF	1			0074	STATE	CHECK= FLAGWRD0
0067	REF	3	LAST	74	0304	CMTMTIME	CHECK= UPBUFF
0068	REF	4	LAST	136	0305	SW/NDX	CHECK= UPBUFF +1
0069	REF	5	LAST	136	0324	ENDBUF	CHECK= UPBUFF +16D
0070	REF	6	LAST	136	0325	V1	CHECK= UPBUFF +17D
0071	REF	7	LAST	136	0327	A0	CHECK= UPBUFF +19D
0072	REF	2	LAST	74	0332	DNLSTADR	CHECK= DNLSTCOD
0073	REF	3	LAST	136	0333	CTLIST	CHECK= DNLSTCOD +1
0074	REF	1			0373	TEMPFLSH	CHECK= CADRFLSH +2
0075	REF	3	LAST	77	0746	LANDLAT	CHECK= LAT
0077	REF	2	LAST	78	1021	TLIFTOFF	CHECK= TEVENT
0078	REF	5	LAST	84	1307	CPHI	CHECK= THETAD
0079	REF	6	LAST	136	1307	RDOTREF	CHECK= THETAD
0080	REF	7	LAST	136	1310	CTHETA	CHECK= THETAD +1
0081	REF	8	LAST	136	1311	CPSI	CHECK= THETAD +2
0082	REF	9	LAST	136	1311	VREF	CHECK= THETAD +2
0083	REF	4	LAST	84	1314	DELVX	CHECK= DELV
0084	REF	5	LAST	136	1316	DELVY	CHECK= DELV +2
0085	REF	6	LAST	136	1320	DELVZ	CHECK= DELV +4
0086	REF	1			E3,1642	TETLEM	CHECK= T-OTHER
0087	REF	2	LAST	136	E3,1642	TETOTHER	CHECK= T-OTHER
0088	REF	4	LAST	94	E4,1715	RRATE2	CHECK= RTHETA
0089	REF	3	LAST	135	E6,1476	PAXERR	CHECK= AK
0090	REF	6	LAST	136	E6,1525	OMEGAXC	CHECK= OMEGAC
0091	REF	7	LAST	136	E6,1525	TVCRCS	CHECK= OMEGAC
0092	REF	4	LAST	120	E6,1525	ASPS(TM)	CHECK= WBODY
0093	REF	8	LAST	136	E6,1527	OMEGAYC	CHECK= OMEGAC +2
0094	REF	5	LAST	136	E6,1527	WBODY1	CHECK= WBODY +2
0095	REF	1			E6,1531	WBODY2	CHECK= WBODY1 +2

0096	REF	9	LAST	136	E6,1531	OMEGAZC	CHECK= CMEGAC +4
0097	REF	5	LAST	110	E6,1533	OGARATE	CHECK= OMEGAB
0098	REF	6	LAST	137	E6,1533	OMEGAXB	CHECK= OMEGAB
0099	REF	4	LAST	136	E6,1533	XPIPBUF	CHECK= ADOT
0100	REF	2	LAST	120	E6,1534	YPIPBUF	CHECK= XPIPBUF +1
0101	REF	2	LAST	120	E6,1535	ZPIPBUF	CHECK= YPIPBUF +1
0102	REF	2	LAST	120	E6,1536	XOLDBUF	CHECK= ZPIPBUF +1
0103	REF	2	LAST	120	E6,1537	YOLDBUF	CHECK= XOLDBUF +1
0104	REF	2	LAST	120	E6,1540	ZOLDBUF	CHECK= YOLDBUF +1
0105	REF	7	LAST	137	E6,1535	OMEGAYB	CHECK= CMEGAB +2
0107	REF	8	LAST	137	E6,1537	OMEGAZB	CHECK= CMEGAB +4
0108	REF	4	LAST	136	E6,1567	VDT/180	CHECK= ERRORX
0109	REF	4	LAST	136	E6,1570	-VT/180E	CHECK= ERRORY
0110	REF	4	LAST	136	E6,1572	QAXERR	CHECK= THETADX
0111	REF	3	LAST	136	E6,1573	RAXERR	CHECK= THETADY
0112	REF	3	LAST	120	E6,1574	Q7	CHECK= THETADZ
0113	REF	4	LAST	121	E7,1404	DELVLVC	CHECK= DELVSLV
0114	REF	4	LAST	132	E7,1412	SPRTETIG	CHECK= TIG
0115	REF	2	LAST	127	E7,1645	DELVSIN	CHECK= DELVEET3
0116	REF	3	LAST	137	E7,1645	VGTEMP	CHECK= DELVEET3
0118	REF	3	LAST	128	E7,1720	VGPREV	CHECK= VGTIG
0119	REF	3	LAST	123	E7,1724	LEWD	CHECK= VIO
0120	REF	3	LAST	123	E7,1726	L/DCALC	CHECK= TTE
0121	REF	4	LAST	136	E7,1756	VL	CHECK= VPRED
0122	REF	4	LAST	124	E7,1760	GAMMAL	CHECK= GAMMAEI
0123	REF	5	LAST	137	E7,1760	PREDANG	CHECK= GAMMAEI
0124	REF	6	LAST	137	E7,1761	JJ	CHECK= GAMMAEI +1
0125	REF	2	LAST	79	1063	VTEMP	CHECK= MARKTIME +2
0126	REF	4	LAST	137	E7,1722	VMAGI	CHECK= VGTIG +2
0127	REF	4	LAST	124	E7,1724	VGTLI	CHECK= VMAGI +2

L CHECK EQUALS LIST USER'S PAGE NO. 4 EQ S?

P0200 THE FOLLOWING LOCATIONS ARE PUT CHECK= DUE TO THE REQUIREMENTS OF
R0201 COPYCYCLE:

0210	REF	7	LAST	124	E7,1730	ASKEP	CHECK= ASPS
0211	REF	8	LAST	138	E7,1731	ASP1	CHECK= ASPS +1
0212	REF	9	LAST	138	E7,1732	ASPUP	CHECK= ASPS +2
0213	REF	10	LAST	138	E7,1733	ASPDWN	CHECK= ASPS +3
0214	REF	11	LAST	138	E7,1734	ASP3	CHECK= ASPS +4
0215	REF	1			04,2171	DUMMYAD	CHECK= ROD +3

*** END OF ERASTOTL.041 ***

L INTERRUPT LEAD INS USER'S PAGE NO. 1 EQ S?

```
0001                          4000                SETLOC 4000

0002  REF   1                                     COUNT* $$/RUPTS
0003                          4000  0 0004 0      INHINT              GO
0004  REF   1                 4001  3 4051 1      CAF     GOBB
0005  REF   1                 4002  56 006 1      XCH     BBANK
0006  REF   1                 4003  1 2563 1      TCF     GOPROG

0007  REF   1                 4004  52 011 0      DXCH    ARUPT       T6RUPT
0008                          4005  0 0006 1      EXTEND
0009  REF   1                 4006  3 0111 0      DCA     T6LOC
0010                          4007  52 006 0      DTCB

0011  REF   2  LAST  139      4010  52 011 0      DXCH    ARUPT       T5RUPT
0012  REF   1                 4011  4 0030 0      CS      TIME5
0013  REF   1                 4012  6 5011 1      AD      .5SEC
0014  REF   1                 4013  1 4056 1      TCF     T5RUPT

0015  REF   3  LAST  139      4014  52 011 0      DXCH    ARUPT       T3RUPT
0016  REF   1                 4015  3 5254 1      CAF     T3RPTBB
0017  REF   2  LAST  139      4016  56 006 1      XCH     BBANK
0018  REF   1                 4017  1 3362 1      TCF     T3RUPT

0019  REF   4  LAST  139      4020  52 011 0      DXCH    ARUPT       T4RUPT
0020  REF   1                 4021  3 4054 1      CAF     T4RPTBB
0021  REF   3  LAST  139      4022  56 006 1      XCH     BBANK
0022  REF   1                 4023  1 2000 1      TCF     T4RUPT

0023  REF   5  LAST  139      4024  52 011 0      DXCH    ARUPT       KEYRUPT1
0024  REF   1                 4025  3 4052 1      CAF     KEYRPTBB
0025  REF   4  LAST  139      4026  56 006 1      XCH     BBANK
0026  REF   1                 4027  1 3666 0      TCF     KEYRUPT1

0027  REF   6  LAST  139      4030  52 011 0      DXCH    ARUPT       KEYRUPT2
0028  REF   1                 4031  3 4052 1      CAF     MKRUPTBB
0029  REF   5  LAST  139      4032  56 006 1      XCH     BBANK
0030  REF   1                 4033  1 2105 0      TCF     MARKRUPT

0031  REF   7  LAST  139      4034  52 011 0      DXCH    ARUPT       UPRUPT
0032  REF   1                 4035  3 4052 1      CAF     UPRPTBB
0033  REF   6  LAST  139      4036  56 006 1      XCH     BBANK
0034  REF   1                 4037  1 3710 0      TCF     UPRUPT

0035  REF   8  LAST  139      4040  52 011 0      DXCH    ARUPT       DOWNRUPT
0036  REF   1                 4041  3 4051 1      CAF     DWNRPTBB
0037  REF   7  LAST  139      4042  56 006 1      XCH     BBANK
0038  REF   1                 4043  1 4621 1      TCF     DODOWNTM

0039  REF   9  LAST  139      4044  52 011 0      DXCH    ARUPT       RADAR RUPT
0040  REF   1                 4045  3 4053 0      CAF     RDRPTBB
```

L INTERRUPT LEAD INS USER'S PAGE NO. 2 EQ S3

```
0041   REF   8  LAST  139      4046  56 006 1            XCH     BBANK
0042   REF   1                 4047  1 2536 1            TCF     VHFREAD

0043                           4050  5 0017 1            RESUME

0047   REF   1                 E3,1400                   EBANK=  LST1          RESTART USES E0, E3
0048   REF   2  LAST  139      4051  12063 1   GOBB     BBCON   GOPROG

0049   REF   2  LAST  140      E3,1400                   EBANK=  LST1
0050   REF   1                 5254             T3RPTBB  EQUALS  WAITBB
0052   REF   2  LAST  139      4052             KEYRPTBB =       MKRUPTBB

0053   REF   2  LAST  129      E7,1722                   EBANK=  MRKBUF1
0054   REF   2  LAST  139      4052  16067 1    MKRUPTBB BBCON   MARKRUPT

0055   REF   2  LAST  139      4052             UPRPTBB  =       KEYRPTBB

0057   REF   2  LAST  139      4051             DWNRPTBB =       GOBB

0058   REF   2  LAST  129      E7,1703                   EBANK=  RM
0059   REF   2  LAST  140      4053  56067 0    RDRPTBB  BBCON   VHFREAD
0062   REF   1                 1322                      EBANK=  DSRUPTSW
0063   REF   2  LAST  139      4054  14062 0    T4RPTBB  BBCON   T4RUPT
0064   REF   1                 0025                      EBANK=  TIME1
0065   REF   2  LAST  139      4055  04060 0    T5RPTBB  BBCON   T5RUPT

0066                           4056  0 0006 1    T5RUPT   EXTEND
0067   REF   1                 4057  6 5327 1             BZMF    NOQBRSM
0068                           4060  0 0006 1             EXTEND
0069   REF   1                 4061  3 0113 1             DCA     T5LOC
0070                           4062  52 006 0             DTCB
```

L T4RUPT PROGRAM USER'S PAGE NO. 1 EQ S3

```
0002  REF   1                06,2000                          SETLOC  T4RUP
0003                         06,2000                          BANK

0004  REF   1                                                 COUNT*  $$/T4RPT
0005  REF   1                06,2000  54 016 1   T4RUPT      TS      BANKRUPT
0006                         06,2001  0 0006 1                EXTEND
0007  REF   1                06,2002  22 012 1                QXCH    QRUPT

0008  REF   2  LAST  140     06,2003  11'322 1                CCS     DSRUPTSW        GOES 3(-1)0 AROUND AND AROUND
0009  REF   1                06,2004  1 2010 0                TCF     NORMT4 +1
0010  REF   2  LAST  141     06,2005  1 2007 0                TCF     NORMT4

0011  REF   1                06,2006  1 2132 1                TCF     QUIKDSP

0012  REF   2  LAST   35     06,2007  3 6214 0   NORMT4       CAF     THREE
0013  REF   1                06,2010  54 070 1                TS      RUPTREG1
0014  REF   3  LAST  141     06,2011  55'322 1                TS      DSRUPTSW

0016  REF   1                     7675                74K    =       HIGH4
R0017 RELTAB IS A PACKED TABLE. RELAYWORD CODE IN UPPER 4 BITS, RELAY CODE
R0018 IN LOWER 5 BITS.

0020  REF   1                     4000                       SETLOC  FFTAG12
0021                          4063                          BANK
00215 REF   1                                               COUNT*  $$/PIN
0022                          4063    04025 1   RELTAB      OCT     04025
0023                          4064    10003 0               OCT     10003
0024                          4065    14031 0               OCT     14031
0025                          4066    20033 0               OCT     20033
0026                          4067    24017 1               OCT     24017
0027                          4070    30036 1               OCT     30036
0028                          4071    34034 1               OCT     34034
0029                          4072    40023 1               OCT     40023
0030                          4073    44035 1               OCT     44035
0031                          4074    50037 0               OCT     50037
0032                          4075    54000 0               OCT     54000
0033                          4076    60000 1   RELTAB11    OCT     60000
```

L T4RUPT PROGRAM USER'S PAGE NO. 2 EQ S3

P0034 SWITCHED-BANK PORTION.

```
0036  REF   2 LAST  141   06,2000                    SETLOC T4RUP
0037                      06,2012                    BANK

0038  REF   2 LAST  141 TO  141:     10     10*      COUNT* $$/T4RPT
0039  REF   1               06,2012  11'241 0  CDRVE  CCS    DSPTAB +11D
0040  REF   1               06,2013  0 2063 0         TC     DSPOUT
0041  REF   2 LAST  142     06,2014  0 2063 0         TC     DSPOUT

0042  REF   2 LAST  142     06,2015  57'241 1         XCH    DSPTAB +11D
0043  REF   1               06,2016  7 4347 1         MASK   LOW11
0044  REF   3 LAST  142     06,2017  55'241 0         TS     DSPTAB +11D
0045  REF   1               06,2020  6 4076 1         AD     RELTAB11
0046                        06,2021  0 0006 1         EXTEND
0047  REF   1               06,2022  01 010 1         WRITE  CUTO
0048  REF   1               06,2023  0 2072 0         TC     HANG20
```

L T4RUPT PROGRAM

P0049 DSPOUT PROGRAM. PUTS OUT DISPLAYS.

```
0050  REF  1                  06,2024  55'221 0  DSPOUTSB TS    NOUT
0051  REF  1                  06,2025  4 4772 0           CS    ZERO
0052  REF  1                  06,2026  54 073 1           TS    DSRUPTEM      SET TO -0 FOR 1ST PASS THRU DSPTAB
0053  REF  1                  06,2027  57'201 0           XCH   DSPCNT
0054  REF  1                  06,2030  6 4771 1           AD    NEG0          TO PREVENT +0
0055  REF  2  LAST  143       06,2031  55'201 1           TS    DSPCNT
0056  REF  3  LAST  143       06,2032  51'201 0  DSPSCAN  INDEX DSPCNT
0057  REF  4  LAST  142       06,2033  11'226 1           CCS   DSPTAB
0058  REF  4  LAST  143       06,2034  11'201 1           CCS   DSPCNT        IF DSPTAB ENTRY +, SKIP
0059  REF  1                  06,2035  1 2030 1           TCF   DSPSCAN -2    IF DSPCNT +, AGAIN
0060  REF  1                  06,2036  1 2047 1           TCF   DSPLAY        IF DSPTAB ENTRY -, DISPLAY
0061                          06,2037   22400 0  11,14,9   OCT   22400         CANNOT GET HERE
0062  REF  2  LAST  143       06,2040  10 073 1           CCS   DSRUPTEM      IF DSRUPTEM=+0,2ND PASS THRU DSPTAB
0063                          06,2041   37764 0  12DMRUPT  DEC   16372         (DSPCNT = 0). +0 INTO NOUT.
0064  REF  2  LAST  143       06,2042  55'221 0           TS    NOUT
0065  REF  2  LAST   42       06,2043  0 0002 0           TC    Q
0066  REF  3  LAST  143       06,2044  54 073 1           TS    DSRUPTEM      IF DSRUPTEM=-0,1ST PASS THRU DSPTAB
0067  REF  1                  06,2045  3 4355 0           CAF   TABLNTH       (DSPCNT=0). +0 INTO DSRUPTEM. PASS AGAIN
0068  REF  2  LAST  143       06,2046  1 2031 0           TCF   DSPSCAN -1

0069  REF  1                  06,2047  6 4770 0  DSPLAY   AD    CNE
0070  REF  5  LAST  143       06,2050  51'201 0           INDEX DSPCNT
0071  REF  5  LAST  143       06,2051  55'226 1           TS    DSPTAB        REPLACE POSITIVELY
0072  REF  2  LAST  142       06,2052  7 4347 1           MASK  LOW11         REMOVE BITS 12 TO 15
0073  REF  4  LAST  143       06,2053  54 073 1           TS    DSRUPTEM
0074  REF  1                  06,2054  3 4344 0           CAF   HI5
0075  REF  6  LAST  143       06,2055  51'201 0           INDEX DSPCNT
0076  REF  1                  06,2056  7 4063 1           MASK  RELTAB        PICK UP BITS 12 TO 15 OF RELTAB ENTRY
0077  REF  5  LAST  143       06,2057  6 0073 0           AD    DSRUPTEM
0078                          06,2060  0 0006 1           EXTEND
0079  REF  2  LAST  142       06,2061  01 010 1           WRITE CUT0          WRITE CHANNEL 10
0080  REF  1                  06,2062  1 6706 1           TCF   Q+1           ***NORMAL RETURN SKIPS ONE


00802 REF  1                    5005                     OCT54    EQUALS LTHVACA
00805 REF  1                    4355                     TABLNTH  EQUALS BINCON     DEC 10  LENGTH OF DSPTAB
0081  REF  1                  06,2063  3 0101 1  DSPOUT   CA     FLAGWRD5
00815 REF  1                  06,2064  7 4752 1           MASK   DSKYBIT
0082                          06,2065  0 0006 1           EXTEND
0083  REF  1                  06,2066  1 2126 1           BZF    NODSPOUT
0084  REF  3  LAST  143       06,2067  11'221 0           CCS    NOUT
0085  REF  1                  06,2070  0 2024 0           TC     DSPOUTSB
0086  REF  2  LAST  143       06,2071  1 2126 1           TCF    NODSPOUT     NO DISPLAY REQUESTS
0087  REF  1                  06,2072  4 2037 0  HANG20    CS     11,14,9
0088  REF  4  LAST  141       06,2073  27'322 1           ADS    DSRUPTSW

0089  REF  1                  06,2074  3 7663 0           CAF    20MRUPT
0090  REF  1                  06,2075  54 027 0  SETTIME4 TS     TIME4
```

L T4RUPT PROGRAM USER'S PAGE NO. 4 ED 53

```
P0091   THE STATUS OF THE PROCEED PUSHBUTTON IS MONITORED EVERY 120 MILLISECONDS VIA THE CHANNEL 32 BIT 14 INBIT.
R0093   THE STATE OF THIS INBIT IS COMPARED WITH ITS STATE DURING THE PREVIOUS T4RUPT AND IS PROCESSED AS FOLLOWS.

R0095       IF PREV ON AND NOW ON    -   BYPASS
R0096       IF PREV ON AND NOW OFF   -   UPDATE IMODES33
R0097       IF PREV OFF AND NOW ON   -   UPDATE IMODES33 AND PROCESS VIA PINBALL
R0098       IF PREV OFF AND NOW OFF  -   BYPASS

R0099   THE LOGIC EMPLOYED REQUIRES ONLY 9 MCT (APPROX. 108 MICROSECONDS) OF COMPUTER TIME WHEN NO CHANGES OCCUR.


 0101   REF   1                 06,2076  3 1334 1  PROCEEDE CA      IMODES33        MONITIOR FOR PROCEED BUTTON
 0102                           06,2077  0 0006 1           EXTEND
 0103   REF   1                 06,2100  06 032 0           RXOR     CHAN32          CHECK IF BIT 14 DIFFERENT
 0104   REF   1                 06,2101  7 4753 0           MASK     PROCDBIT
 0105                           06,2102  0 0006 1           EXTEND
 0106   REF   1                 06,2103  1 2116 1           BZF      T4JUMP          NO CHANGE

 0107   REF   2  LAST  144      06,2104  23'334 1           LXCH     IMODES33
 0108                           06,2105  0 0006 1           EXTEND
 0109   REF   1                 06,2106  06 001 0           RXOR     LCHAN
 0110   REF   3  LAST  144      06,2107  55'334 0           TS       IMODES33        UPDATE IMODES33
 0111   REF   2  LAST  144      06,2110  7 4753 0           MASK     PROCDBIT
 0112   REF   1                 06,2111  10 000 0           CCS      A
 0113   REF   2  LAST  144      06,2112  1 2116 1           TCF      T4JUMP          WAS ON - NOW OFF

 0115   REF   1                 06,2113  0 5120 1           TC       NOVAC30         WAS OFF - NOW ON
 0116   REF   1                   1202                     EBANK=   DSPCOUNT
 0117   REF   1                 06,2114  03311 1           2CADR    PROCKEY
 0117   REF   1                 06,2115  60102 1
```

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P0118 JUMP TO APPROPRIATE ONCE-PER SECOND (.96 SEC ACTUALLY) ACTIVITY

```
0119   REF   2  LAST  141   06,2116  50 070 0  T4JUMP   INDEX   RUPTREG1
0120                       06,2117  1 2120 1           TCF     +1

0121   REF   1             06,2120  1 2124 0           TCF     OPTTEST
0122   REF   1             06,2121  1 3001 1           TCF     OPTMON
0123   REF   2  LAST  145   06,2122  1 2124 0           TCF     OPTTEST
0124   REF   1             06,2123  1 2167 1           TCF     IMUMON
0129   REF   1             06,2124  0 4714 1  OPTTEST  TC      IBNKCALL
0130   REF   1             06,2125    20000 0          CADR    OPTDRIVE

0131   REF   1               7663           20MRUPT  =       OCT37776        (DEC 16382)
0132                       06,2126  0 0006 1  NODSPOUT EXTEND                 TURN OFF RELAYS
0133   REF   3  LAST  143   06,2127  01 010 1           WRITE   OUT0

0134   REF   1             06,2130  3 2041 0           CAF     120MRUPT        SET FOR NEXT CORVE
0135   REF   1             06,2131  1 2075 0           TCF     SETTIME4

0136   REF  15  LAST   85   06,2132  3 4753 1  QUIKDSP  CAF     BIT14
0137   REF   5  LAST  143   06,2133  7 1322 1           MASK    DSRUPTSW
0138                       06,2134  0 0006 1           EXTEND
0139   REF   1             06,2135  1 2163 0           BZF     QUIKOFF         WROTE LAST TIME, NOW TURN OFF RELAYS.

1395   REF   4  LAST  143   06,2136  11'221 0           CCS     NOUT
0140   REF   2  LAST  143   06,2137  0 2024 0           TC      DSPOUTSB
0141   REF   1             06,2140  1 2150 0           TCF     NODSPY          NOUT=0 OR BAD RETURN FROM DSPOUTSB
0142   REF  16  LAST  145   06,2141  4 4753 0           CS      BIT14           GOOD RETURN (WE DISPLAYED SOMETHING)
0143   REF   6  LAST  145   06,2142  27'322 1 QUIKRUPT  ADS     DSRUPTSW

0144   REF   2  LAST  143   06,2143  3 7663 0           CAF     20MRUPT
0145   REF   2  LAST  143   06,2144  54 027 0           TS      TIME4

0146   REF  13  LAST   84   06,2145  3 4760 1           CAF     BIT9
0147   REF   7  LAST  145   06,2146  27'322 1           ADS     DSRUPTSW

0148   REF   1             06,2147  0 5323 0           TC      RESUME

0149                       06,2150  0 0006 1  NODSPY   EXTEND
0150   REF   4  LAST  145   06,2151  01 010 1           WRITE   OUT3

0151   REF   3  LAST  145   06,2152  3 7663 0  SYNCT4   CAF     20MRUPT
0152   REF   3  LAST  145   06,2153  26 027 0           ADS     TIME4

0153   REF  14  LAST  145   06,2154  3 4760 1           CAF     BIT9
0154   REF   8  LAST  145   06,2155  27'322 1           ADS     DSRUPTSW
0155   REF   9  LAST  145   06,2156  11'322 1           CCS     DSRUPTSW
0156   REF   2  LAST  145   06,2157  0 5323 0           TC      RESUME
0157                       06,2160    37737 0 OCT37737 OCT     37737
0158   REF   1             06,2161  0 2152 0           TC      SYNCT4
```

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```
0159   REF   3  LAST  145   06,2162  0 5323 0          TC      RESUME

0160                       06,2163  0 0006 1  QUIKOFF  EXTEND
0161   REF   5  LAST  145   06,2164  01 010 1          WRITE   OUT0
0162   REF  17  LAST  145   06,2165  3 4753 1          CAF     BIT14          RESET DSRUPTSW TO SEND DISPLAY NEXT PASS
0163   REF   1              06,2166  1 2142 0          TCF     QUIKRUPT
```

L T4RUPT PROGRAM USER'S PAGE NO. 7 EQ S3

PROGRAM NAME: IMUMON

FUNCTIONAL DESCRIPTION: THIS PROGRAM IS ENTERED EVERY 480 MS. IT DETECTS CHANGES OF THE IMU STATUS BITS IN CHANNEL 30 AND CALLS THE APPROPRIATE SUBROUTINES. THE BITS PROCESSED AND THEIR RELEVANT SUBROUTINES ARE:

FUNCTION	BIT	SUBROUTINE CALLED
TEMP IN LIMITS	15	TLIM
ISS TURN-ON REQUEST	14	ITURNON
IMU FAIL	13	IMUFAIL (SETISSW)
IMU CDU FAIL	12	ICDUFAIL (SETISSW)
IMU CAGE	11	IMUCAGE
IMU OPERATE	9	IMUOP

THE LAST SAMPLED STATE OF THESE BITS IS LEFT IN IMODES30. ALSO, EACH SUBROUTINE CALLED FINDS THE NEW VALUE OF THE BIT IN A, WITH Q SET TO THE PROPER RETURN LOCATION, NXTIFAIL.

CALLING SEQUENCE: T4RUPT EVERY 480 MILLISECONDS.

JOBS OR TASKS INITIATED: NONE.

SUBROUTINES CALLED: TLIM, ITURNON, SETISSW, IMUCAGE, IMUOP.

ERASABLE INITIALIZATION:
FRESH START OR RESTART WITH NO GROUPS ACTIVE: C(IMODES30) = OCT 37411.
RESTART WITH ACTIVE GROUPS: C(IMODES30) = (B(IMODES30)AND(OCT 00035)) PLUS OCT 37400.
THIS LEAVES IMU FAIL BITS INTACT.

ALARMS: NONE.

EXIT: TNONTEST.

OUTPUT: UPDATED IMODES30 WITH CHANGES PROCESSED BY APPROPRIATE SUBROUTINE.

```
0195  REF  2  LAST  135   06,2167  3 1333 0  IMUMON  CA      IMODES3    SEE IF THERE HAS BEEN A CHANGE IN THE
0196                      06,2170  0 0006 1           EXTEND             RELEVANT BITS OF CHAN 30.
0197  REF  1              06,2171  06 030 1           RXOR    CHAN3      CHECK IF BITS 9,11-15 CHANGED
0198  REF  1              06,2172  7 2764 1           MASK    30RDMSK
0199                      06,2173  0 0006 1           EXTEND
0200  REF  1              06,2174  1 2224 0           BZF     TNONTEST   NO CHANGE IN STATUS.

0201  REF  3  LAST  145   06,2175  54 070 1           TS      RUPTREG1   SAVE BITS WHICH HAVE CHANGED.
0202  REF  3  LAST  147   06,2176  23'333 0           LXCH    IMODES30   UPDATE IMODES30.
0203                      06,2177  0 0006 1           EXTEND
0204  REF  2  LAST  144   06,2200  06 001 0           RXOR    LCHAN
0205  REF  4  LAST  147   06,2201  55'333 1           TS      IMODES30

0206  REF  2  LAST  143   06,2202  4 4770 1           CS      ONE
0207  REF  4  LAST  147   06,2203  56 070 0           XCH     RUPTREG1
0208                      06,2204  0 0006 1           EXTEND
```

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```
0209  REF  1                  06,2205  6 2517 0          BZMF   TLIM         CHANGE IN IMU TEMP.
0210  REF  1                  06,2206  1 2210 1          TCF    NXTIFBIT     BEGIN BIT SCAN.

0211  REF  3  LAST  147       06,2207  6 4770 0  -1      AD     ONE          (RE-ENTERS HERE FROM NXTIFAIL.)
0212  REF  5  LAST  147       06,2210  24 070 0  NXTIFBIT INCR   RUPTREG1     ADVANCE BIT POSITION NUMBER.
0213                          06,2211  6 0000 1  +1      DOUBLE
0214  REF  2  LAST  144       06,2212  54 000 0          TS     A            SKIP IF OVERFLOW.
0215  REF  2  LAST  148       06,2213  1 2210 1          TCF    NXTIFBIT     LOOK FOR BIT.

0216  REF  1                  06,2214  56 071 1          XCH    RUPTREG2     SAVE OVERFLOW-CORRECTED DATA.
0217  REF  6  LAST  148       06,2215  50 070 0          INDEX  RUPTREG1     SELECT NEW VALUE OF THIS BIT.
0218  REF  1                  06,2216  3 4753 1          CAF    TONISSBT
0219  REF  5  LAST  147       06,2217  7 1333 1          MASK   IMODES30
0220  REF  7  LAST  148       06,2220  50 070 0          INDEX  RUPTREG1
0221  REF  1                  06,2221  0 2760 1          TC     IFAILJMP

0222  REF  2  LAST  148       06,2222  10 071 0  NXTIFAIL CCS    RUPTREG2     PROCESS ANY ADDITIONAL CHANGES.
0223  REF  3  LAST  148       06,2223  1 2207 1          TCF    NXTIFBIT -1
```

L T4RUPT PROGRAM USER'S PAGE NO. 9 E0 S3

P0224 PROGRAM NAME: TNONTEST.

R0225 FUNCTIONAL DESCRIPTION: THIS PROGRAM HONORS REQUESTS FOR ISS INITIALIZATION. ISS TURN-ON (CHANNEL 30 BIT 14)
R0227 AND ISS OPERATE (CHANNEL 30 BIT 9) REQUESTS ARE TREATED AS A PAIR AND PROCESSING TAKES PLACE .480 SECONDS
R0229 AFTER EITHER ONE APPEARS. THIS INITIALIZATION TAKES ON ONE OF THE FOLLOWING THREE FORMS:

R0231 1) ISS TURN-ON: IN THIS SITUATION THE COMPUTER IS OPERATING WHEN THE ISS IS TURNED ON. NOMINALLY,
R0233 BOTH ISS TURN-ON AND ISS OPERATE APPEAR. THE PLATFORM IS CAGED FOR 90 SECONDS AND THE ICDU'S ZEROED
R0235 SO THAT AT THE END OF THE PROCESS THE GIMBAL LOCK MONITOR WILL FUNCTION PROPERLY.

R0237 2) ICDU INITIALIZATION: IN THIS CASE THE COMPUTER WAS PROBABLY TURNED ON WITH THE ISS IN OPERATE OR
R0239 A FRESH START WAS DONE WITH THE ISS IN OPERATE. IN THIS CASE ONLY ISS OPERATE IS ON. THE ICDU'S ARE
R0241 ZEROED SO THE GIMBAL LOCK MONITOR WILL FUNCTION. AN EXCEPTION IS IF THE ISS IS IN GIMBAL LOCK AFTER
R0243 A RESTART, THE ICDU'S WILL NOT BE ZEROED.

R0244 3) RESTART WITH RESTARTABLE PROGRAM USING THE IMU: IN THIS CASE, NO INITIALIZATION TAKES PLACE SINCE
R0246 IT IS ASSUMED THAT THE USING PROGRAM DID THE INITIALIZATION AND THEREFORE T4RUPT SHOULD NOT INTERFERE.

R0248 IMODES30 BIT 7 IS SET = 1 BY THE FIRST BIT (CHANNEL 30 BIT 14 OR 9) WHICH ARRIVES. FOLLOWING THIS, TNONTEST IS
R0250 ENTERED, FINDS BIT 7 = 1 BUT BIT 8 = 0, SO IT SETS BIT 8 = 1 AND EXITS. THE NEXT TIME IT FINDS BIT 8 = 1 AND
R0252 PROCEEDS, SETTING BITS 8 AND 7 = 0. AT PROCTNON, IF ISS TURN-ON REQUEST IS PRESENT, THE ISS IS CAGED (ZERO +
R0254 COARSE). IF ISS OPERATE IS NOT PRESENT PROGRAM ALARM 00213 IS ISSUED. AT THE END OF A 90 SECOND CAGE, BIT 2
R0256 OF IMODES30 IS TESTED. IF IT IS = 1, ISS TURN-ON WAS NOT PRESENT FOR THE ENTIRE 90 SECONDS. IN THAT CASE, IF
R0258 THE ISS TURN-ON REQUEST IS PRESENT THE 90 SECOND WAIT IS REPEATED, OTHERWISE NO ACTION OCCURS UNLESS A PROGRAM
R0260 WAS WAITING FOR THE INITIALIZATION IN WHICH CASE THE PROGRAM IS GIVEN AN IMUSTALL ERROR RETURN. IF THE DELAY
R0262 WENT PROPERLY, THE ISS DELAY OUTBIT IS SENT AND THE ICDU'S ZEROED. A TASK IS INITIATED TO REMOVE THE PIPA FAIL
R0264 INHIBIT BIT IN 10.24 SECONDS. IF A MISSION PROGRAM WAS WAITING IT IS INFORMED VIA ENDIMU.

R0266 AT PROCTNON, IF ONLY ISS OPERATE IS PRESENT (OPONLY), THE CDU'S ARE ZEROED UNLESS THE PLATFORM IS IN COARSE
R0268 ALIGN (= GIMBAL LOCK HERE) OR A MISSION PROGRAM IS USING THE IMU (IMUSEFLG = 1).

R0270 CALLING SEQUENCE: T4RUPT EVERY 480 MILLISECONDS AFTER IMUMON.

R0271 JOBS OR TASKS INITIATED: 1) ENDTNON, 90 SECONDS AFTER CAGING STARTED. 2) ISSUP, 4 SECONDS AFTER CAGING DONE.
R0273 3) PFAILOK, 10.24 SECONDS AFTER INITIALIZATION COMPLETED. 4) UNZ2, 320 MILLISECONDS AFTER ZEROING
R0275 STARTED.

R0276 SUBROUTINES CALLED: CAGESUB, CAGESUB2, ZEROICDU, ENDIMU, IMUBAD, NOATTOFF, SETISSW, VARDELAY.

R0278 ERASABLE INITIALIZATION: SEE IMUMON.

R0279 ALARMS: PROGRAM ALARM 00213 IF ISS TURN-ON REQUESTED WITHOUT ISS OPERATE.

R0281 EXIT: ENDTNON EXITS TO C33TEST. TASKS HAVING TO DO WITH INITIALIZATION EXIT AS FOLLOWS: MISSION PROGRAM
R0283 WAITING AND INITIALIZATION COMPLETE, EXIT TO ENDIMU, MISSION PROGRAM WAITING AND INITIALIZATION FAILED, EXIT TO
R0285 IMUBAD, IMU NOT IN USE, EXIT TO TASKOVER.

R0286 OUTPUT: ISS INITIALIZED.

0287 REF 6 LAST 148 06,2224 4 1333 1 TNONTEST CS IMODES30 AFTER PROCESSING ALL CHANGES, SEE IF IT

L T4RUPT PROGRAM USER'S PAGE NO. 10 ED S3

```
0288   REF   1                  06,2225  7 4762 1          MASK   ITNON1BT        IS TIME TO ACT ON TURN-ON REQUEST
0289   REF   3  LAST  148       06,2226  10 000 0          CCS    A
0290   REF   1                  06,2227  1 2366 1          TCF    C33TEST         NO - EXAMINE CHANNEL 33.

0291   REF   1                  06,2230  3 4761 0          CAF    ITNON2BT        SEE IF FIRST OR 2ND SAMPLE
0292   REF   7  LAST  149       06,2231  7 1333 1          MASK   IMODES30
0293   REF   4  LAST  150       06,2232  10 000 0          CCS    A
0294   REF   1                  06,2233  1 2237 1          TCF    PROCTNON        REACT AFTER SECOND SAMPLE.

0295   REF   2  LAST  150       06,2234  3 4761 0          CAF    ITNON2BT        IF FIRST SAMPLE, SET BIT TO REACT
0296   REF   8  LAST  150       06,2235  27'333 1          ADS    IMODES30        TIME.
0297   REF   2  LAST  150       06,2236  1 2366 1          TCF    C33TEST

R0298                PROCESS IMU TURN-ON REQUESTS AFTER WAITING 1 SAMPLE FOR ALL SIGNALS TO ARRIVE.

0300   REF   3  LAST  150       06,2237  3 4761 0  PROCTNON CA     ITNON2BT
03002  REF   2  LAST  150       06,2240  6 4762 0           AD     ITNON1BT
03005                            06,2241  4 0000 0           COM
0301   REF   9  LAST  150       06,2242  7 1333 1           MASK   IMODES30
0302   REF  10  LAST  150       06,2243  55'333 1           TS     IMODES30
0303   REF   2  LAST  148       06,2244  7 4753 0           MASK   TONISSBT        SEE IF TURN-ON REQUEST
0304   REF   5  LAST  150       06,2245  10 000 0           CCS    A
0305   REF   1                  06,2246  1 2342 1           TCF    OPONLY          OPERATE ON ONLY.

0306   REF  11  LAST  150       06,2247  4 1333 1           CS     IMODES30        IF TURN-ON REQUEST, WE SHOULD HAVE IMU
0307   REF   1                  06,2250  7 4760 0           MASK   IMUOPBIT        OPERATE.
0308   REF   6  LAST  150       06,2251  10 000 0           CCS    A
0309                            06,2252  1 2255 0           TCF    +3

0310   REF   1                  06,2253  0 5671 1           TC     ALARM           ALARM IF NOT.
0311                            06,2254  00213 1            OCT    213

0312   REF   1                  06,2255  0 2740 0  +3       TC     CAGESUB

0313   REF   1                  06,2256  3 3670 0           CAF    90SECS
0314   REF   1                  06,2257  0 5233 0           TC     WAITLIST
0315   REF   1                  E3,1474                     EBANK= CDUIND
0316   REF   1                  06,2260  02265 1           2CADR  ENDTNON
0316   REF   1                  06,2261  14063 1

0317   REF   3  LAST  150       06,2262  1 2366 1           TCF    C33TEST

0318   REF   2  LAST  150       06,2263  3 3670 0  RETNON   CAF    90SECS
0319   REF   1                  06,2264  0 5260 0           TC     VARDELAY

0320   REF   1                  06,2265  4 4767 1  ENDTNON  CS     DLAYFAIL        RESET TURN-ON REQUEST FAILBIT
0321   REF  12  LAST  150       06,2266  7 1333 1           MASK   IMODES30
0322   REF  13  LAST  150       06,2267  57'333 0           XCH    IMODES30
0323   REF   2  LAST  150       06,2270  7 4767 1           MASK   DLAYFAIL        IF IT WAS OFF, SEND ISS DELAY COMPLETE
0324                            06,2271  0 0006 1           EXTEND
```

```
0325  REF  1                  06,2272  1 2305 1            BZF     ENDTNON2

0326  REF  3  LAST  150       06,2273  3 4753 1            CAF     TONISSBT        IF IT WAS ON AND TURN-ON REQUEST NOW
0327  REF 14  LAST  150       06,2274  7 1333 1            MASK    IMODES30        PRESENT, RE-ENTER 90 SEC DELAY IN WL.
0328                           06,2275  0 0006 1            EXTEND
0329  REF  1                  06,2276  1 2263 0            BZF     RETNON

0330  REF  2  LAST  136       06,2277  4 0074 0            CS      FLAGWRD0        IF IT IS NOT ON NOW, SEE IF A PROG WAS
0331  REF  1                  06,2300  7 4761 1            MASK    IMUSEFLG        WAITING.
0332  REF  7  LAST  150       06,2301 10 0000 0            CCS     A
0333  REF  1                  06,2302  1 5314 0            TCF     TASKOVER
0334  REF  1                  06,2303  0 4655 0            TC      POSTJUMP
0335  REF  1                  06,2304   17625 0            CADR    IMUBAD          UNSUCCESSFUL TURN-ON.

0336  REF 13  LAST   84       06,2305  3 4752 0 ENDTNON2   CAF     BIT15           SEND ISS DELAY COMPLETE.
0337                           06,2306  0 0006 1            EXTEND
0338  REF  1                  06,2307  05 012 1            WOR     CHAN12          TURN OFF ISS DELAY COUNTER
0339  REF  2  LAST  145       06,2310  0 4714 1            TC      IBNKCALL        TURN OFF NO ATT LAMP.
0340  REF  1                  06,2311   17207 1            CADR    NOATTOFF

0341  REF  1                  06,2312  0 5511 1 UNZ2       TC      ZEROICDU

0342  REF  1                  06,2313  4 5001 1            CS      BITS4&5         REMOVE ZERO AND COARSE.
0343                           06,2314  0 0006 1            EXTEND
0344  REF  2  LAST  151       06,2315  03 012 1            WAND    CHAN12

0345  REF  1                  06,2316  3 5025 0            CAF     7.9SEC          WAIT 7.9 SEC FOR CTRS TO FIND GIMBALS
0346  REF  2  LAST  150       06,2317  0 5260 0            TC      VARDELAY

0347  REF  1                  06,2320  3 4763 1 ISSUP      CA      IMUNITBT
03472 REF  1                  06,2321  6 4765 1            AD      IMUFINHT
03474 REF  1                  06,2322  6 4766 1            AD      ICDUINHT
03476                         06,2323  4 0000 0            COM                     REMOVE CAGING, IMUFAIL INHIBIT, AND
0348  REF 15  LAST  151       06,2324  7 1333 1            MASK    IMODES30        ICDUFAIL INHIBIT FLAGS.
0349  REF 16  LAST  151       06,2325 55'333 1            TS      IMODES30

0350  REF  1                  06,2326  4 4763 0            CS      NOIMUDAP        ENABLE DAP
0351  REF  4  LAST  144       06,2327  7 1334 0            MASK    IMODES33
0352  REF  5  LAST  151       06,2330 55'334 0            TS      IMODES33

0353  REF  1                  06,2331  0 2706 1            TC      SETISSW         ISS WARNING MIGHT HAVE BEEN INHIBITED.

0354  REF 14  LAST  151       06,2332  4 4752 1            CS      BIT15           REMOVE IMU DELAY COMPLETE DISCRETE.
0355                           06,2333  0 0006 1            EXTEND
0356  REF  3  LAST  151       06,2334  03 012 1            WAND    CHAN12

0357  REF  1                  06,2335  3 5020 0            CAF     4SECS           DONT ENABLE PROG ALARM ON PIP FAIL FOR
0358  REF  2  LAST  150       06,2336  0 5233 0            TC      WAITLIST        ANOTHER 4 SECS.
0359  REF  2  LAST  150       E3,1474                      EBANK=  CDUIND
0360  REF  1                  06,2337    03175 1          2CADR   PFAILOK
0360  REF  1                  06,2340    16063 0
```

```
0364   REF   2  LAST  151   06,2341  1 5314 0          TCF     TASKOVER

0367   REF  13  LAST   85   06,2342  3 4765 1  OPONLY  CAF     BIT4
0368                       06,2343  0 0006 1          EXTEND                  IF OPERATE ON ONLY AND WE ARE IN COARSE
0369   REF   4  LAST  151   06,2344  02 012 0          RAND    CHAN12          ALIGN, DONT ZERO THE CDUS BECAUSE WE
0370   REF   8  LAST  151   06,2345  10 000 0          CCS     A               MIGHT BE IN GIMBAL LOCK. USE V41N2 TO
0371   REF   4  LAST  150   06,2346  1 2366 1          TCF     C33TEST         RECOVER.

0372   REF   2  LAST  151   06,2347  3 4761 0          CAF     IMUSEFLG        OTHERWISE, ZERO THE COUNTERS
0373   REF   3  LAST  151   06,2350  7 0074 0          MASK    FLAGWRD0        UNLESS SOMEONE IS USING THE IMU
0374   REF   9  LAST  152   06,2351  10 000 0          CCS     A
0375   REF   5  LAST  152   06,2352  1 2366 1          TCF     C33TEST

0376   REF   1               06,2353  0 2751 0          TC      CAGESUB2        SET TURNON FLAGS.

0377   REF   3  LAST  151   06,2354  0 4714 1  ISSZERO TC      IBNKCALL        TURN OFF NO ATT LAMP
0378   REF   2  LAST  151   06,2355   17207 1          CADR    NOATTOFF            IMU CAGE OFF ENTRY

0379   REF  14  LAST   85   06,2356  3 4764 0          CAF     BIT5            ISS CDU ZERO
0380                       06,2357  0 0006 1          EXTEND
0381   REF   5  LAST  152   06,2360  05 012 1          WOR     CHAN12

03811  REF   2  LAST  151   06,2361  0 5511 1          TC      ZEROICDU
0382   REF  14  LAST   85   06,2362  3 4763 1          CAF     BIT6            WAIT 300 MS FOR AGS TO RECEIVE SIGNAL.
0383   REF   1               06,2363  0 5223 1          TC      TWIDDLE
0384   REF   1               06,2364   02312 0          ADRES   UNZ2
0386   REF   6  LAST  152   06,2365  1 2366 1          TCF     C33TEST
```

R0387 PROGRAM NAME: C33TEST

R0388 FUNCTIONAL DESCRIPTION: THIS PROGRAM MONITORS THREE FLIP-FLOP INBITS OF CHANNEL 33 AND CALLS THE APPROPRIATE
R0390 SUBROUTINE TO PROCESS A CHANGE. IT IS ANALOGOUS TO IMUMON, WHICH MONITORS CHANNEL 30, EXCEPT THAT IT READS
R0392 CHANNEL 33 WITH A WAND INSTRUCTION BECAUSE A 'WRITE' PULSE IS REQUIRED TO RESET THE FLIP-FLOPS. THE BITS
R0394 PROCESSED AND THE SUBROUTINES CALLED ARE:

	BIT	FUNCTION	SUBROUTINE
R0397	13	PIPA FAIL	PIPFAIL
R0398	12	DOWNLINK TOO FAST	DNTMFAST
R0399	11	UPLINK TOO FAST	UPTMFAST

R0400 UPON ENTRY TO THE SUBROUTINE, THE NEW BIT STATE IS IN A.

R0401 CALLING SEQUENCE: EVERY 480 MILLISECONDS AFTER TNONTEST.

R0402 JOBS OR TASKS INITIATED: NONE.

R0403 SUBROUTINES CALLED: PIPFAIL, DNTMFAST AND UPTMFAST ON BIT CHANGES.

R0404 ERASABLE INITIALIZATION: C(IMODES33) = OCT 16000 ON A FRESH START OR RESTART, THEREFORE, THESE ALARMS WILL
R0406 REAPPEAR IF THE CONDITIONS PERSIST.

R0407 ALARMS: NONE.

R0408 EXIT: GLOCKMON.

R0409 OUTPUT: UPDATED BITS 13, 12 AND 11 OF IMODES33 WITH CHANGES PROCESSED.

```
0410  REF  6  LAST  151   06,2366  3 1334 1  C33TEST  CA     IMODES33   SEE IF RELEVANT CHAN 33 BITS HAVE
0411  REF  1             06,2367  7 5055 0           MASK   33RDMSK
0412  REF  2  LAST   42  06,2370  54 001 1           TS     L          CHANGED.
0413  REF  2  LAST  153  06,2371  3 5055 1           CAF    33RDMSK
0414                     06,2372  0 0006 1           EXTEND
0415  REF  1             06,2373  03 033 1           WAND   CHAN33     RESETS FLIP-FLOP INPUTS.
0416                     06,2374  0 0006 1           EXTEND
0417  REF  3  LAST  147  06,2375  06 001 0           RXOR   LCHAN
0418                     06,2376  0 0006 1           EXTEND
0419  REF  1             06,2377  1 2426 1           BZF    GLOCKMON   ON NO CHANGE.

0420  REF  8  LAST  148  06,2400  54 070 1           TS     RUPTREG1   SAVE BITS WHICH HAVE CHANGED.
0421  REF  7  LAST  153  06,2401  23'334 1           LXCH   IMODES33
0422                     06,2402  0 0006 1           EXTEND
0423  REF  4  LAST  153  06,2403  06 001 0           RXOR   LCHAN
0424  REF  8  LAST  153  06,2404  55'334 0           TS     IMODES33   UPDATED IMODES33.

0425  REF  2  LAST  143  06,2405  3 4772 1           CAF    ZERO
0426  REF  9  LAST  153  06,2406  56 070 0           XCH    RUPTREG1
0427                     06,2407  6 0000 1           DOUBLE
```

L T4RUPT PROGRAM

```
0428  REF   1                    06,2410  1 2413 1                TCF    NXTIBT +1       SCAN FOR BIT CHANGES.

0429  REF   4  LAST  148         06,2411  6 4770 0  -1            AD     ONE
0430  REF  10  LAST  153         06,2412  24 070 0  NXTIBT        INCR   RUPTREG1
0431                              06,2413  6 0000 1  +1            DOUBLE
0432  REF  10  LAST  152         06,2414  54 000 0                TS     A               (CODING IDENTICAL TO CHAN 30)
0433  REF   2  LAST  154         06,2415  1 2412 0                TCF    NXTIBT

0434  REF   3  LAST  148         06,2416  56 071 1                XCH    RUPTREG2
0435  REF  11  LAST  154         06,2417  50 070 0                INDEX  RUPTREG1        GET NEW VALUE OF BIT WHICH CHANGED.
0436  REF   1                    06,2420  3 4754 0                CAF    PIP2FLBT
0437  REF   9  LAST  153         06,2421  7 1334 0                MASK   IMODES33
0438  REF  12  LAST  154         06,2422  50 070 0                INDEX  RUPTREG1
0439  REF   1                    06,2423  0 2766 1                TC     C33JMP

0440  REF   4  LAST  154         06,2424  10 071 0  NXTFL33       CCS    RUPTREG2        PROCESS POSSIBLE ADDITIONAL CHANGES.
0441  REF   3  LAST  154         06,2425  1 2411 0                TCF    NXTIBT -1
```

L T4RUPT PROGRAM USER'S PAGE NO. 15 EQ S3

P0442 PROGRAM NAME: GLOCKMON

R0443 FUNCTIONAL DESCRIPTION: THIS PROGRAM MONITORS THE CDUZ COUNTER TO DETERMINE WHETHER THE ISS IS IN GIMBAL LOCK
R0445 AND TAKES ACTION IF IT IS. THREE REGIONS OF MIDDLE GIMBAL ANGLE (MGA) ARE USED:

R0447 1) ABS(MGA) LESS THAN OR EQUAL TO 70 DEGREES - NORMAL MODE.
R0448 2) ABS(MGA) GREATER THAN 70 DEGREES AND LESS THAN OR EQUAL TO 85 DEGREES - GIMBAL LOCK LAMP TURNED ON.
R0450 3) ABS(MGA) GREATER THAN 85 DEGREES - ISS PUT IN COARSE ALIGN AND NO ATT LAMP TURNED ON.

R0452 CALLING SEQUENCE: EVERY 480 MILLISECONDS AFTER C33TEST.

R0453 JOBS OR TASKS INITIATED: NONE.

R0454 SUBROUTINES CALLED: 1) SETCOARS WHEN ABS(MGA) GREATER THAN 85 DEGREES AND ISS NOT IN COARSE ALIGN.
R0456 2) LAMPTEST BEFORE TURNING OFF GIMBAL LOCK LAMP.

R0457 ERASABLE INITIALIZATION:
R0458 1) FRESH START OR RESTART WITH NO GROUPS ACTIVE: C(CDUZ) = 0, IMODES30 BIT 6 = 0, IMODES33 BIT 1 = 0.
R0460 2) RESTART WITH GROUPS ACTIVE: SAME AS FRESH START EXCEPT C(CDUZ) NOT CHANGED SO GIMBAL MONITOR
R0462 PROCEEDS AS BEFORE.

R0463 ALARMS: 1) MGA REGION (2) CAUSES GIMBAL LOCK LAMP TO BE LIT.
R0464 2) MGA REGION (3) CAUSES THE ISS TO BE PUT IN COARSE ALIGN AND THE NO ATT LAMP TO BE LIT IF EITHER NOT
R0466 SO ALREADY.

```
0467  REF  2  LAST  135  06,2426  10 034 1  GLOCKMON CCS    CDUZ
0468  REF  1             06,2427  1 2433 0           TCF    GLOCKCHK      SEE IF MAGNITUDE OF MGA IS GREATER THAN
0469  REF  1             06,2430  1 2471 0           TCF    SETGLOCK      70 DEGREES.
0470  REF  2  LAST  155  06,2431  1 2433 0           TCF    GLOCKCHK
0471  REF  2  LAST  155  06,2432  1 2471 0           TCF    SETGLOCK

0472  REF  1             06,2433  6 2516 1  GLOCKCHK AD     -70DEGS
0473                     06,2434  0 0006 1           EXTEND
0474  REF  3  LAST  155  06,2435  6 2470 0           BZMF   SETGLOCK -1   NO LOCK.

0475  REF  1             06,2436  6 3557 0           AD     -15DEGS       SEE IF ABS(MGA) GREATER THAN 85 DEGS.
0476                     06,2437  0 0006 1           EXTEND
0477  REF  1             06,2440  6 2466 1           BZMF   NOGIMRUN

0478  REF  14  LAST  152  06,2441  3 4765 1           CAF    BIT4          IF SO, SYSTEM SHOULD BE IN COARSE ALIGN
0479                     06,2442  0 0006 1           EXTEND                TO PREVENT GIMBAL RUN-AWAY.
0480  REF  6   LAST  152  06,2443  02 012 0           RAND   CHAN12
0481  REF  11  LAST  154  06,2444  10 000 0           CCS    A
0482  REF  2   LAST  155  06,2445  1 2466 0           TCF    NOGIMRUN

04821 REF  2   LAST  135  E6,1465                     EBANK= DAPDATR1
04822 REF  1             06,2446  3 5045 0           CAF    EBANK6
04823 REF  1             06,2447  54 003 0           TS     EBANK
04824 REF  3   LAST  155  06,2450  4 1465 0           CS     DAPDATR1
04825 REF  1             06,2451  7 4346 0           MASK   PRIO30
```

```
04826  REF  12  LAST  155   06,2452  10 000 0            CCS     A
04827  REF   1               06,2453  1 2460 0            TCF     CALLCRS         NO

04828  REF   1               06,2454  3 4770 0            CAF     AVEGBIT         YES, IS AVEG ON
04828S REF   1               06,2455  7 0075 1            MASK    FLAGWRD1
04829  REF  13  LAST  156   06,2456  10 000 0            CCS     A
04829S REF   3  LAST  155   06,2457  1 2466 0            TCF     NOGIMRUN        YES, DON'T COARSE ALIGN

0483   REF   4  LAST  152   06,2460  0 4714 1  CALLCRS   TC      IBNKCALL        GO INTO COARSE ALIGN
0484   REF   1               06,2461  17070 0             CADR    SETCOARS

0485   REF   1               06,2462  3 6211 0            CAF     SIX             ENABLE ISS ERROR COUNTERS IN 60 MS
0486   REF   3  LAST  151   06,2463  0 5233 0            TC      WAITLIST
0487   REF   3  LAST  151   E3,1474                      EBANK=  CDUIND
0488   REF   1               06,2464  03064 0            2CADR   CA+ECE
0488   REF   1               06,2465  16063 0
0489   REF  15  LAST  152   06,2466  3 4763 1  NOGIMRUN  CAF     BIT6            TURN ON GIMBAL LOCK LAMP.
0490   REF   4  LAST  155   06,2467  1 2471 0            TCF     SETGLOCK

0491   REF   3  LAST  153   06,2470  3 4772 1  -1        CAF     ZERO
0492   REF   6  LAST  143   06,2471  6 1241 1  SETGLOCK  AD      DSPTAB +11D     SEE IF PRESENT STATE OF GIMBAL LOCK LAMP
0493   REF  16  LAST  156   06,2472  7 4763 0            MASK    BIT6            AGREES WITH DESIRED STATE BY HALF ADDING
0494                        06,2473  0 0006 1            EXTEND                  THE TWO.
0495   REF   1               06,2474  1 5323 1            BZF     GLOCKOK         OK AS IS.

0496   REF   7  LAST  156   06,2475  7 1241 0            MASK    DSPTAB +11D     IF OFF, DONT TURN ON IF IMU BEING CAGED.
0497   REF  14  LAST  156   06,2476  10 000 0            CCS     A
0498   REF   1               06,2477  1 2513 0            TCF     GLAMPTST        TURN OFF UNLESS LAMP TEST IN PROGRESS.

0499   REF   2  LAST  151   06,2500  3 4763 1            CAF     IMUNITBT
0500   REF  17  LAST  151   06,2501  7 1333 1            MASK    IMODES30
0501   REF  15  LAST  156   06,2502  10 000 0            CCS     A
0502   REF   2  LAST  156   06,2503  1 5323 1            TCF     GLOCKOK

0503   REF   8  LAST  156   06,2504  4 1241 0  GLINVERT  CS      DSPTAB +11D     INVERT GIMBAL LOCK LAMP.
0504   REF  17  LAST  156   06,2505  7 4763 0            MASK    BIT6
0505   REF  15  LAST  151   06,2506  6 4752 0            AD      BIT15           TO INDICATE CHANGE IN DSPTAB +11D.
0506   REF   9  LAST  156   06,2507  57'241 1            XCH     DSPTAB +11D
0507   REF   1               06,2510  7 2160 0            MASK    OCT37737
0508   REF  10  LAST  156   06,2511  27'241 0            ADS     DSPTAB +11D
0509   REF   3  LAST  156   06,2512  1 5323 1            TCF     GLOCKOK

0510   REF   1               06,2513  0 2771 1  GLAMPTST  TC      LAMPTEST        TURN OFF UNLESS LAMP TEST IN PROGRESS.
0511   REF   4  LAST  156   06,2514  1 5323 1            TCF     GLOCKOK
0512   REF   1               06,2515  1 2504 0            TCF     GLINVERT

0513                        06,2516   63434 1  -70DEGS   DEC     -.38888         -70 DEGREES SCALED IN HALF-REVOLUTIONS.
0514   REF   1               06,3557                     -15DEGS EQUALS  OCT75252        SAME AS -.08333 DEC
```

L T4RUPT PROGRAM USER'S PAGE NO. 17 E6 S3

R0515 PROGRAM NAME: TLIM.

R0516 FUNCTIONAL DESCRIPTION: THIS PROGRAM MAINTAINS THE TEMP LAMP (BIT 4 OF CHANNEL 11) ON THE DSKY TO AGREE WITH
R0518 THE TEMP SIGNAL FROM THE ISS (BIT 15 OF CHANNEL 30). HOWEVER, THE LIGHT WILL NOT BE TURNED OFF IF A LAMP TEST
R0520 IS IN PROGRESS.

R0521 CALLING SEQUENCE: CALLED BY IMUMON ON A CHANGE OF BIT 15 OF CHANNEL 30.

R0522 JOBS OR TASKS INITIATED: NONE.

R0523 SUBROUTINES CALLED: LAMPTEST.

R0524 ERASABLE INITIALIZATION: FRESH START AND RESTART TURN THE TEMP LAMP OFF.

R0526 ALARMS: TEMP LAMP TURNED ON WHEN IMU TEMP GOES OUT OF LIMITS.

R0527 EXIT: NXTIFAIL.

R0528 OUTPUT: SERVICE OF TEMP LAMP. IN A, EXCEPT FOR TLIM.

```
 0530   REF   1                 06,2517  7 4750 0  TLIM     MASK    POSMAX       REMOVE BIT FROM WORD OF CHANGES AND SET
 0531   REF   5  LAST  154      06,2520  54 071 0           TS      RUPTREG2     DSKY TEMP LAMP ACCORDINGLY.

 0532   REF  18  LAST  156      06,2521  3 1333 0           CA      IMODES30
05325   REF   1                 06,2522  7 4752 1           MASK    TLIMBIT
 0533                           06,2523  0 0006 1           EXTEND
 0534   REF   1                 06,2524  1 2531 0           BZF     TEMPOK

 0535   REF  15  LAST  155      06,2525  3 4765 1           CAF     BIT4         TURN ON LAMP.
 0536                           06,2526  0 0006 1           EXTEND
 0537   REF   1                 06,2527  05 011 1           WOR     DSALMOUT
 0538   REF   1                 06,2530  1 2222 0           TCF     NXTIFAIL

 0539   REF   2  LAST  156      06,2531  0 2771 1  TEMPOK   TC      LAMPTEST     IF TEMP NOW OK, DONT TURN OFF LAMP IF
 0540   REF   2  LAST  157      06,2532  1 2222 0           TCF     NXTIFAIL     LAMP TEST IN PROGRESS.

 0541   REF  16  LAST  157      06,2533  4 4765 0           CS      BIT4
 0542                           06,2534  0 0006 1           EXTEND
 0543   REF   2  LAST  157      06,2535  03 011 1           WAND    DSALMOUT     TURN OFF TEMP CAUTION
 0544   REF   3  LAST  157      06,2536  1 2222 0           TCF     NXTIFAIL
```

L T4RUPT PROGRAM USER'S PAGE NO. 18 E6 S3

P0545 PROGRAM NAME: ITURNON.

R0546 FUNCTIONAL DESCRIPTION: THIS PROGRAM IS CALLED BY IMUMON WHEN A CHANGE OF BIT 14 OF CHANNEL 30 (ISS TURN-ON
R0548 REQUEST) IS DETECTED. UPON ENTRY, ITURNON CHECKS IF A TURN-ON DELAY SEQUENCE HAS FAILED, AND IF SO, IT EXITS.
R0550 IF NOT, IT CHECKS WHETHER THE TURN-ON REQUEST CHANGE IS TO ON OR OFF. IF ON, IT SETS BIT 7 OF IMODES30 TO 1 SO
R0552 THAT TNONTEST WILL INITIATE THE ISS INITIALIZATION SEQUENCE. IF OFF, THE TURN-ON DELAY SIGNAL, CHANNEL 12 BIT
R0554 15, IS CHECKED AND IF IT IS ON, ITURNON EXITS. IF THE DELAY SIGNAL IS OFF, PROGRAM ALARM 00207 IS ISSUED, BIT 2
R0556 OF IMODES30 IS SET TO 1 AND THE PROGRAM EXITS.
R0557 THE SETTING OF BIT 2 OF IMODES30 (ISS DELAY SEQUENCE FAIL) INHIBITS THIS ROUTINE AND IMUOP FROM
R0559 PROCESSING ANY CHANGES. THIS BIT WILL BE RESET BY THE ENDTNON ROUTINE WHEN THE CURRENT 90 SECOND DELAY PERIOD
R0561 ENDS.

R0562 CALLING SEQUENCE: FROM IMUMOM WHEN ISS TURN-ON REQUEST CHANGES STATE.

R0563 JOBS OR TASKS INITIATED: NONE.

R0564 SUBROUTINES CALLED: ALARM, IF THE ISS TURN-ON REQUEST IS NOT PRESENT FOR 90 SECONDS.

R0566 ERASABLE INITIALIZATION: FRESH START AND RESTART SET BIT 15 OF CHANNEL 12 AND BITS 2 AND 7 OF IMODES30 TO ,
R0568 AND BIT 14 OF IMODES30 TO 1.

R0569 ALARMS: PROGRAM ALARM 00207 IS ISSUED IF THE ISS TURN-ON REQUEST SIGNAL IS NOT PRESENT FOR 90 SECONDS.

R0571 EXIT: NXTIFAIL.

R0572 OUTPUT: BIT 7 OF IMODES30 TO START ISS INITIALIZATION, OR BIT 2 OF IMODES30 AND PROGRAM ALARM 00207 TO INDICATE
R0574 A FAILED TURN-ON SEQUENCE.

```
0575  REF   3  LAST  150  06,2537  3 4767 0  ITURNON  CAF   DLAYFAIL   IF DELAY REQUEST HAS GONE OFF
0576  REF  19  LAST  157  06,2540  7 1333 1            MASK  IMODES30   PREMATURELY, DO NOT PROCESS ANY CHANGES
0577  REF  16  LAST  156  06,2541  10 000 0            CCS   A          UNTIL THE CURRENT 90 SEC WAIT EXPIRES.
0578  REF   4  LAST  157  06,2542  1 2222 0            TCF   NXTIFAIL

0579  REF   4  LAST  151  06,2543  3 4753 1            CAF   TONISSBT   SEE IF JUST ON OR OFF
0580  REF  20  LAST  158  06,2544  7 1333 1            MASK  IMODES30
0581                      06,2545  0 0006 1            EXTEND
0582  REF   1              06,2546  1 2562 0            BZF   ITURNON2   IF JUST ON.

0583  REF  16  LAST  156  06,2547  3 4752 0            CAF   BIT15
0584                      06,2550  0 0006 1            EXTEND           SEE IF DELAY PRESENT DISCRETE HAS BEEN
0585  REF   7  LAST  155  06,2551  02 012 0            RAND  CHAN12     SENT. IF SO, ACTION COMPLETE.
0586                      06,2552  0 0006 1            EXTEND
0587                      06,2553  1 2555 1            BZF   +2
0588  REF   5  LAST  158  06,2554  1 2222 0            TCF   NXTIFAIL

0589  REF   4  LAST  158  06,2555  3 4767 0            CAF   DLAYFAIL   IF NOT, SET BIT TO INDICATE REQUEST NOT
0590  REF  21  LAST  158  06,2556  27'333 1            ADS   IMODES30   PRESENT FOR FULL DURATION.
0591  REF   2  LAST  150  06,2557  0 5671 1            TC    ALARM
0592                      06,2560   00207 1            OCT   207
0593  REF   6  LAST  158  06,2561  1 2222 0            TCF   NXTIFAIL
```

L T4RUPT PROGRAM USER'S PAGE NO. 19 E6 S3

```
0594   REF  22  LAST  158   06,2562  4 1333 1  ITURNON2 CS     IMODES30      SET BIT7 TO INDICATE WAIT OF 1 SAMPLE
0595   REF   3  LAST  150   06,2563  7 4762 1           MASK   ITNON1BT
0596   REF  23  LAST  159   06,2564  27'333 1           ADS    IMODES30
0597   REF   7  LAST  158   06,2565  1 2222 0           TCF    NXTIFAIL
```

L T4RUPT PROGRAM USER'S PAGE NO. 2 E6 53

P0598 PROGRAM NAME: IMUCAGE.

R0599 FUNCTIONAL DESCRIPTION: THIS PROGRAM PROCESSES CHANGES OF THE IMUCAGE INBIT, CHANNEL 30 BIT 11. IF THE BIT
R0601 CHANGES TO 0 (CAGE BUTTON PRESSED), THE ISS IS CAGED (ICDU ZERO + COARSE ALIGN + NO ATT LAMP) UNTIL THE
R0603 ASTRONAUT SELECTS ANOTHER PROGRAM TO ALIGN THE ISS. ANY PULSE TRAINS TO THE ICDU'S AND GYRO'S ARE TERMINATED,
R0605 THE ASSOCIATED OUTCOUNTERS ARE ZEROED AND THE GYRO'S ARE DE-SELECTED. NO ACTION OCCURS WHEN THE BUTTON IS
R0607 RELEASED (INBIT CHANGES TO 1).

R0608 CALLING SEQUENCE: BY IMUMON WHEN IMU CAGE BIT CHANGES.

R0609 JOBS OR TASKS INITIATED: NONE.

R0610 SUBROUTINES CALLED: CAGESUB.

R0611 ERASABLE INITIALIZATION: FRESH START AND RESTART SET BIT 11 OF IMODES30 TO 1.

R0613 ALARMS: NONE.

R0614 EXIT: NXTIFAIL.

R0615 OUTPUT: ISS CAGED, COUNTERS ZEROED, PULSE TRAINS TERMINATED AND NO ATT LAMP LIT.

```
0617   REF  17  LAST  158   06,2566  10 0000 0   IMUCAGE  CCS     A          NO ACTION IF GOING OFF.
0618   REF   1              06,2567   1 2354 0            TCF     ISSZERO
0619   REF   1              06,2570   3 5021 1            CA      LOW9       TERMINATE ICDU,OPTICS, GYRO PULSE TRAINS
0620                        06,2571   0 0006 1            EXTEND
0621   REF   1              06,2572   03 014 1            WAND    CHAN14

0622   REF   1              06,2573   4 2774 0            CS      CCT272     KNOCK DOWN TVC ENABLE, IMU ERROR COUNTER
0623                        06,2574   0 0006 1            EXTEND                 ENABLE, ZERO ICDU, COARSE ALIGN
0624   REF   8  LAST  158   06,2575   03 012 1            WAND    CHAN12         ENABLE, OPTICS ERR CNTR ENABLE

06241  REF   1              06,2576   4 4762 1            CS      ENGONBIT   CLEAR ENGINE ON FLAG
06242  REF   2  LAST  143   06,2577   7 0101 0            MASK    FLAGWRD5
06243  REF   3  LAST  160   06,2600  54 101 0             TS      FLAGWRD5
0625   REF  16  LAST   85   06,2601   4 4754 1            CS      BIT13      TURN OFF ENGINE
0626                        06,2602   0 0006 1            EXTEND
0627   REF   3  LAST  157   06,2603   03 011 1            WAND    DSALMOUT

0628   REF   1              06,2604   0 2746 0            TC      CAGESUB1

0629   REF   5  LAST  156   06,2605   0 4714 1            TC      IBNKCALL   KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
0630   REF   1              06,2606    17121 0            CADR    RNDREFDR

0631   REF   4  LAST  156   06,2607   4 4772 0            CS      ZERO       ZERO COMMAND OUT-COUNTERS
0632   REF   1              06,2610  54 050 0             TS      CDUXCMD
0633   REF   1              06,2611  54 051 1             TS      CDUYCMD
0634   REF   1              06,2612  54 052 1             TS      CDUZCMD
0635   REF   1              06,2613  54 047 0             TS      GYROCMD
```

L T4RUPT PROGRAM USER'S PAGE NO. 21 E6 S3

```
0636   REF   1                  06,2614  4 2777 0     CS      OCT740      HAVING WAITED AT LEAST 27 MCT FROM
0637                             06,2615  0 0006 1     EXTEND              GYRO PULSE TRAIN TERMINATION, WE CAN
0638   REF   2  LAST  160        06,2616  03 014 1     WAND    CHAN14      DE-SELECT THE GYROS.
0639   REF   8  LAST  159        06,2617  1 2222 0     TCF     NXTIFAIL
```

L T4RUPT PROGRAM USER'S PAGE NO. 22 E6 S3

```
R0640   PROGRAM NAME:  IMUOP.

R0641   FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES IN THE ISS OPERATE DISCRETE, BIT 9 OF CHANNEL 30.
R0643   IF THE INBIT CHANGES TO 0, INDICATING ISS ON, IMUOP GENERALLY SETS BIT 7 OF IMODES30 TO 1 TO REQUEST ISS
R0645   INITIALIZATION VIA TNONTEST.  AN EXCEPTION IS DURING A FAILED ISS DELAY DURING WHICH BIT 2 OF IMODES30 IS SET
R0647   TO 1 AND NO FURTHER INITIALIZATION IS REQUIRED.  WHEN THE INBIT CHANGES TO 1, INDICATING ISS OFF, IMUSEFLG IS
R0649   TESTED TO SEE IF ANY PROGRAM WAS USING THE ISS.  IF SO, PROGRAM ALARM 00214 IS ISSUED.

R0651   CALLING SEQUENCE:  BY IMUMON WHEN BIT 9 OF CHANNEL 30 CHANGES.

R0652   JOBS OR TASKS INITIATED:  NONE.

R0653   SUBROUTINES CALLED:  ALARM, IF ISS IS TURNED OFF WHILE IN USE.

R0654   ERASABLE INITIALIZATION:  ON FRESH START AND RESTART, BIT 9 OF IMODES30 IS SET TO 1 EXCEPT WHEN THE GIMBAL LOCK
R0656   LAMP IS ON, IN WHICH CASE IT IS SET TO 0.  THIS PREVENTS ICDU ZERO BY TNONTEST WITH THE ISS IN GIMBAL LOCK.

R0658   ALARMS:  PROGRAM ALARM 00214 IF THE ISS IS TURNED OFF WHILE IN USE.

R0659   EXIT:  NXTIFAIL.

R0660   OUTPUT:  ISS INITIALIZATION REQUEST (IMODES30 BIT 7) OR PROGRAM ALARM 00214.

 0662                    06,2620  0 0006 1  IMUOP    EXTEND                    IF OPERATE JUST ON, WAIT 1 SAMPLE.
 0663   REF   1          06,2621  1 2646 0           BZF     IMUOP2

 0664   REF  10 LAST 154 06,2622  4 1334 0           CS      IMODES33          DISABLE DAP
 0665   REF   2 LAST 151 06,2623  7 4763 0           MASK    NOIMUDAP
 0666   REF  11 LAST 162 06,2624 27'334 0            ADS     IMODES33

 0667   REF   6 LAST 160 06,2625  0 4714 1           TC      IBNKCALL          KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
 0668   REF   2 LAST 160 06,2626    17121 0          CADR    RNDREFDR

 0682   REF   1          06,2627  4 4760 0           CS      UTBIT
 0684   REF   1          06,2630  7 0104 0           MASK    FLAGWRD8
 0686   REF   2 LAST 162 06,2631 54 104 0            TS      FLAGWRD8

 0669   REF   1          06,2632  3 4762 0           CA      RNDVZBIT          TURN OFF FLAGS
 0692   REF   1          06,2633  6 4761 0           AD      IMUSEBIT
 0695                    06,2634  4 0000 0           COM
 0670   REF   4 LAST 152 06,2635  7 0074 0           MASK    FLAGWRD5
 0671   REF   5 LAST 162 06,2636 56 074 1            XCH     FLAGWRD5          IF GOING OFF, ALARM IF PROG USING IMU
 0672                    06,2637  4 0000 0           COM
 0673   REF   3 LAST 152 06,2640  7 4761 1           MASK    IMUSEFLG
 0674   REF  18 LAST 160 06,2641 10 000 0            CCS     A
 0675   REF   9 LAST 161 06,2642  1 2222 0           TCF     NXTIFAIL

 0676   REF   3 LAST 158 06,2643  0 5671 1           TC      ALARM
 0677                    06,2644   00214 0          OCT     214
 0678   REF  10 LAST 162 06,2645  1 2222 0           TCF     NXTIFAIL
```

L T4RUPT PROGRAM USER'S PAGE NO. 23 E6 S3

```
0679   REF   5  LAST  158   06,2646  3 4767 0  IMUOP2   CAF    DLAYFAIL
0680   REF  24  LAST  159   06,2647  7 1333 1           MASK   IMODES3
0681   REF  19  LAST  162   06,2650  10 000 0           CCS    A
0682   REF  11  LAST  162   06,2651  1 2222 0           TCF    NXTIFAIL     IF SO, DONT PROCESS UNTIL PRESENT 90
0683   REF   2  LAST  158   06,2652  1 2562 0           TCF    ITURNOV2     SECONDS EXPIRES.
```

L T4RUPT PROGRAM USER'S PAGE NO. 24 E6 S3

PC684 PROGRAM NAME: PIPFAIL

RC685 FUNCTIONAL DESCRIPTION: THIS PROGRAM PROCESSES CHANGES OF BIT 13 OF CHANNEL 33, PIPA FAIL. IT SETS BIT 1 OF
RC687 IMODES30 TO AGREE. IT CALLS SETISSW IN CASE A PIPA FAIL NECESSITATES AN ISS WARNING. IF NOT,I.E., IMODES3
RC689 BIT 1 = 1, AND A PIPA FAIL IS PRESENT AND THE ISS IS NOT BEING INITIALIZED, PROGRAM ALARM 00212 IS ISSUED.

RC691 CALLING SEQUENCE: BY C33TEST ON CHANGES OF CHANNEL 33 BIT 13

RC692 JOBS OR TASKS INITIATED: NONE.

RC693 SUBROUTINES CALLED: 1) SETISSW, AND 2) ALARM (SEE FUNCTIONAL DESCRIPTION).

RC695 ERASABLE INITIALIZATION: SEE IMUMON FOR INITIALIZATION OF IMODES3[illegible]. THE RELAVANT BITS ARE 5, 7, 8, 9, AND 10.

RC697 ALARMS: PROGRAM ALARM 00212 IF PIPA FAIL IS PRESENT BUT NEITHER ISS WARNING IS TO BE ISSUED NOR THE ISS IS
RC699 BEING INITIALIZED.

RC700 EXIT: NXTFL33.

RC701 OUTPUT: PROGRAM ALARM 00212 AND ISS WARNING MAINTENANCE.

0702	REF	20	LAST	163	06,2653	10 000 0	PIPFAIL	CCS	A	SET BIT10 IN IMODES30 SO ALL ISS WARNING
0703	REF	1			06,2654	3 4757 0		CAF	PIPAFLBT	INFO IS IN ONE REGISTER
0704	REF	25	LAST	163	06,2655	57'333 0		XCH	IMODES30	
0705	REF	1			06,2656	7 3000 0		MASK	-BIT10	
0706	REF	26	LAST	164	06,2657	27'333 1		ADS	IMODES30	
0707	REF	2	LAST	151	06,2660	0 2706 1		TC	SETISSW	
0708	REF	27	LAST	164	06,2661	4 1333 1		CS	IMODES30	IF PIP FAIL DOESNT LIGHT ISS WARNING, DO
0709	REF	1			06,2662	7 4770 1		MASK	ACCFINHT	A PROGRAM ALARM IF IMU OPERATING BUT NOT
0710	REF	21	LAST	164	06,2663	10 000 0		CCS	A	CAGED OR BEING TURNED ON.
0711	REF	1			06,2664	1 2424 0		TCF	NXTFL33	
0712	REF	28	LAST	164	06,2665	3 1333 0		CA	IMODES30	
0713	REF	1			06,2666	7 2776 1		MASK	OCT1720	
0714	REF	22	LAST	164	06,2667	10 000 0		CCS	A	
0715	REF	2	LAST	164	06,2670	1 2424 0		TCF	NXTFL33	ABOVE CONDITION NOT MET.
0716	REF	4	LAST	162	06,2671	0 5671 1		TC	ALARM	
0717					06,2672	00212 0		OCT	212	
0718	REF	3	LAST	164	06,2673	1 2424 0		TCF	NXTFL33	

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PC719   PROGRAM NAMES:  DNTMFAST, UPTMFAST

RC720   FUNCTIONAL DESCRIPTION:  THESE PROGRAMS PROCESS CHANGES OF BITS 12 AND 11 OF CHANNEL 33.  IF A BIT CHANGES TO A
RC722   0, A PROGRAM ALARM IS ISSUED.  THE ALARMS ARE:

RC723                BIT     ALARM           CAUSE
RC724                ---     -----           -----
RC725                 12     01105           DOWNLINK TOO FAST
RC726                 11     01106           UPLINK TOO FAST

RC727   CALLING SEQUENCE:  BY C33TEST ON A BIT CHANGE.

RC728   SUBROUTINES CALLED:  ALARM, IF A BIT CHANGES TO A 0.

RC729   ERASABLE INITIALIZATION:  FRESH START OR RESTART, BITS 12 AND 11 OF IMODES33 ARE SET TO 1.

RC731   ALARMS:  SEE FUNCTIONAL DESCRIPTION.

RC732   EXIT:  NXTFL33.

RC733   OUTPUT:  PROGRAM ALARM ON A BIT CHANGE TO 0.

 0734   REF  23  LAST  164   06,2674  10 000 0  DNTMFAST CCS   A          DO PROG ALARM IF TM TOO FAST.
 0735   REF   4  LAST  164   06,2675  1 2424 0            TCF   NXTFL33

 0736   REF   5  LAST  164   06,2676  0 5671 1            TC    ALARM
 0737                        06,2677   01105 1            OCT   1105
 0738   REF   5  LAST  165   06,2700  1 2424 0            TCF   NXTFL33

 0739   REF  24  LAST  165   06,2701  10 000 0  UPTMFAST CCS   A          SAME AS DNLINK TOO FAST WITH DIFFERENT
 0740   REF   6  LAST  165   06,2702  1 2424 0            TCF   NXTFL33    ALARM CODE.

 0741   REF   6  LAST  165   06,2703  0 5671 1            TC    ALARM
 0742                        06,2704   01106 1            OCT   1106
 0743   REF   7  LAST  165   06,2705  1 2424 0            TCF   NXTFL33
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R0744   PROGRAM NAME:  SETISSW

R0745   FUNCTIONAL DESCRIPTION:  THIS PROGRAM TURNS THE ISS WARNING LAMP ON AND OFF (CHANNEL 11 BIT 1 = 1 FOR ON,
R0747   0 FOR OFF) DEPENDING ON THE STATUS OF IMODES30 BITS 13 (IMU FAIL) AND 4 (INHIBIT IMU FAIL), 12 (ICDU FAIL) AND
R0749   3 (INHIBIT ICDU FAIL), AND 10 (PIPA FAIL) AND 1 (INHIBIT PIPA FAIL).  THE LAMP IS LEFT ON IF A LAMP TEST IS IN
R0751   PROGRESS.

R0752   CALLING SEQUENCE:  CALLED BY IMUMON ON CHANGES TO IMU FAIL AND ICDU FAIL.  CALLED BY IFAILOK AND PFAILOK UPON
R0754   REMOVAL OF THE FAIL INHIBITS.  CALLED BY PIPFAIL WHEN THE PIPA FAIL DISCRETE CHANGES.  IT IS CALLED BY PIPUSE
R0756   SINCE THE PIPA FAIL PROGRAM ALARM MAY NECESSITATE AN ISS WARNING, AND LIKEWISE BY PIPFREE WHEN THE ALARM DEPARTS
R0758   AND IT IS CALLED BY IMUZERO3 AND ISSUP AFTER THE FAIL INHIBITS HAVE BEEN REMOVED.

R0760   JOBS OR TASKS INITIATED:  NONE.

R0761   SUBROUTINES CALLED:  NONE.

R0762   ERASABLE INITIALIZATION:

R0763           1) IMODES30 - SEE IMUMON.
R0764           2) IMODES33 BIT 1 = 0 (LAMP TEST NOT IN PROGRESS).

R0765   ALARMS:  ISS WARNING.

R0766   EXIT:  VIA Q.

R0767   OUTPUT:  ISS WARNING LAMP SET PROPERLY.

0768  REF  1                    06,2706  3 4776 0  SETISSW  CAF     OCT15      SET ISS WARNING USING THE FAIL BITS IN
0769  REF 29  LAST 164          06,2707  7 1333 1           MASK    IMODES33   BITS 13, 12, AND 10 OF IMODES33 AND THE
0770                            06,2710  0 0006 1           EXTEND             FAILURE INHIBIT BITS IN POSITIONS
0771  REF 14  LAST  85          06,2711  7 4757 1           MP      BIT10      4, 3, AND 1.
0772  REF 30  LAST 166          06,2712  3 1333 0           CA      IMODES30
0773                            06,2713  0 0006 1           EXTEND
0774  REF  5  LAST 153          06,2714  04 001 1           ROR     LCHAN      0 INDICATES FAILURE.
0775                            06,2715  4 0000 0           COM
0776  REF  1                    06,2716  7 5054 1           MASK    OCT15000
0777  REF 25  LAST 165          06,2717  10 000 0           CCS     A
0778  REF  1                    06,2720  1 2731 1           TCF     ISSWON     FAILURE.

0779  REF  1                    06,2721  3 4770 0  ISSWOFF  CAF     LMPTSTBT   DONT TURN OFF ISS WARNING IF LAMP TEST
0780  REF 12  LAST 162          06,2722  7 1334 0           MASK    IMODES33   IN PROGRESS.
0781  REF 26  LAST 166          06,2723  10 000 0           CCS     A
0782  REF  3  LAST 143          06,2724  0 0002 0           TC      Q

0783  REF 14  LAST  85          06,2725  4 4770 1           CS      BIT1
0784                            06,2726  0 0006 1           EXTEND
0785  REF  4  LAST 160          06,2727  03 011 1           WAND    DSALMOUT   TURN OFF ISS WARNING
0786  REF  4  LAST 166          06,2730  0 0002 0           TC      Q

0787                            06,2731  0 0006 1  ISSWON   EXTEND
```

```
07871  REF   1                    06,2732  22 066 1                QXCH    ITEMP6
07872  REF   1                    06,2733  0 5770 1                TC      VARALARM        TELL EVERYONE WHAT CAUSED THE ISSWARNING
07873  REF  15  LAST  166         06,2734  3 4770 0                CAF     BIT1
0788                               06,2735  0 0006 1                EXTEND
0789   REF   5  LAST  166         06,2736  05 011 1                WOR     DSALMOUT        TURN ON ISS WARNING
0790   REF   2  LAST  167         06,2737  0 0066 1                TC      ITEMP6
0791   REF   1                    06,2740  4 7667 0       CAGESUB  CS      BIT15+6         SET OUTBITS + INTERNAL FLAGS FOR
0792                               06,2741  0 0006 1                EXTEND                  SYSTEM TURN-ON OR CAGE. DISABLE THE
0793   REF   9  LAST  160         06,2742  03 012 1                WAND    CHAN12          ERROR COUNTER AND REMOVE IMU DELAY COMP
0794   REF   2  LAST  151         06,2743  3 5001 0                CAF     BITS4&5         SEND ZERO AND COARSE.
0795                               06,2744  0 0006 1                EXTEND
0796   REF  10  LAST  167         06,2745  05 012 1                WOR     CHAN12

0797   REF  11  LAST  156         06,2746  4 1241 0       CAGESUB1 CS      DSPTAB +11D     TURN ON NO ATT LAMP
0798   REF   1                    06,2747  7 7664 0                MASK    OC40010
0799   REF  12  LAST  167         06,2750  27'241 0                ADS     DSPTAB +11D

0800   REF  31  LAST  166         06,2751  4 1333 1       CAGESUB2 CS      IMODES30        SET FLAGS TO INDICATE CAGING OR TURN-ON
0801   REF   1                    06,2752  7 5012 0                MASK    OCT75                   AND INHIBIT ALL ISS WARNING INFO
0802   REF  32  LAST  167         06,2753  27'333 1                ADS     IMODES30

0803   REF  13  LAST  166         06,2754  4 1334 0                CS      IMODES33        DISABLE DAP AUTO AND HOLD MODES
0804   REF   3  LAST  162         06,2755  7 4763 0                MASK    NOIMUDAP
0805   REF  14  LAST  167         06,2756  27'334 0                ADS     IMODES33

0806   REF   5  LAST  166         06,2757  0 0002 0                TC      Q

0807   REF   3  LAST  164         06,2706                  IMUFAIL  EQUALS SETISSW
0808   REF   4  LAST  167         06,2706                  ICDUFAIL EQUALS SETISSW
```

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PC809                   JUMP TABLES AND CONSTANTS.

 0810   REF   1                 06,2760  1 2537 0  IFAILJMP TCF    ITURNON        CHANNEL 30 DISPATCH.
 0811   REF   1                 06,2761  1 2706 0           TCF    IMUFAIL
 0812   REF   1                 06,2762  1 2706 0           TCF    ICDUFAIL
 0813   REF   1                 06,2763  1 2566 1           TCF    IMUCAGE
 0814                           06,2764    76400 1  30RDMSK  OCT    76400          (BIT 10 NOT SAMPLED HERE).
 0815   REF   1                 06,2765  1 2620 0           TCF    IMUOP

 0816   REF   1                 06,2766  1 2653 1  C33JMP   TCF    PIPFAIL        CHANNEL 33 DISPATCH.
 0817   REF   1                 06,2767  1 2674 1           TCF    DNTMFAST
 0818   REF   1                 06,2770  1 2701 1           TCF    UPTMFAST

R0819                   SUBROUTINE TO SKIP IF LAMP TEST NOT IN PROGRESS.
 0820   REF  15  LAST  167      06,2771  4 1334 0  LAMPTEST CS     IMODES33       BIT 1 OF IMODES33 = 1 IF LAMP TEST IN
 0821   REF   2  LAST  166      06,2772  7 4770 1           MASK   LMPTSTBT       PROGRESS
 0822   REF   1                 06,2773  1 5651 1           TCF    INCRQCK
 0823   REF   1                    5055                    33RDMSK  EQUALS PRIO16
 0824   REF   1                    7664                    OC40010  EQUALS OT40010
 0828                           06,2774    00272 0  OCT272   OCT    00272
 0829                           06,2775    00300 1  BITS7&8  OCT    300
 0830                           06,2776    01720 0  OCT1720  OCT    1720
 0831                           06,2777    00740 1  OCT740   OCT    00740
 0832   REF   1                    5054                    OCT15000 EQUALS PRIO15
 0834                           06,3000    76777 1  -BIT10   OCT    -1000

 0836   REF   1                    5775                    120MS    =      OCT14          (DEC 12)
 0837   REF   4  LAST  146         5323                    GLOCKOK  EQUALS RESUME
```

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P0838   OPTICS MONITORING AND ZERO ROUTINES
 0839   REF   2  LAST  135   06,3001  3 1337 1  OPTMON   CA      OPTMODES   MONITOR OPTICS INBITS IN CHAN 30 AND 33
 0840                        06,3002  0 0006 1           EXTEND
 0841   REF   2  LAST  147   06,3003  06 030 1           RXOR    CHAN30     LOOK FOR OCDU FAIL BIT CHANGE
 0842   REF   1              06,3004  7 4762 1           MASK    OCDUFBIT
 0843   REF  13  LAST  154   06,3005  54 070 1           TS      RUPTREG1   STORE CHANGE BIT
 0844   REF  27  LAST  166   06,3006  10 000 0           CCS     A
 0845   REF   1              06,3007  0 3221 0           TC      OCDUFTST   PROCESS OCDUFAIL BIT CHANGE

 0846   REF   1              06,3010  11'323 0  33OPTMON CCS     OPTIND     BYPASS IF TVC TAKEOVER
 0847                        06,3011  1 3015 1           TCF     +4
 0848                        06,3012  1 3015 1           TCF     +3
 0849   REF   1              06,3013  0 3256 0           TC      OPDISAB    DISABLE OPTICS ERR CNTRS
 0850   REF   5  LAST  168   06,3014  1 5323 1           TCF     RESUME

 0851   REF   3  LAST  169   06,3015  3 1337 1           CA      OPTMODES   LOOK FOR OPTICS MODE SWITCH CHANGE
 0852                        06,3016  0 0006 1           EXTEND
 0853   REF   2  LAST  153   06,3017  06 033 1           RXOR    CHAN33
 0854   REF   1              06,3020  7 5001 1           MASK    OCTHIRTY
 0855   REF  14  LAST  169   06,3021  26 070 1           ADS     RUPTREG1   STORE INBIT CHANGES
 0856   REF   4  LAST  169   06,3022  23'337 1           LXCH    OPTMODES
 0857                        06,3023  0 0006 1           EXTEND
 0858   REF   6  LAST  166   06,3024  06 001 0           RXOR    LCHAN
 0859   REF   5  LAST  169   06,3025  55'337 0           TS      OPTMODES   UPDATE OPTMODES TO SHOW BIT  CHANGES

 0859   REF   2  LAST  135   06,3026  3 0374 1           CA      C31FLWRD
 0860   REF   2  LAST  169   06,3027  7 5001 1           MASK    OCTHIRTY
 0861                        06,3030  0 0006 1           EXTEND
 0862                        06,3031  1 3037 1           BZF     +6
 0863   REF   3  LAST  153   06,3032  54 001 1           TS      L          USE FAILWORD INDICATORS
 0864   REF   3  LAST  169   06,3033  4 5001 1           CS      OCTHIRTY
 0865   REF   6  LAST  169   06,3034  7 1337 0           MASK    OPTMODES
 0866   REF   4  LAST  169   06,3035  6 0001 0           AD      L
 0867   REF   7  LAST  169   06,3036  55'337 0           TS      OPTMODES
 0868   REF   8  LAST  169   06,3037  4 1337 0           CS      OPTMODES   SAMPLE CURRENT SWITCH SETTING
 0869   REF   4  LAST  169   06,3040  7 5001 1           MASK    OCTHIRTY
 0870                        06,3041  0 0006 1           EXTEND
 0871   REF   1              06,3042  1 3047 0           BZF     SETSAMP    MANUAL-SET ZERO IN SWSAMPLE

 0872   REF   1              06,3043  7 4764 1           MASK    OPMD18IT   SEE IF CSC
 0873   REF  28  LAST  169   06,3044  10 000 0           CCS     A
 0874                        06,3045  0 3047 1           TC      +2         CSC-SET SWSAMPLE  POS
 0875   REF   1              06,3046  3 7702 0           CAF     NEGONE     ZOPTICS-SET SWSAMPLE (-1)
 0876   REF   1              06,3047  55'354 0  SETSAMP  TS      SWSAMPLE   CURRENT OPTICS SWITCH SETTING

 0877   REF   1              06,3050  11'330 1  PROCESSW CCS     DESOPMOD   BRANCH ON PREVIOUS SETTING
 0878   REF   1              06,3051  0 3143 1           TC      CSCDES     CSC
 0879   REF   1              06,3052  0 3115 1           TC      MANUDES    MANUAL
 0881   REF   2  LAST  169   06,3053  11'354 0  ZOPTDES  CCS     SWSAMPLE   IS SWITCH STILL AT ZOPTICS
 0882   REF   1              06,3054  0 3132 1           TC      ZTOCSC     NOW AT CSC
```

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0875   REF   1                    06,3055  0 3071 1          TC     ZTOMAN     MANUAL
0876   REF   1                    06,3056  0 3101 1          TC     ZOPFINI    ZOPTICS-SEE IF ZOPT PROCESSING
0877   REF   1                    06,3057  0 3124 0          TC     SETDESMD   ZOPT NOT PROCESSING-NO ACTION

0878   REF   1                    06,3060  11'332 0          CCS    ZOPTCNT    ZOPT PROCESSING-CHECK COUNTER
0879   REF   1                    06,3061  0 3123 1          TC     SETCNT     32 SAMPLE NOT FINISHED-SET COUNTER
0880   REF  16  LAST  167         06,3062  3 4770 0 SETZOEND CAF    BIT1       32 SAMPLE WAIT COMPLETED-SET UP ENDZOPT
08801                              06,3063  0 0006 1          EXTEND
08802  REF  11  LAST  167         06,3064  05 012 1          WOR    CHAN12     SEND OCDU ZERO
08803  REF   1                    06,3065  3 4124 1          CAF    200MS      HOLD FOR 200MS
08804  REF   2  LAST  152         06,3066  0 5223 1          TC     TWIDDLE
08805  REF   1                    06,3067   03171 0          ADRES  ENDZOPT
08809  REF   2  LAST  170         06,3070  0 3124 0          TC     SETDESMD
0881   REF   2  LAST  170         06,3071  0 3101 1 ZTOMAN   TC     ZOPFINI    ZOP TO MANUAL-IS ZOPT DONE
0882   REF   1                    06,3072  0 3154 1          TC     CSCTOMAN   YES
0883   REF   7  LAST  165         06,3073  0 5671 1 ZOPALARM TC     ALARM      ALARM-SWITCHED ALTERED WHILE ZOPTICS
0884                              06,3074   00116 1          OCT    00116
0885   REF   1                    06,3075  3 4775 0          CAF    OCT13      PROCESSING-SET RETURN OPTION
0886   REF   1                    06,3076  55'331 0          TS     WTOPTION

0887   REF   1                    06,3077  0 3104 1          TC     CANZOPT    CANCEL ZOPT

0888   REF   2  LAST  170         06,3100  0 3154 1          TC     CSCTOMAN
A0897                                                                           BIT 1 OF OPTMODES HAS BEEN ELIMINATED.
A0898                                                                           IF T4RUPT TIMING IS REDUCED, IT WILL
A0899                                                                           BE NECESSARY TO REINSTATE THE BIT AS
A0900                                                                           BEFORE, BUT PREVENT OPTICS LOCKOUT.
0901   REF   1                    06,3101  3 4766 1 ZOPFINI  CAF    ZOPTCS
0902   REF   9  LAST  169         06,3102  7 1337 0 ZOPFIN2  MASK   OPTMODES   RETURNS TO L+1 PROCESSING AND
0903   REF   2  LAST  168         06,3103  1 5651 1          TCF    INCRQCK    L+2 IF NOT
0906   REF   2  LAST  170         06,3104  3 4766 1 CANZOPT  CAF    ZOPTCS     CANCEL ZERO OPTICS
09062  REF   1                    06,3105  6 4767 0          AD     OCDUINHT
09065                              06,3106  4 0000 0          COM
0907   REF  10  LAST  170         06,3107  7 1337 0          MASK   OPTMODES   ZERO ZOPT PROCESSING BIT-ENABLE OCDUFAIL
0908   REF  11  LAST  170         06,3110  55'337 0          TS     OPTMODES
0909   REF  17  LAST  170         06,3111  4 4770 1          CS     BIT1       MAKE SURE ZERO OCDU IS OFF
0910                              06,3112  0 0006 1          EXTEND
0911   REF  12  LAST  170         06,3113  03 012 1          WAND   CHAN12
0912   REF   6  LAST  167         06,3114  0 0002 0          TC     Q
```

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0913   REF  3  LAST  169   06,3115  11'354 0  MANUDES  CCS    SWSAMPLE        SEE IF SWITCH STILL IN MANUAL MODE
0914   REF  1              06,3116  0 3137 1           TC     MANTOCSC        NOW AT CSC
0915   REF  1              06,3117  0 3127 0           TC     MANTOMAN        STILL MANUAL
-------------------------------------------------------------------------------------------------------------------
0916   REF  2  LAST  170   06,3120  11'331 0           CCS    WTOPTION        ZOPTICS-LOOK AT ZOPTICS RETURN OPTION
0917   REF  1              06,3121  0 3150 0           TC     CSCTOZOP +2     5 SEC RETURN GOOD- CONTINUE ZOPTICS
0918   REF  2  LAST  171   06,3122  0 3146 1           TC     CSCTOZOP
09182  REF  2  LAST  170   06,3123  55'332 0  SETCNT   TS     ZOPTCNT
09183  REF  4  LAST  171   06,3124  3 1354 1  SETDESMD CA     SWSAMPLE        SET CURRENT SWITCH INDICATOR- RESUME
09184  REF  2  LAST  169   06,3125  55'330 1           TS     DESOPMOD
-------------------------------------------------------------------------------------------------------------------
09185  REF  6  LAST  169   06,3126  0 5323 0           TC     RESUME
0922   REF  3  LAST  171   06,3127  11'331 0  MANTOMAN CCS    WTOPTION        DECREMENT RETURN OPTION TIME
0923   REF  4  LAST  171   06,3130  55'331 0           TS     WTOPTION
0924   REF  3  LAST  170   06,3131  0 3124 0           TC     SETDESMD

09241  REF  3  LAST  170   06,3132  0 3101 1  ZTOCSC   TC     ZOPFINI         SEE IF ZOPT PROCESSING
-------------------------------------------------------------------------------------------------------------------
09242  REF  2  LAST  171   06,3133  0 3142 0           TC     MANTOCSC +3     NO- RETURN TO COARS OPT
09243  REF  8  LAST  170   06,3134  0 5671 1           TC     ALARM           ZOPT PROCESSING- ALARM
09244               00116   06,3135  00116 1           OCT    00116
09245  REF  2  LAST  170   06,3136  0 3104 1           TC     CANZOPT         CANCEL ZOPT
0925   REF  5  LAST  160   06,3137  3 4772 1  MANTOCSC CAF    ZERO            CANCEL ZOPT RETURN OPTION IF SET
0926   REF  5  LAST  171   06,3140  55'331 0           TS     WTOPTION
-------------------------------------------------------------------------------------------------------------------
0927   REF  3  LAST  171   06,3141  55'332 0           TS     ZOPTCNT

0935   REF  3  LAST  170   06,3142  0 3154 1    +3     TC     CSCTOMAN
0936   REF  5  LAST  171   06,3143  11'354 0  CSCDES   CCS    SWSAMPLE        SEE IF SWITCH STILL AT CSC
0937   REF  4  LAST  171   06,3144  0 3124 0           TC     SETDESMD        STILL AT CSC
0938   REF  4  LAST  171   06,3145  0 3154 1           TC     CSCTOMAN        MANUAL
-------------------------------------------------------------------------------------------------------------------
0939   REF  1              06,3146  3 4763 1  CSCTOZOP CAF    OCT40           ZOPTICS-INITIALIZE FOR ZOPT
0940   REF  4  LAST  171   06,3147  55'332 0           TS     ZOPTCNT
0941   REF  1              06,3150  0 3213 1    +2     TC     INITZOPT
09412  REF  1              06,3151  0 4077 0           TC     NOOPRATE
09414  REF  1              06,3152  0 3257 1           TC     ECDISAB
09416  REF  5  LAST  171   06,3153  0 3124 0           TC     SETDESMD
-------------------------------------------------------------------------------------------------------------------
0942   REF  2  LAST  169   06,3154  11'323 0  CSCTOMAN CCS    OPTIND          IS THE OPTICS IN USE
0943   REF  1              06,3155  0 3161 1           TC     CANCOARS        YES DISABLE OPTICS ERR CNTRS, SET IVC
0944   REF  2  LAST  171   06,3156  0 3161 1           TC     CANCOARS        ENABLE BIT IF IN MANUAL AND REENABLE
0945                       06,3157  0 3160 0           TC     +1              OPTICS ERR CNTRS
0946   REF  6  LAST  171   06,3160  0 3124 0           TC     SETDESMD        NO NORMAL EXIT
0947   REF  6  LAST  171   06,3161  3 4772 1  CANCOARS CAF    ZERO
-------------------------------------------------------------------------------------------------------------------
0948   REF  1              06,3162  54 740 0           TS     TOLD
0949   REF  1              06,3163  54 741 1           TS     SOLD
0950   REF  2  LAST  171   06,3164  0 3257 1           TC     ECDISAB         DISABLE OP ERR CNTRS
0951   REF  2  LAST  156   06,3165  3 6211 0           CA     SIX             ENABLE ERR CNTRS AFTER 60 MS
0952   REF  3  LAST  170   06,3166  0 5223 1           TC     TWIDDLE
0953   REF  1              06,3167  03263 0           ADRES  ECENAB
-------------------------------------------------------------------------------------------------------------------
0955   REF  7  LAST  171   06,3170  0 3124 0           TC     SETDESMD
0973   REF  7  LAST  171   06,3171  3 4772 1  ENDZOPT  CA     ZERO
09731  REF  2  LAST  135   06,3172  54 036 0           TS     CDUS            ZERO IN CDUS, -20 IN CDUT
09732  REF  1              06,3173  55'327 1           TS     ZONE            INITIALIZE SHAFT MONITOR ZONE
09733  REF  1              06,3174  4 3671 0           CS     20DEGS
```

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0973   REF   1                  06,3175  54 035 0              TS      CDUT
0974   REF  18  LAST  170       06,3176  4 4770 1              CS      BIT1        TURN OFF ZERO OCDU
0975                             06,3177  0 0006 1              EXTEND
0976   REF  13  LAST  170       06,3200  03 012 1              WAND    CHAN12
0977   REF   2  LAST  170       06,3201  3 4124 1              CAF     200MS       DELAY 200MS FOR CDUS TO RESYNCHRONIZE
0978   REF   3  LAST  151       06,3202  0 5260 0              TC      VARDELAY

0979   REF  12  LAST  170       06,3203  4 1337 0              CS      OPTMODES    SHOW ZOPTICS SINCE LAST FRESH START
0980   REF   1                  06,3204  7 4757 1              MASK    ZROPTFIN    OR RESTART
0981   REF  13  LAST  172       06,3205  27'337 0              ADS     OPTMODES

0982   REF   3  LAST  171       06,3206  4 6211 1              CS      SIX
0983   REF  14  LAST  172       06,3207  7 1337 0              MASK    OPTMODES
0984   REF  15  LAST  172       06,3210  55'337 0              TS      OPTMODES

0985   REF   2  LAST  169       06,3211  0 3221 0              TC      OCDUFTST    CHECK OCDU FAIL BIT AFTER ENABLE

0986   REF   3  LAST  152       06,3212  0 5314 1              TC      TASKOVER

0992   REF   8  LAST  171       06,3213  3 4772 1  INITZOPT    CAF     ZERO        INITIALIZE ZOPTICS-INHIBIT OCDUFAIL
0993   REF   6  LAST  171       06,3214  55'331 0              TS      WTOPTION    AND SHOW OPTICS PROCESSING
0994   REF  16  LAST  172       06,3215  4 1337 0              CS      OPTMODES    SET ZERO OPTICS PROCESSING
0995   REF   4  LAST  172       06,3216  7 6211 1              MASK    SIX             OPTICS CDU FAIL INHIBITED
0996   REF  17  LAST  172       06,3217  27'337 0              ADS     OPTMODES
0997   REF   7  LAST  170       06,3220  0 0002 0              TC      Q
```

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```
0998   REF  15  LAST   85   06,3221  3 4762 0  OCDUFTST CAF    BIT7          SEE IF OCDUFAIL ON OR OFF
0999                       06,3222  0 0006 1           EXTEND
1000   REF   3  LAST  169   06,3223  02 030 0           RAND   CHAN30
1001   REF  29  LAST  169   06,3224  10 000 0           CCS    A
1002   REF   1              06,3225  1 3247 1           TCF    OPFAILOF      OCDUFAIL LIGHT OFF

1003   REF   2  LAST  170   06,3226  3 4767 0           CAF    OCDUINHT      OCDUFAIL LIGHT ON UNLESS INHIBITED
1004   REF  18  LAST  172   06,3227  7 1337 0           MASK   OPTMODES
1005   REF  30  LAST  173   06,3230  10 000 0           CCS    A
1006   REF   8  LAST  172   06,3231  0 0002 0           TC     Q             OCDUFAIL INHIBITED

1007   REF  15  LAST   84   06,3232  3 4761 0  OPFAILON CAF    BIT8          ON BIT
1008   REF  13  LAST  167   06,3233  6 1241 1           AD     DSPTAB +11D
1009   REF  16  LAST  173   06,3234  7 4761 1           MASK   BIT8
1010                       06,3235  0 0006 1  SETOFF   EXTEND
1011   REF   1              06,3236  1 6711 1           BZF    TCQ           NO CHANGE

1012   REF   5  LAST  169   06,3237  54 001 1           TS     L
1013   REF  14  LAST  173   06,3240  3 1241 1           CA     DSPTAB +11D
1014                       06,3241  0 0006 1           EXTEND
1015   REF   7  LAST  169   06,3242  06 001 0           RXOR   LCHAN
1016   REF   2  LAST  157   06,3243  7 4750 0           MASK   POSMAX
1017   REF  17  LAST  158   06,3244  6 4752 0           AD     BIT15         SHOW ACTION WANTED
1018   REF  15  LAST  173   06,3245  55'241 0           TS     DSPTAB +11D
1019   REF   9  LAST  173   06,3246  0 0002 0           TC     Q

1020   REF   3  LAST  168   06,3247  3 4770 0  OPFAILOF CAF    LMPTSTBT      CONT TURN OFF IF LAMP TEST
1021   REF  16  LAST  168   06,3250  7 1334 0           MASK   IMODES33
1022   REF  31  LAST  173   06,3251  10 000 0           CCS    A
1023   REF  10  LAST  173   06,3252  0 0002 0           TC     Q             LAMP TEST IN PROGRESS

1024   REF  17  LAST  173   06,3253  3 4761 0           CAF    BIT8          TURN OFF OCDUFAIL LIGHT
1025   REF  16  LAST  173   06,3254  7 1241 0           MASK   DSPTAB +11D
1026   REF   1              06,3255  1 3235 1           TCF    SETOFF

102605 REF  11  LAST  173   06,3256  24 002 0  OPDISAB  INCR   Q
10261  REF  14  LAST   86   06,3257  4 4767 1  ECDISAB  CS     BIT2
102615                     06,3260  0 0006 1           EXTEND
10262  REF  14  LAST  172   06,3261  03 012 1           WAND   CHAN12
102625 REF  12  LAST  173   06,3262  0 0002 0           TC     Q
10263  REF   6  LAST  171   06,3263  3 1354 1  ECENAB   CA     SWSAMPLE
                           06,3264  0 0006 1           EXTEND
102635                     06,3265  1 3267 0           BZF    +2            MANUAL SET TVC ENABLE
10264
102645 REF   1              06,3266  1 3272 1           TCF    ECENAB1
10265  REF  18  LAST  173   06,3267  3 4761 0           CAF    BIT3
102655                     06,3270  0 0006 1           EXTEND
10266  REF  15  LAST  173   06,3271  05 012 1           WOR    CHAN12
102665 REF  15  LAST  173   06,3272  3 4767 0  ECENAB1  CAF    BIT2
10267                      06,3273  0 0006 1           EXTEND
102675 REF  16  LAST  173   06,3274  05 012 1           WOR    CHAN12
```

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10268	REF	4	LAST	172	06,3275	0 5314 1		TC	TASKOVER
1027	REF	1			4775		OCT13	=	ELEVEN
1028	REF	3	LAST	167	5001		OCTHIRTY	EQUALS	BITS4&5
1030	REF	18	LAST	156	4763		OCT4	EQUALS	BIT6
1031	REF	1			4124		20MS	EQUALS	OCT24

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P1032 OPTICS CDU DRIVING PROGRAM

```
1034  REF   1              10,2000                    SETLOC  OPTDRV
1035                       10,2000                    BANK
1036  REF   1                                         COUNT*  $$/SXT

R1037 SHAFT STOP MONITOR-ZONE UPDATE

1038  REF   3  LAST  171   10,2000  3 0036 1  OPTDRIVE CA      CDUS        GRAB OPTIC SHAFT CDU
1039  REF   6  LAST  173   10,2001  54 001 1            TS      L
1040  REF  32  LAST  173   10,2002  10 000 0            CCS     A           GET ABS(CDUS)
1041  REF   1              10,2003  6 7673 1            AD      13,14,15
1042                       10,2004  1 2006 1            TCF     +2          ABS(CDUS) - 45 DEG
1043                       10,2005  1 2003 1            TCF     -2
1044                       10,2006  0 0006 1            EXTEND
1045  REF   1              10,2007  6 2016 1            BZMF    OZONE       LESS THAN 45 DEG-SET ZONE 0
1046  REF   2  LAST  171   10,2010  3 1327 0            CA      ZONE        IF ZONE ZERO, CHANGE TO + OR - OTHERWISE
1047                       10,2011  0 0006 1            EXTEND              DONT MESS WITH ZONE
1048                       10,2012  1 2014 1            BZF     +2
1049  REF   1              10,2013  1 2020 0            TCF     CONTDRVE    JUST CONTINUE
1050  REF   7  LAST  175   10,2014  56 001 0            XCH     L           GREATER THAN 45 DEG-SET ZONE TO SIGN CDU
1051  REF   2  LAST  175   10,2015  1 2017 1            TCF     OZONE +1
1052  REF   9  LAST  172   10,2016  3 4772 1  OZONE     CAF     ZERO        ABS(CDUS) LESS THEN 90 DEG-ZONE ZERO
1053  REF   3  LAST  175   10,2017  55'327 1            TS      ZONE
1054  REF   1                                         COUNT*  $$/T4RPT
1055  REF   3  LAST  171   10,2020  11'323 0  CONTDRVE  CCS     CPTIND
1056                       10,2021  0 2025 1            TC      +4          WORK COARS OPTICS
1057                       10,2022  0 2025 1            TC      +3          WORK COARS OPTICS
1058  REF   2  LAST  171   10,2023  0 4077 0            TC      NOOPRATE    NO OPT  DISABLE   TVC
1059  REF   7  LAST  171   10,2024  0 5323 0            TC      RESUME      NO OPT

1060  REF   7  LAST  173   10,2025  3 1354 1            CA      SWSAMPLE    SEE IF SWITCH AT CMC
1061                       10,2026  0 0006 1            EXTEND
1062  REF   1              10,2027  1 2226 1            BZF     TVCBCK
10623                      10,2030  0 0006 1            EXTEND
10625 REF   8  LAST  175   10,2031  6 5323 0            BZMF    RESUME
1063  REF   2  LAST  172   10,2032  3 4757 0  RATEDRV1  CAF     ZROPTFIN    SEE IF OCDUS ZEROED SINCE LAST FSTART
1064  REF  19  LAST  173   10,2033  7 1337 0            MASK    OPTMODES
1065  REF  33  LAST  175   10,2034  10 000 0            CCS     A
1066                       10,2035  0 2040 1            TC      +3
1067  REF   9  LAST  171   10,2036  0 5671 1            TC      ALARM       OPTICS NOT ZEROED
1068                       10,2037   00120 1            OCT     00120

1069  REF  16  LAST  173   10,2040  3 4767 0            CA      BIT2        SEE IF ERR CNTS ENABLED
1070                       10,2041  0 0006 1            EXTEND
1071  REF  17  LAST  173   10,2042  02 012 0            RAND    CHAN12
1072                       10,2043  0 0006 1            EXTEND
1073  REF   1              10,2044  1 2204 1            BZF     SETBIT      CNTS NOT ENABLED-DO IT AND RESUME

1074  REF   5  LAST  154   10,2045  3 4770 0            CAF     ONE         INITIALIZE OPTIND
```

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```
1075  REF   4  LAST  175   10,2046  55'323 0  OPT2     TS      OPTIND
1078  REF   5  LAST  176   10,2047  51'323 1  GETOPCMD INDEX   OPTIND
1079  REF   1             10,2050  3 1312 0            CA      DESOPTT      PICK UP DESIRED OPT ANGLE
1080                      10,2051  0 0006 1            EXTEND
1081  REF   6  LAST  176   10,2052  5 1323 1            INDEX   OPTIND
1082  REF   2  LAST  172   10,2053  20 035 0            MSU     CDUT         GET DIFFERENCE
1083                      10,2054  0 0006 1            EXTEND
1084  REF  17  LAST  160   10,2055  7 4754 1            MP      BIT13
1085  REF   8  LAST  175   10,2056  56 001 0            XCH     L
1086                      10,2057  6 0000 1            DOUBLE
1087  REF   3  LAST   69   10,2060  54 061 1            TS      ITEMP1
1088                      10,2061  1 2063 1            TCF     +2           NO OVFL

1089  REF   9  LAST  176   10,2062  26 001 1            ADS     L            WITH OVFL
1090  REF   7  LAST  176   10,2063  51'323 1  STORCMD  INDEX   OPTIND
1091  REF   1             10,2064  23'325 1            LXCH    COMMANDO     STORE COMMAND
1092  REF   8  LAST  176   10,2065  11'323 0            CCS     OPTIND
1093  REF   1             10,2066  1 2140 1            TCF     TRUNCMD      GET TRUN COMMAND
1094  REF   4  LAST  176   10,2067  54 061 1            TS      ITEMP1       INITIALIZE SEND INDICATOR TO ZERO
1095  REF   2 LAST 175 TO  175:    16    16*           COUNT*  $$/SXT
```

R1096 SHAFT STOP AVOIDANCE

```
10961 REF   4  LAST  175   10,2070  10 036 0            CCS     CDUS         IF CDUS GREATER THAN +OR- 90 DEG CHECK
10962 REF   1             10,2071  6 4751 0            AD      NEG1/2        FOR POSSIBLE STOP PROBLEM
10963                     10,2072  1 2074 1            TCF     +2
10964                     10,2073  1 2071 1            TCF     -2
10965                     10,2074  0 0006 1            EXTEND
10966 REF   1             10,2075  6 2124 1            BZMF    CMDSETUP     CDUS LESS THAN 90 DEG, NO PROBLEMS

1097  REF   4  LAST  175   10,2076  3 1327 0            CA      ZONE
1098                      10,2077  0 0006 1            EXTEND
1099  REF   2  LAST  176   10,2100  1 2124 0            BZF     CMDSETUP     ZONE=3,NORMAL COMMAND
1100  REF  18  LAST  173   10,2101  7 4752 1            MASK    BIT15        GRAB SIGN OF ZONE
1101  REF  10  LAST  176   10,2102  54 001 1            TS      L
1102  REF   2  LAST  176   10,2103  3 1326 1            CA      COMMANDO +1
1103  REF  19  LAST  176   10,2104  7 4752 1            MASK    BIT15        GRAB SIGN OF SHAFT COMMAND
1104                      10,2105  0 0006 1            EXTEND
1105  REF   8  LAST  173   10,2106  06 001 0            RXOR    LCHAN
1106  REF  34  LAST  175   10,2107  10 000 0            CCS     A
1107  REF   3  LAST  176   10,2110  1 2124 0            TCF     CMDSETUP     SIGN ZONE NOT EQUAL TO SIGN COMMAND
1108  REF   1             10,2111  11'313 0            CCS     DESOPTS      SEE IF DESOPTS BETWEEN -90 AND +90
1109  REF   2  LAST  176   10,2112  6 4751 0            AD      NEG1/2
1110                      10,2113  1 2115 1            TCF     +2           ABS(DESOPTS) - 90 DEG
1111                      10,2114  1 2112 0            TCF     -2
1112                      10,2115  0 0006 1            EXTEND
1113                      10,2116  6 2120 0            BZMF    +2           DESOPTS IN FIRST OR FOURTH QUAD
1114  REF   4  LAST  176   10,2117  1 2124 0            TCF     CMDSETUP
1115  REF   3  LAST  176   10,2120  4 1326 0            CS      COMMANDO +1  REVERSE REGULAR COMMAND
1116  REF   4  LAST  176   10,2121  55'326 0            TS      COMMANDO +1
```

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```
11163  REF  10  LAST  175   10,2122  3 4772 1            CAF     ZERO          ZERO DESIRED SHAFT RATE
11166  REF   1               10,2123  54 736 1            TS      SRATE
1117   REF   2 LAST 175 TO  176:     40    40*           COUNT*  $$/T4RPT

1118   REF   8  LAST  175   10,2124  3 1354 1  CMDSETUP  CA      SWSAMPLE
11182                        10,2125  0 0006 1            EXTEND
11184  REF   1               10,2126  1 2212 0            BZF     RATEDRV2
11186  REF   3  LAST  175   10,2127  0 4077 0            TC      NOOPRATE      DISABLE  TVC DAP BIT
11188  REF   6  LAST  175   10,2130  3 4770 0            CAF     ONE           SET OPTIND
1119   REF   9  LAST  176   10,2131  55'323 0  CMDSET    TS      OPTIND
1120   REF  35  LAST  176   10,2132  50 000 1            INDEX   A
1121   REF   5  LAST  176   10,2133  11'325 0            CCS     COMMAND0      GET SIGN OF COMMAND
1122   REF   1               10,2134  0 2153 1            TC      POSOPCMD
1123   REF   1               10,2135  0 2160 1            TC      NEXTOPT +1    ZERO COMMAND-SKIP SEND INDICATOR
1124   REF   1               10,2136  0 2170 0            TC      NEGOPCMD
1125   REF   2  LAST  177   10,2137  0 2160 1            TC      NEXTOPT +1    ZERO COMMAND

1126   REF  10  LAST  177   10,2140  55'323 0  TRUNCMD    TS      OPTIND
11265  REF   3  LAST  176   10,2141  4 0035 0            CS      COUT          IF COMMAND GREATER THAN 45 DEG- COMMAND
1127   REF   2  LAST  176   10,2142  6 1312 0            AD      DESOPTT       45 DEG
1128   REF  13  LAST  173   10,2143  54 002 1            TS      Q
1129   REF   1               10,2144  0 2047 0            TC      GETOPCMD      LESS THAN 45 DEG-NORMAL OPERATION

1130   REF  36  LAST  177   10,2145  10 000 0            CCS     A             GREATER THAN 45 DEG-USE OPSMAX WITH
1131   REF   3  LAST  173   10,2146  3 4750 1            CA      POSMAX        CORRECT SIGN
1132                        10,2147  0 2151 0            TC      +2
1133   REF   4  LAST  177   10,2150  4 4750 0            CS      POSMAX
1134   REF  11  LAST  176   10,2151  54 001 1            TS      L
1135   REF   1               10,2152  0 2063 0            TC      STORCMD
1136   REF   1               10,2153  6 2211 1  POSOPCMD  AD      MAXPLS1
1137                        10,2154  0 0006 1            EXTEND
1138   REF   1               10,2155  6 2175 0            BZMF    DELOPCMD      COMMAND LESS THAN MAX PULSE
1139   REF   1               10,2156  4 2210 1            CS      MAXPLS        GREATER THAN MAX PULSE-USE MAX PULSE

1140   REF   5  LAST  176   10,2157  24 061 0  NEXTOPT   INCR    ITEMP1        SET SEND INDICATOR
1141   REF   2  LAST  143   10,2160  6 4771 1    +1      AD      NEG0          MAKE SURE ZERO COMMAND IS -ZERO
1142   REF  11  LAST  177   10,2161  51'323 1            INDEX   OPTIND
1143   REF   2  LAST   40   10,2162  54 053 0            TS      CDUTCMD       STORE PULSE IN SEND REG

1144   REF  12  LAST  177   10,2163  11'323 0            CCS     OPTIND
1145   REF   1               10,2164  0 2131 0            TC      CMDSET        GET NEXT OPT
1146   REF   6  LAST  177   10,2165  10 061 1            CCS     ITEMP1        ARE ANY PULSES TO GO
1147   REF   1               10,2166  1 2200 0            TCF     SENDOCMD      YES-SEND EM
1148   REF   9  LAST  175   10,2167  0 5323 0            TC      RESUME        NO

1149   REF   2  LAST  177   10,2170  6 2211 1  NEGOPCMD  AD      MAXPLS1
1150                        10,2171  0 0006 1            EXTEND
1151   REF   2  LAST  177   10,2172  6 2175 0            BZMF    DELOPCMD      LESS THAN MAX PULSE
1152   REF   2  LAST  177   10,2173  3 2210 0            CA      MAXPLS        MAX PULSES
1153   REF   3  LAST  177   10,2174  1 2157 1            TCF     NEXTOPT
```

```
1154  REF 13 LAST 177  10,2175  51'323 1  DELOPCMD INDEX  OPTIND
1155  REF  6 LAST 177  10,2176  57'325 1           XCH    COMMAND0     SET UP SMALL COMMAND
1156  REF  4 LAST 177  10,2177  1 2157 1           TCF    NEXTOPT

1157  REF  1           10,2200  3 5050 1  SENDOCMD CAF    11,12        SEND OCDU DRIVE COMMANDS
1158                   10,2201  0 0006 1           EXTEND
1159  REF  3 LAST 161  10,2202  05 014 1           WOR    CHAN14
1160  REF 10 LAST 177  10,2203  0 5323 0           TC     RESUME

1161  REF 17 LAST 175  10,2204  3 4767 0  SETBIT   CAF    BIT2         ENABLE OCDU ERR CNTS
1162                   10,2205  0 0006 1           EXTEND
1163  REF 18 LAST 175  10,2206  05 012 1           WOR    CHAN12
1164  REF 11 LAST 178  10,2207  0 5323 0           TC     RESUME       START  COARS NEXT TIME AROUND

1165                   10,2210   77654 0  MAXPLS   DEC    -83          WAS -165
1166                   10,2211   77655 1  MAXPLS1  DEC    -82          WAS -164
1167  REF  1              5050             11,12    EQUALS PRIO6
1168  REF  2 LAST 171  10,2212  4 0741 1  RATEDRV2 CS     SOLD
11681 REF  2 LAST 177  10,2213  6 0736 0           AD     SRATE
1169  REF  3 LAST 177  10,2214  6 4771 1           AD     NEG0
1170  REF 12 LAST 177  10,2215  54 001 1           TS     L
11713 REF  2 LAST 171  10,2216  4 0740 0           CS     TOLD
11714 REF  1           10,2217  6 0735 0           AD     TRATE
1172  REF  4 LAST 178  10,2220  6 4771 1           AD     NEG0
1173  REF  3 LAST 177  10,2221  52 054 1           DXCH   CDUTCMD
11731                  10,2222  0 0006 1           EXTEND
11732 REF  2 LAST 178  10,2223  3 0736 0           DCA    TRATE
11733 REF  3 LAST 178  10,2224  52 741 1           DXCH   TOLD
1177  REF  2 LAST 177  10,2225  0 2200 1           TC     SENDOCMD
1183  REF 19 LAST 173  10,2226  3 4761 0  TVCBCK   CAF    BIT8         IS TVC BIT ENABLED
1184                   10,2227  0 0006 1           EXTEND
1185  REF 19 LAST 178  10,2230  02 012 0           RAND   CHAN12
1186                   10,2231  0 0006 1           EXTEND

1187                   10,2232  1 2234 1           BZF    +2
1188  REF  1           10,2233  0 2032 1           TC     RATEDRV1
1189  REF 20 LAST 178  10,2234  3 4761 0           CAF    BIT8         NO TURN IT ON
1190                   10,2235  0 0006 1           EXTEND
1191  REF 20 LAST 178  10,2236  05 012 1           WOR    CHAN12
1192  REF 12 LAST 178  10,2237  0 5323 0           TC     RESUME

1193  REF  1              4000                    SETLOC STOPRAT
1194                      4077                    BANK
11945 REF  1                                      COUNT* $$/T4RPT
1195  REF 21 LAST 178     4077  4 4761 1  NOOPRATE CS     BIT8
1196                      4100  0 0006 1           EXTEND
1197  REF 21 LAST 178     4101  03 012 1           WAND   CHAN12

1198  REF 14 LAST 177     4102  0 0002 0           TC     Q
```

L DOWNLINK LISTS USER'S PAGE NO. 1 ED S3

```
C002  REF  1              05,2000          SETLOC DOWNTELM
C003                      05,2000          BANK

C004  REF  1                0337           EBANK= DNTMBUFF

R0005 SPECIAL DOWNLINK OP CODES
A0006                                      OP CODE ADDRESS(EXAMPLE) SENDS..      BIT 15  BITS 14-12 BITS 11
A0007                                                                                                  -0
A0008                                      ------ ---------  ----------          ------  --------- -------
A0009                                                                                                  --
A0010                                      1DNADR TIME2      (2 AGC WDS)         0       0         ECADR
A0011                                      2DNADR TEPHEM     (4 AGC WDS)         0       1         ECADR
A0012                                      3DNADR VGBODY     (6 AGC WDS)         0       2         ECADR
A0013                                      4DNADR STATE      (8 AGC WDS)         0       3         ECADR
A0014                                      5DNADR UPBUFF     (10AGC WDS)         0       4         ECADR
A0015                                      6DNADR DSPTAB     (12AGC WDS)         0       5         ECADR
A0016                                      DNCHAN 30         CHANNELS            0       7         CHANNEL
A0017                                                                                                ADDRESS
A0018                                      DNPTR  NEXTLIST   POINTS TO NEXT      0       6         ADRES
A0019                                                        LIST.

R0020 DOWNLIST FORMAT DEFINITIONS AND RULES-
R0021 1. END OF A LIST = -XDNADR (X = 1 TO 6), -DNPTR, OR -DNCHAN.
R0022 2. SNAPSHOT SUBLIST = LIST WHICH STARTS WITH A -1DNADR.
R0023 3. SNAPSHOT SUBLIST CAN ONLY CONTAIN 1DNADRS.
R0024 4. TIME2 1DNADR MUST BE LOCATED IN THE CONTROL LIST OF A DOWNLIST.
R0025 5. ERASABLE DOWN TELEMETRY WORDS SHOULD BE GROUPED IN SEQUENTIAL
R0026    LOCATIONS AS MUCH AS POSSIBLE TO SAVE STORAGE USED BY DOWNLINK LISTS.
R00261 6. THE DOWNLINK LISTS(INCLUDING SUBLISTS) ARE ORGANIZED SUCH THAT THE ITEMS LISTED FIRST(IN FRONT OF FBANK) ARE
R00263    SENT FIRST. EXCEPTION--- SNAPSHOT SUBLISTS. IN THE SNAPSHOT SUBLISTS THE DATA REPRESENTED BY THE FIRST
R00265    11 1DNADRS IS PRESERVED (IN ORDER) IN DNTMBUFF AND SENT BY THE NEXT 11 DOWNRUPTS. THE DATA REPRESENTED BY THE
R00267    LIST IS SENT IMMEDIATELY.
R00268

C027  REF  1                                  COUNT* $$/DLIST
C028                      0007       ERASZERO EQUALS 7
C029  REF  1              0007       SPARE    EQUALS ERASZERO      USE SPARE TO INDICATE AVAILABLE SPACE
C030                    05,2000 77340 0 LOWIDCOD OCT    77340      LOW ID CODE

C031  REF  1             05,2113       NOMDNLST EQUALS CMCSTADL   FRESH START AND POST P27 DOWNLIST
C032  REF  1             05,2211       UPDNLIST EQUALS CMENTRDL   UPDATE PROGRAM (P27) DOWNLIST
```

L DOWNLINK LISTS USER'S PAGE NO. 2 EC S3

P0033 CSM POWERED FLIGHT DOWNLIST

R0034 ----------CONTROL LIST----------

C035					05,2001		CMPOWEDL	EQUALS	
C036	REF	1			05,2001	32043 1		DNPTR CMPOWE01	COLLECT SNAPSHOT
C037	REF	2	LAST	179	05,2002	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
C038	REF	1			05,2003	32052 1		DNPTR CMPOWE02	COLLECT SECOND SNAPSHOT
C039	REF	3	LAST	180	05,2004	14337 0		4DNADR DNTMBUFF	SEND SNAPSHOT
C040	REF	1			05,2005	32057 1		DNPTR CMPOWE03	COMMON DATA
C041	REF	5	LAST	137	05,2006	03412 0		1DNADR TIG	TIG,+1
C042	REF	2	LAST	121	05,2007	03422 0		1DNADR DELLT4	DELLT4,+1
C043	REF	2	LAST	121	05,2010	13414 1		3DNADR RTARG	RTARG,+1,+2,...+5
C044	REF	2	LAST	121	05,2011	03427 0		1DNADR TGO	TGO,+1
C045	REF	2	LAST	79	05,2012	01104 0		1DNADR PIPTIME1	PIPTIME1,+1
C046	REF	7	LAST	136	05,2013	11314 1		3DNADR DELV	DELV,+1,...+4,+5
C047	REF	2	LAST	135	05,2014	03023 0		1DNADR PACTOFF	PACTOFF,YACTOFF
C048	REF	3	LAST	136	05,2015	03223 1		1DNADR PCMD	PCMD,YCMD
C049	REF	2	LAST	128	05,2016	03702 1		1DNADR CSTEER	CSTEER,GARBAGE
C050	REF	2	LAST	105	05,2017	12444 0		3DNADR DELVEET1	CSI DELTA VELOCITY COMPONENTS (31-33)
C053	REF	2	LAST	36	05,2020	25733 1		6DNADR REFSMMAT	REFSMMAT,+1,...+10,+11
C054	REF	1			05,2021	32061 1		DNPTR CMPOWE04	COMMON DATA
C055	REF	2	LAST	135	05,2022	00024 1		1DNADR TIME2	TIME2,TIME1
C056	REF	1			05,2023	32063 0		DNPTR CMPOWE05	COLLECT SNAPSHOT
C057	REF	4	LAST	180	05,2024	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
C058	REF	2	LAST	180	05,2025	32052 1		DNPTR CMPOWE02	COLLECT SNAPSHOT
C059	REF	5	LAST	180	05,2026	14337 0		4DNADR DNTMBUFF	SEND SNAPSHOT
C060	REF	2	LAST	180	05,2027	32057 1		DNPTR CMPOWE03	COMMON DATA
C061	REF	1			05,2030	32075 1		DNPTR CMPOWE08	COMMON DATA
C062	REF	3	LAST	134	05,2031	03743 1		1DNADR ELEV	ELEV,+1
C06205	REF	2	LAST	133	05,2032	03753 0		1DNADR CENTANG	CENTANG,+1
C0621	REF	1			05,2033	00007 0		1DNADR SPARE	
C063	REF	13	LAST	67	05,2034	00106 0		1DNADR STATE +1 0	FALGWRDS 10 AND 11
C064	REF	3	LAST	136	05,2035	01021 0		1DNADR TEVENT	TEVENT,+1
C065	REF	4	LAST	180	05,2036	03223 1		1DNADR PCMD	PCMD,YCMD
C066	REF	20	LAST	175	05,2037	01337 1		1DNADR OPTMODES	OPTMODES,HOLDFLAG
C067	REF	1			05,2040	32101 0		DNPTR CMPOWE07	COMMON DATA
C068	REF	5	LAST	137	05,2041	13720 0		3DNADR VGTIG	VGTIG,+1,...+4,+5
C069	REF	2	LAST	129	05,2042	64111 1		-3DNADR DELVEET2	CDH DELTA VELOCITY COMPONENTS (98-100)

R0072 ----------SUB LISTS----------

C073	REF	1			05,2043	76746 0	CMPOWE01	-1DNADR RN +2	RN+2,+3 SNAPSHOT DATA
C074	REF	2	LAST	180	05,2044	01033 0		1DNADR RN +4	RN+4,+5
C075	REF	1			05,2045	01035 0		1DNADR VN	VN,+1
C076	REF	2	LAST	180	05,2046	01037 1		1DNADR VN +2	VN+2,+3
C077	REF	3	LAST	180	05,2047	01041 0		1DNADR VN +4	VN+4,+5
C078	REF	2	LAST	78	05,2050	01043 1		1DNADR PIPTIME	PIPTIME,+1
C079	REF	3	LAST	180	05,2051	76750 1		-1DNADR RN	RN,+1
C080	REF	3	LAST	155	05,2052	77743 1	CMPOWE02	-1DNADR CDUZ	CDUZ,CDUT SNAPSHOT DATA

L DOWNLINK LISTS USER'S PAGE NO. 3 EC S3

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0081  REF   5  LAST  137   05,2053  03133 0          1DNADR  ADOT          ADOT,+1/OGARATE,+1
0082  REF   6  LAST  181   05,2054  03135 0          1DNADR  ADOT +2       ADOT+2,+3/OMEGAB+2,+3
0083  REF   7  LAST  181   05,2055  03137 1          1DNADR  ADOT +4       ADOT+4,+5/OMEGAB+4,+5
0084  REF   2  LAST  135   05,2056  77745 1         -1DNADR  CDUX          CDUX,CDUY

0085  REF   4  LAST  136   05,2057  07076 1  CMPOWE03 2DNADR  AK            AK,AK1,AK2,RCSFLAGS          COMMON DATA
0086  REF   5  LAST  137   05,2060  70605 0         -2DNADR  THETADX       THETADX,THETADY,THETADZ,GARBAGE

0087  REF  14  LAST  180   05,2061  20074 0  CMPOWE04 5DNADR  STATE         FLAGWRD0 THRU FLAGWRD9       COMMON DATA
0088  REF  17  LAST  173   05,2062  52551 1         -6DNADR  DSPTAB        DISPLAY TABLES

0089  REF   1              05,2063  76056 0  CMPOWE05-1DNADR  R-OTHER +2    R-OTHER+2,+3          SNAPSHOT DATA
0090  REF   2  LAST  181   05,2064  01723 0          1DNADR  R-OTHER +4    R-OTHER+4,+5
0091  REF   1              05,2065  01725 0          1DNADR  V-OTHER        V-OTHER,+1
0092  REF   2  LAST  181   05,2066  01727 1          1DNADR  V-OTHER +2     V-OTHER+2,+3
0093  REF   3  LAST  181   05,2067  01731 0          1DNADR  V-OTHER +4     V-OTHER+4,+5
0094  REF   3  LAST  136   05,2070  01642 0          1DNADR  T-OTHER        T-OTHER,+1
0095  REF   3  LAST  181   05,2071  76060 0         -1DNADR  R-OTHER        R-OTHER,+1

0096  REF   2  LAST  135   05,2072  00775 1  CMPOWE06 1DNADR  OPTION1        OPTION1,2            COMMON DATA
00961 REF   2  LAST   89   05,2073  01516 1          1DNADR  TET           TET,+1
00962 REF   6  LAST  181   05,2074  07172 1          2DNADR  THETADX       THETADX,THETADY,THETEDZ,GARBAGE
00963 REF   1              05,2075  01432 0  CMPOWE08 1DNADR  RSBBQ         RSBBQ,+1
0097                       05,2076  34076 1          DNCHAN  76            CHANNELS 76(GARBAGE),77
0971  REF   3  LAST  169   05,2077  04374 0          2DNADR  C31FLWRD      C31FLWRD,FAILREG,+1,+2
0098  REF   5  LAST  176   05,2100  73741 1         -2DNADR  CDUS          CDUS,PIPAX,PIPAY,PIPAZ

0099  REF   2  LAST  135   05,2101  03072 1  CMPOWE07 1DNADR  LEMMASS       LEMMASS,CSMMASS          COMMON DATA
0100  REF   4  LAST  155   05,2102  03065 1          1DNADR  DAPDATR1      DAPDATR1,DAPDATR2
0101  REF   5  LAST  137   05,2103  07167 0          2DNADR  ERRORX        ERRORX,ERRORY,ERRORZ,GARBAGE
0102  REF   6  LAST  136   05,2104  13125 0          3DNADR  WBODY         WBODY,...+5/OMEGAC,...+5
0103  REF   2  LAST  135   05,2105  05306 1          2DNADR  REDOCTR       REDOCTR,THETAD,+1,+2
0104  REF  33  LAST  167   05,2106  01333 0          1DNADR  IMODES30      IMODES30,IMODES33
0105                       05,2107  34011 0  CMPOWE09 DNCHAN  11           CHANNELS 11,12
0106                       05,2110  34013 1          DNCHAN  13           CHANNELS 13,14
0107                       05,2111  34030 0          DNCHAN  30           CHANNELS 30,31
0108                       05,2112  43745 0         -DNCHAN  32           CHANNELS 32,33

R0109  ------------------------------------------------------------
R0110  *** THE FOLLOWING IS A LIST OF LOCATIONS IN DOWNLINK LISTS
R0111  *** BUT NOT REFERENCED IN THE DIRECTORY BECAUSE THEY ARE NOT
R0112  *** THE FIRST LOCATION REFERENCED IN AN INSTRUCTION
R0113  *** THIS LIST SHOULD BE UPDATED WHEN ANY CHANGES ARE MADE TO LISTS.

A0114                                                    LOCATION      LIST NAME

0115  REF   1              E6,1424          DL101   =     YACTOFF       CMPOWEDL
0116  REF   2  LAST  109   E6,1624          DL102   =     YCMD
0117  REF   2  LAST  140      0025          DL103   =     TIME1
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L DOWNLINK LISTS USER'S PAGE NO. 4 E S3

0118	REF	3	LAST	181	E6,1624	DL104	=	YCMD	
01185	REF	1			1340	DL105	=	HOLDFLAG	
01186	REF	5	LAST	137	E7,1722	DL1055	=	VMAGI	
01187	REF	1			E7,1724	DL1056	=	VGTLI	
0119	REF	4	LAST	177	0035	DL106	=	CDUT	CMPOWE02
0120	REF	2	LAST	136	E6,1533	DL107	=	OGARATE	
0121	REF	9	LAST	137	E6,1533	DL108	=	OMEGAB	
0122	REF	1			0033	DL109	=	CDUY	
0123	REF	2	LAST	135	E6,1477	DL110	=	AK1	CMPOWE03
0124	REF	2	LAST	135	E6,1500	DL111	=	AK2	
0125	REF	1			E6,1501	DL112	=	RCSFLAGS	
0126	REF	4	LAST	137	E6,1573	DL113	=	THETADY	
0127	REF	4	LAST	137	E6,1574	DL114	=	THETADZ	
0128	REF	1			0776	DL115	=	OPTION2	CMPOWE06
0129	REF	5	LAST	182	E6,1573	DL116	=	THETADY	
0130	REF	5	LAST	182	E6,1574	DL117	=	THETADZ	
0131	REF	1			0375	DL118	=	FAILREG	CMPOWE08
0132	REF	2	LAST	135	0037	DL119	=	PIPAX	
0133	REF	2	LAST	135	0040	DL120	=	PIPAY	
0134	REF	1			0041	DL121	=	PIPAZ	
0136	REF	1			E6,1473	DL122	=	CSMMASS	CMPOWE07
0137	REF	1			E6,1466	DL123	=	DAPDATR2	
0138	REF	5	LAST	137	E6,1570	DL124	=	ERRORY	
0139	REF	3	LAST	136	E6,1571	DL125	=	ERRORZ	
0140	REF	10	LAST	137	E6,1525	DL126	=	OMEGAC	
0141	REF	10	LAST	136	1307	DL127	=	THETAD	
0142	REF	17	LAST	173	1334	DL128	=	IMODES33	

L DOWNLINK LISTS USER'S PAGE NO. 5 E3 S3

P0143 CSM COAST AND ALIGNMENT DOWNLIST

R0144 ----------CONTROL LIST----------

0145					05,2113		CMCSTADL	EQUALS	SEND ID BY SPECIAL CODING
0146	REF	1			05,2113	32043 1		DNPTR CMCSTA01	COLLECT SNAPSHOT
0147	REF	6	LAST	180	05,2114	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
0148	REF	1			05,2115	32052 1		DNPTR CMCSTA02	COLLECT SECOND SNAPSHOT
0149	REF	7	LAST	183	05,2116	14337 0		4DNADR DNTMBUFF	SEND SNAPSHOT
0150	REF	1			05,2117	32057 1		DNPTR CMCSTA03	COMMON DATA
0151	REF	6	LAST	180	05,2120	03412 0		1DNADR TIG	TIG,+1
0152	REF	3	LAST	135	05,2121	00302 0		1DNADR BESTI	BESTI,BESTJ
0153	REF	3	LAST	136	05,2122	17674 1		4DNADR MARKDOWN	MARKDOWN,+1,,,+5,+6,GARBAGE
0154	REF	1			05,2123	17460 0		4DNADR MARK2DWN	MARK2DWN,+1,,,+5,+6
0155	REF	3	LAST	135	05,2124	06342 1		2DNADR HAPOX	HAPOX,+1,HPERX,+1
0156	REF	3	LAST	180	05,2125	03023 0		1DNADR PACTOFF	PACTOFF, YACTOFF (30)
0157	REF	6	LAST	180	05,2126	13720 0		3DNADR VGTIG	VGTIG,,,,+5
0158	REF	3	LAST	180	05,2127	25733 1		6DNADR REFSMMAT	REFSMMAT,+1,,,,+10,+11
0159	REF	1			05,2130	32061 1		DNPTR CMCSTA04	COMMON DATA
0160	REF	3	LAST	180	05,2131	00024 1		1DNADR TIME2	TIME2,TIME1
0161	REF	1			05,2132	32063 0		DNPTR CMCSTA05	COLLECT SNAPSHOT
0162	REF	8	LAST	183	05,2133	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
0163	REF	2	LAST	183	05,2134	32052 1		DNPTR CMCSTA02	COLLECT SNAPSHOT
0164	REF	9	LAST	183	05,2135	14337 0		4DNADR DNTMBUFF	SEND SNAPSHOT
0165	REF	1			05,2136	32072 0		DNPTR CMCSTA06	COMMON DATA
0166	REF	3	LAST	135	05,2137	12757 1		3DNADR OGC	OGC,+1,IGC,+1,MGC,+1
0167	REF	15	LAST	181	05,2140	00106 0		1DNADR STATE +10D	FALGWRDS 10 AND 11
0168	REF	4	LAST	180	05,2141	01021 0		1DNADR TEVENT	TEVENT,+1
0169	REF	1			05,2142	02633 0		1DNADR LAUNCHAZ	LAUNCHAZ,+1
0170	REF	21	LAST	180	05,2143	01337 1		1DNADR OPTMODES	OPTMODES,HOLDFLAG
0171	REF	1			05,2144	32101 0		DNPTR CMCSTA07	COMMON DATA
0172	REF	18	LAST	181	05,2145	52551 1		-6DNADR DSPTAB	DISPLAY TABLES

R0173 ----------SUB LISTS----------

0174	REF	2	LAST	180	05,2043	CMCSTA01 EQUALS	CMPOWE01	COMMON DOWNLIST DATA
0175	REF	3	LAST	180	05,2052	CMCSTA02 EQUALS	CMPOWE02	COMMON DOWNLIST DATA
0176	REF	3	LAST	180	05,2057	CMCSTA03 EQUALS	CMPOWE03	COMMON DOWNLIST DATA
0177	REF	2	LAST	180	05,2061	CMCSTA04 EQUALS	CMPOWE04	COMMON DOWNLIST DATA
0178	REF	2	LAST	180	05,2063	CMCSTA05 EQUALS	CMPOWE05	COMMON DOWNLIST DATA
0179	REF	1			05,2072	CMCSTA06 EQUALS	CMPOWE06	COMMON DOWNLIST DATA
0180	REF	2	LAST	180	05,2101	CMCSTA07 EQUALS	CMPOWE07	COMMON DOWNLIST DATA

R0181 ----------

L DOWNLINK LISTS USER'S PAGE NO. 6 E2 S3

R0182 *** UNREFERENCED LOCATIONS USED IN LIST 2
R0183 *** UPDATE THIS LIST WHEN ANY CHANGES ARE MADE TO DOWNLINK LISTS

A0184								LOCATION	LIST NAME
0185	REF	2	LAST	73	0303	DL201	=	BESTJ	CSMSTADL
0186	REF	2	LAST	95	E4,1744	DL202	=	HPERX	
0187	REF	2	LAST	181	E6,1424	DL203	=	YACTOFF	
0188	REF	3	LAST	181	0025	DL204	=	TIME1	
0189	REF	3	LAST	135	E5,1761	DL205	=	IGC	
0190	REF	2	LAST	99	E5,1763	DL206	=	MGC	

L DOWNLINK LISTS USER'S PAGE NO. 7 E 53

P0191 CSM RENDEZVOUS AND PRETHRUST LIST

R0192 ----------CONTROL LIST----------

```
0193                          05,2146          CMRENDDL EQUALS          SEND ID BY SPECIAL CODING
0194  REF   1                 05,2146  32043 1         DNPTR  CMREND01  COLLECT SNAPSHOT
0195  REF  10  LAST  183      05,2147  24337 0         6DNADR DNTMBUFF   SEND SNAPSHOT
0196  REF   1                 05,2150  32052 1         DNPTR  CMREND02  COLLECT SECOND SNAPSHOT
0197  REF  11  LAST  185      05,2151  14337 0         4DNADR DNTMBUFF   SEND SNAPSHOT
0198  REF   1                 05,2152  32057 1         DNPTR  CMREND03  COMMON DATA
0199  REF   7  LAST  183      05,2153  03412 0         1DNADR TIG        TIG,+1
0200  REF   3  LAST  180      05,2154  03422 0         1DNADR DELLT4     DELLT4,+1
0201  REF   3  LAST  180      05,2155  13414 1         3DNADR RTARG      RTARG,+1...+4,+5
0202  REF   1                 05,2156  01007 1         1DNADR VHFTIME    VHFTIME,+1
0203  REF   4  LAST  183      05,2157  17674 1         4DNADR MARKDOWN   MARKDOWN,+1...+5,+6,RM
0204  REF   3  LAST  135      05,2160  00771 0         1DNADR VHFCNT     VHFCNT,TRKMKCNT
0205  REF   2  LAST  127      05,2161  03662 0         1DNADR TTPI       TTPI,+1
0206  REF   1                 05,2162  03424 0         1DNADR ECSTEER    ECSTEER,GARBAGE
0207  REF   2  LAST   98      05,2163  02636 0         1DNADR DELVTPF    DELVTPF,+1
0208  REF   3  LAST  135      05,2164  06460 0         2DNADR TCDH       CDH AND CSI TIME                (32-33)
0209  REF   3  LAST  133      05,2165  03655 1         1DNADR TPASS4     TPASS4,+1
0210  REF   5  LAST  137      05,2166  13404 0         3DNADR DELVSLV    DELVSLV,+1...+4,+5
0211  REF   6  LAST  135      05,2167  06311 1         2DNADR RANGE      RANGE,+1,RRATE,+1
0212  REF   1                 05,2170  32061 1         DNPTR  CMREND04  COMMON DATA
0213  REF   4  LAST  183      05,2171  00024 1         1DNADR TIME2      TIME2,TIME1
0214  REF   1                 05,2172  32063 0         DNPTR  CMREND05  COLLECT SNAPSHOT
0215  REF  12  LAST  185      05,2173  24337 0         6DNADR DNTMBUFF   SEND SNAPSHOT
0216  REF   2  LAST  185      05,2174  32052 1         DNPTR  CMREND02  COLLECT SNAPSHOT
0217  REF  13  LAST  185      05,2175  14337 0         4DNADR DNTMBUFF   SEND SNAPSHOT
0218  REF   1                 05,2176  32072 0         DNPTR  CMREND06  COMMON DATA
0219  REF   1                 05,2177  02632 1         1DNADR DIFFALT    COH DELTA ALTITUDE              (74)
0220  REF   3  LAST  180      05,2200  03753 0         1DNADR CENTANG    CENTANG,+1
0221  REF   2  LAST  180      05,2201  00007 0         1DNADR SPARE
0222  REF   4  LAST  137      05,2202  13645 1         3DNADR DELVEET3   DELVEET3,+1,...+4,+5
0223  REF  22  LAST  183      05,2203  01337 1         1DNADR OPTMODES   OPTMODES,HOLDFLAG
0224  REF   1                 05,2204  32101 0         DNPTR  CMREND07  COMMON DATA
0225  REF   5  LAST  136      05,2205  02315 1         1DNADR RTHETA     RTHETA,+1
0226  REF   4  LAST  136      05,2206  07400 1         2DNADR LAT(SPL)   LAT(SPL),+1,LNG(SPL),+1
0227  REF   5  LAST  137      05,2207  07756 1         2DNADR VPRED      VPRED,+1,GAMMAEI,+1
0228  REF  16  LAST  183      05,2210  77671 1        -1DNADR STATE +10D FALGWRDS 10 AND 11
```

R0229 ----------SUB LISTS----------

```
0230  REF   3  LAST  183      05,2043          CMREND01 EQUALS CMPOWED1  COMMON DOWNLIST DATA
0231  REF   4  LAST  183      05,2052          CMREND02 EQUALS CMPOWED2  COMMON DOWNLIST DATA
0232  REF   4  LAST  183      05,2057          CMREND03 EQUALS CMPOWED3  COMMON DOWNLIST DATA
0233  REF   3  LAST  183      05,2061          CMREND04 EQUALS CMPOWED4  COMMON DOWNLIST DATA
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L DOWNLINK LISTS USER'S PAGE NO. 8 EC S3

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 0234   REF   3  LAST  183   05,2063          CMREND05 EQUALS CMPOWED5        COMMON DOWNLIST DATA

 0235   REF   2  LAST  183   05,2072          CMREND06 EQUALS CMPOWED6        COMMON DOWNLIST DATA

 0236   REF   3  LAST  183   05,2101          CMREND07 EQUALS CMPOWED7        COMMON DOWNLIST DATA

R0237   ------------------------------------------------------------------
R0238   *** UNREFERENCED LOCATIONS USED IN LIST 3
R0239   *** UPDATE THIS LIST WHEN ANY CHANGES ARE MADE TO DOWNLINK LISTS


A0240                                                      LOCATION        LIST NAME

 0241   REF   3  LAST  140   E7,1703          DL301    =    RM              CMRENDDL
 0242   REF   1                0772           DL3015   =    TRKMKCNT
 0243   REF   2  LAST  105   E5,1462          DL302    =    TCSI
 0244   REF   3  LAST   94   E4,1713          DL303    =    RRATE
 0245   REF   4  LAST  184     0025           DL304    =    TIME1
 0246   REF   2  LAST  121   E7,1402          DL305    =    LNG(SPL)
 0247   REF   7  LAST  137   E7,1760          DL306    =    GAMMAEI
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L DOWNLINK LISTS USER'S PAGE NO. 9 EC S3

P0248 CSM ENTRY AND UPDATE DOWNLIST

R0249 ----------CONTROL LIST----------

0250					05,2211		CMENTRDL	EQUALS	SEND ID BY SPECIAL CODING
0251	REF	1			05,2211	32043 1		DNPTR CMENTRO1	COLLECT SNAPSHOT
0252	REF	14	LAST	185	05,2212	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
0253	REF	1			05,2213	32052 1		DNPTR CMENTRO2	COLLECT SECOND SNAPSHOT
0254	REF	15	LAST	187	05,2214	14337 0		4DNADR DNTMBUFF	SEND SNAPSHOT
0255	REF	1			05,2215	32057 1		DNPTR CMENTRO3	COMMON DATA
0256	REF	3	LAST	136	05,2216	07300 0		2DNADR CMDAPMOD	CMDAPMOD,PREL,QREL,RREL
0257	REF	2	LAST	122	05,2217	03635 1		1DNADR L/D1	L/D1,+1
0258	REF	8	LAST	136	05,2220	24304 0		6DNADR UPBUFF	UPBUFF,+1...+10,+11
0259	REF	9	LAST	187	05,2221	14320 0		4DNADR UPBUFF +12D	UPBUFF+12,13...+18,19D
0260	REF	4	LAST	135	05,2222	04300 0		2DNADR COMPNUMB	COMPNUMB,UPOLDMOD,UPVERB,UPCOUNT
0261	REF	3	LAST	136	05,2223	03313 0		1DNADR PAXERR1	PAXERR1,ROLLTM
0262	REF	4	LAST	136	05,2224	13675 1		3DNADR LATANG	LATANG,+1,RDOT,+1,THETAH,+1
0263	REF	5	LAST	185	05,2225	07400 1		2DNADR LAT(SPL)	LAT(SPL),+1,LNG(SPL),+1
0264	REF	3	LAST	136	05,2226	03265 0		1DNADR ALFA/180	ALFA/180,BETA/180
0265	REF	1			05,2227	32061 1		DNPTR CMENTRO4	COMMON DATA
0266	REF	5	LAST	185	05,2230	00024 1		1DNADR TIME2	TIME2,TIME1
0267	REF	1			05,2231	32260 1		DNPTR CMENTRO5	COLLECT SNAPSHOT
0268	REF	16	LAST	187	05,2232	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
0269	REF	2	LAST	187	05,2233	32052 1		DNPTR CMENTRO2	COLLECT SNAPSHOT
0270	REF	17	LAST	187	05,2234	14337 0		4DNADR DNTMBUFF	SEND SNAPSHOT
0271	REF	3	LAST	181	05,2235	00775 1		1DNADR OPTION1	OPTION1,OPTION2
0272	REF	3	LAST	181	05,2236	01516 1		1DNADR TET	TET,+1
0273	REF	6	LAST	181	05,2237	13167 0		3DNADR ERRORX	ERRORX/Y/Z,THETADX/Y/Z
0274	REF	4	LAST	187	05,2240	07300 0		2DNADR CMDAPMOD	CMDAPMOD,PREL,QREL,RREL
0275	REF	10	LAST	187	05,2241	24304 0		6DNADR UPBUFF	UPBUFF+0,+1...+10,+11D
0276	REF	11	LAST	187	05,2242	14320 0		4DNADR UPBUFF +12D	UPBUFF+12,+13...+18,+19D
0277	REF	3	LAST	181	05,2243	03072 1		1DNADR LEMMASS	LEMMASS,CSMMASS
0278	REF	5	LAST	181	05,2244	03065 1		1DNADR DAPDATR1	DAPDATR1,DAPDATR2
0279	REF	3	LAST	136	05,2245	03314 1		1DNADR ROLLTM	ROLLTM,ROLLC
0280	REF	23	LAST	185	05,2246	01337 1		1DNADR OPTMODES	OPTMODES,HOLDFLAG
0281	REF	7	LAST	181	05,2247	13125 0		3DNADR WBODY	WBODY,...+5/OMEGAC,...+5
0282	REF	3	LAST	181	05,2250	05306 1		2DNADR REDOCTR	REDOCTR,THETAD+0,+1,+2
0283	REF	34	LAST	181	05,2251	01333 0		1DNADR IMODES30	IMODES30,IMODES33
0284	REF	1			05,2252	32107 0		DNPTR CMENTRO9	COMMON DATA
0285	REF	2	LAST	181	05,2253	01432 0		1DNADR RSBBQ	RSBBQ,+1
0286					05,2254	34076 1		DNCHAN 76	CHANNELS 76(GARBAGE),77
0287	REF	4	LAST	181	05,2255	04374 0		2DNADR C31FLWRD	C31FLWRD,FAILREG,+1,+2
0288	REF	17	LAST	185	05,2256	00106 0		1DNADR STATE +10D	FALGWRDS 10 AND 11
0289	REF	8	LAST	186	05,2257	74017 1		-1DNADR GAMMAEI	GAMMAEI,+1

R0290 ----------SUB LISTS----------

0291	REF	4	LAST	185	05,2043	CMENTRO1	EQUALS	CMPOWED1	COMMON DOWNLIST DATA
0292	REF	5	LAST	185	05,2052	CMENTRO2	EQUALS	CMPOWED2	COMMON DOWNLIST DATA

L DOWNLINK LISTS USER'S PAGE NO. 1 E. S3

```
0293   REF   5  LAST  185   05,2057            CMENTR03 EQUALS CMPOWED3        COMMON DOWNLIST DATA

0294   REF   4  LAST  185   05,2061            CMENTR04 EQUALS CMPOWED4        COMMON DOWNLIST DATA

0295   REF   8  LAST  180   05,2260   76463 1  CMENTR05-1DNADR DELV            DELV,+1          SNAPSHOT DATA
0296   REF   9  LAST  188   05,2261   01316 1        1DNADR DELV +2           DELV+2,+3
0297   REF  10  LAST  188   05,2262   01320 1        1DNADR DELV +4           DELV+4,+5
0298   REF   4  LAST  137   05,2263   03726 1        1DNADR TTE               TTE,+1
0299   REF   4  LAST  137   05,2264   03724 0        1DNADR VIO               VIO,+1
0300   REF   6  LAST  185   05,2265   03756 0        1DNADR VPRED             VPRED,+1
0301   REF   3  LAST  180   05,2266   76673 1       -1DNADR PIPTIME1          PIPTIME1,+1

0302   REF   4  LAST  186   05,2101            CMENTR07 EQUALS CMPOWED7        COMMON DOWNLIST DATA

0303   REF   1               05,2107            CMENTR09 EQUALS CMPOWED9        COMMON DOWNLIST DATA

R0304  ------------------------------------------------------------------
R0305  *** UNREFERENCED LOCATIONS USED IN LIST 4
R0306  *** UPDATE THIS LIST WHEN ANY CHANGES ARE MADE TO DOWNLINK LISTS

A0307                                                    LOCATION        LIST NAME

0308   REF   3  LAST  136   E6,1701            DL401    =      PREL            CMENTRDL
0309   REF   3  LAST  136   E6,1702            DL402    =      QREL
0310   REF   2  LAST  115   E6,1703            DL403    =      RREL
0311   REF   3  LAST  135     0301             DL404    =      UPOLDMOD
0312   REF   3  LAST  135     0302             DL405    =      UPVERB
0313   REF   2  LAST   73     0303             DL406    =      UPCOUNT
0314   REF   4  LAST  187   E6,1714            DL407    =      ROLLTM
0315   REF   3  LAST  136   E7,1677            DL408    =      RDOT
0316   REF   2  LAST  123   E7,1701            DL409    =      THETAH
0317   REF   3  LAST  186   E7,1402            DL410    =      LNG(SPL)
0318   REF   2  LAST  115   E6,1666            DL411    =      BETA/180
0319   REF   5  LAST  186     0025             DL412    =      TIME1
0320   REF   2  LAST  182     0776             DL413    =      OPTION2
0321   REF   6  LAST  182   E6,1570            DL414    =      ERRORY
0322   REF   4  LAST  182   E6,1571            DL415    =      ERRORZ
0323   REF   7  LAST  181   E6,1572            DL416    =      THETADX
0324   REF   6  LAST  182   E6,1573            DL417    =      THETADY
0325   REF   6  LAST  182   E6,1574            DL418    =      THETADZ
0326   REF   4  LAST  188   E6,1701            DL419    =      PREL
0327   REF   4  LAST  188   E6,1702            DL420    =      QREL
0328   REF   3  LAST  188   E6,1703            DL421    =      RREL
0329   REF   2  LAST  182   E6,1473            DL422    =      CSMMASS
0330   REF   2  LAST  182   E6,1466            DL423    =      DAPDATR2
0331   REF   2  LAST  116   E6,1715            DL424    =      ROLLC
0332   REF   2  LAST  182     1340             DL425    =      HOLDFLAG
0333   REF   2  LAST  182     0375             DL426    =      FAILREG
```

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P0334 P22 DOWNLISTS

R0335 ----------CONTROL LIST----------

0336					05,2267		CMPG22DL	EQUALS	SEND ID BY SPECIAL CODING
0337	REF	1			05,2267	32043 1		DNPTR CMPG2201	COLLECT SNAPSHOT
0338	REF	18	LAST	187	05,2270	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
0339	REF	1			05,2271	32052 1		DNPTR CMPG2202	COLLECT SNAPSHOT
0340	REF	19	LAST	189	05,2272	14337 0		4DNADR DNTMBUFF	SEND SNAPSHOT
0341	REF	1			05,2273	32057 1		DNPTR CMPG2203	COMMON DATA
0342	REF	1			05,2274	32340 1		DNPTR MARK1/2	MARK 1&2 DATA SNAPSHOT
0343	REF	20	LAST	189	05,2275	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
0344	REF	1			05,2276	32347 0		DNPTR MARK3/4	MARK 3&4 DATA SNAPSHOT
0345	REF	21	LAST	189	05,2277	24337 0		6DNADR DNTMBUFF	SEND SNAPSHOT
0346	REF	1			05,2300	32356 0		DNPTR MARK5	MARK5 DATA SNAPSHOT
0347	REF	22	LAST	189	05,2301	10337 1		3DNADR DNTMBUFF	SEND SNAPSHOT
0348	REF	2	LAST	134	05,2302	03751 1		1DNADR LANDMARK	LANDMARK,GARBAGE
0349	REF	3	LAST	185	05,2303	00007 0		1DNADR SPARE	
0350	REF	4	LAST	189	05,2304	00007 0		1DNADR SPARE	
0351	REF	5	LAST	189	05,2305	00007 0		1DNADR SPARE	
0352	REF	1			05,2306	32061 1		DNPTR CMPG2204	COMMON DATA
0353	REF	6	LAST	187	05,2307	00024 1		1DNADR TIME2	TIME2,TIME1
0354	REF	1			05,2310	32335 0		DNPTR CMPG2205	COLLECT SNAPSHOT
0355	REF	23	LAST	189	05,2311	04337 1		2DNADR DNTMBUFF	SEND SNAPSHOT
0356	REF	6	LAST	189	05,2312	00007 0		1DNADR SPARE	
0357	REF	7	LAST	189	05,2313	00007 0		1DNADR SPARE	
0358	REF	8	LAST	189	05,2314	00007 0		1DNADR SPARE	
0359	REF	9	LAST	189	05,2315	00007 0		1DNADR SPARE	
0360	REF	2	LAST	189	05,2316	32052 1		DNPTR CMPG2202	COLLECT SNAPSHOT
0361	REF	24	LAST	189	05,2317	14337 0		4DNADR DNTMBUFF	SEND SNAPSHOT
0362	REF	1			05,2320	32072 0		DNPTR CMPG2206	COMMON DATA
0363	REF	2	LAST	134	05,2321	03747 0		1DNADR 8NN	8NN,GARBAGE
0364	REF	18	LAST	187	05,2322	00106 0		1DNADR STATE +100	FALGWRDS 10 AND 11
0365	REF	2	LAST	36	05,2323	12025 0		3DNADR RLS	RLS,+1,...+4,+5
0366	REF	10	LAST	189	05,2324	00007 0		1DNADR SPARE	
0367	REF	24	LAST	187	05,2325	01337 1		1DNADR OPTMODES	OPTMODES,HOLDFLAG
0368	REF	1			05,2326	32101 0		DNPTR CMPG2207	COMMON DATA
0369	REF	11	LAST	189	05,2327	00007 0		1DNADR SPARE	
0370	REF	12	LAST	189	05,2330	00007 0		1DNADR SPARE	
0371	REF	13	LAST	189	05,2331	00007 0		1DNADR SPARE	
0372	REF	14	LAST	189	05,2332	00007 0		1DNADR SPARE	
0373	REF	15	LAST	189	05,2333	00007 0		1DNADR SPARE	
0374	REF	16	LAST	189	05,2334	77770 1		-1DNADR SPARE	

R0375 ----------SUB LISTS----------

0376	REF	5	LAST	187	05,2043		CMPG2201	EQUALS CMPOWE01	COMMON DOWNLIST DATA
0377	REF	6	LAST	187	05,2052		CMPG2202	EQUALS CMPOWE02	COMMON DOWNLIST DATA

L DOWNLINK LISTS

```
0378   REF   6  LAST  188   05,2057                CMPG2203 EQUALS CMPOWE03          COMMON DOWNLIST DATA

0379   REF   5  LAST  188   05,2061                CMPG2204 EQUALS CMPOWE04          COMMON DOWNLIST DATA

0380   REF   2  LAST   77   05,2335   77027 1  CMPG2205-1DNADR LONG                 LONG,+1              SNAPSHOT DATA
0381   REF   2  LAST   77   05,2336   00752 1         1DNADR ALT                  ALT,+1
0382   REF   4  LAST  136   05,2337   77031 0        -1DNADR LAT                  LAT,+1

0383   REF   3  LAST  186   05,2072                CMPG2206 EQUALS CMPOWE06          COMMON DOWNLIST DATA

0384   REF   5  LAST  188   05,2101                CMPG2207 EQUALS CMPOWE07          COMMON DOWNLIST DATA

0385   REF   2  LAST  125   05,2340   74236 0  MARK1/2 -1DNADR SVMRKDAT +2          SVMRKDAT+2,+3        SNAPSHOT DATA
0386   REF   3  LAST  190   05,2341   03543 0          1DNADR SVMRKDAT +4          SVMRKDAT+4,+5
0387   REF   4  LAST  190   05,2342   03545 0          1DNADR SVMRKDAT +6          SVMRKDAT+6,+7
0388   REF   5  LAST  190   05,2343   03547 1          1DNADR SVMRKDAT +8D         SVMRKDAT+8,+9
0389   REF   6  LAST  190   05,2344   03551 0          1DNADR SVMRKDAT +10D        SVMRKDAT+10,+11
0390   REF   7  LAST  190   05,2345   03553 1          1DNADR SVMRKDAT +12D        SVMRKDAT+12,+13
0391   REF   8  LAST  190   05,2346   74240 1         -1DNADR SVMRKDAT             SVMRKDAT,+1

0392   REF   9  LAST  190   05,2347   74220 1  MARK3/4 -1DNADR SVMRKDAT +16D        SVMRKDAT+16,+17      SNAPSHOT DATA
0393   REF  10  LAST  190   05,2350   03561 0          1DNADR SVMRKDAT +18D        SVMRKDAT+18,+19
0394   REF  11  LAST  190   05,2351   03563 1          1DNADR SVMRKDAT +20D        SVMRKDAT+20,+21
0395   REF  12  LAST  190   05,2352   03565 1          1DNADR SVMRKDAT +22D        SVMRKDAT+22,+23
0396   REF  13  LAST  190   05,2353   03567 0          1DNADR SVMRKDAT +24D        SVMRKDAT+24,+25
0397   REF  14  LAST  190   05,2354   03571 1          1DNADR SVMRKDAT +26D        SVMRKDAT+26,+27
0398   REF  15  LAST  190   05,2355   74222 0         -1DNADR SVMRKDAT +14D        SVMRKDAT+14,+15

0399   REF  16  LAST  190   05,2356   74202 1  MARK5   -1DNADR SVMRKDAT +30D        SVMRKDAT+30,+31      SNAPSHOT DATA
0400   REF  17  LAST  190   05,2357   03577 1          1DNADR SVMRKDAT +32D        SVMRKDAT+32,+33
0401   REF  18  LAST  190   05,2360   03601 0          1DNADR SVMRKDAT +34D        SVMRKDAT+34,GARBAGE
0402   REF  19  LAST  190   05,2361   74204 1         -1DNADR SVMRKDAT +28D        SVMRKDAT+28,+29

R0403  ------------------------------------------------------------------

R0404  *** UNREFERENCED LOCATIONS USED IN LIST 5
R0405  *** UPDATE THIS LIST WHEN ANY CHANGES ARE MADE TO DOWNLINK LISTS

A0406                                                        LOCATION          LIST NAME

0407   REF   6  LAST  188     0025                 DL501   =      TIME1          CMPG22DL
R0408  ------------------------------------------------------------------
0409   REF   2  LAST  179   05,2362   02113 0  DNTABLE  GENADR CMCSTADL
0410   REF   2  LAST  179   05,2363   02211 1           GENADR CMENTRDL
0411   REF   1              05,2364   02146 0           GENADR CMRENDDL
0412   REF   1              05,2365   02001 1           GENADR CMPOWEDL
0413   REF   1              05,2366   02267 0           GENADR CMPG22DL

R0414  ------------------------------------------------------------------
```

L DOWNLINK LISTS USER'S PAGE NO. 13 EB S3

L FRESH START AND RESTART USER'S PAGE NO. 1 ED 53

P0001 PROGRAM DESCRIPTION 8 APRIL, 1967
R0002 SUNDISK REV 120
R0003 FUNCTIONAL DESCRIPTION

R0004 SLAP1 MAN INITIATED FRESH START
R0005 1. EXECUTE STARTSUB
R0006 2. TURN OFF DSKY DISCRETE-LAMPS
R0007 3. CLEAR FAIL REGISTERS,SELF CHECK ERROR COUNTER AND RESTART
R0008 COUNTER
R0009 4. INITIALIZE OUTBIT CHANNEL 77
R0010 5. EXECUTE DOFSTART

R0011 DOFSTART MACHINE INITIATED FRESH START

R0012 1. CLEAR SELF-CHECK REGISTERS, MODE REGISTER AND COUZ REGISTER
R0013 2. CLEAR PHASE TABLE
R0014 3. INITIALIZE IMU FLAGS
R0015 4. INITIALIZE FLAGWORDS
R0016 5. TRANSFER CONTROL TO IDLE LOOP IN DUMMYJOB

R0017 GOPROG HARDWARE RESTART

R0018 0. EXECUTE STARTSUB
R0019 1. TRANSFER CONTROL TO DOFSTART IF ANY OF THE FOLLOWING CONDITIONS
R0020 EXIST.
R0021 A. RESTART OCCURED DURING EXECUTION OF ERASCHK
R0022 B. BOTH OSCILLATOR FAIL AND AGC WARNING ARE ON
R0023 C. MARK REJECT AND EITHER NAV OR MAIN DSKY ERROR LIGHT RESET
R0024 ARE ON.
R0025 2. SCHEDULE A T5RUPT PROGRAM FOR THE DAP
R0026 3. SET FLAGWRD5 BITS FOR INTWAKE ROUTINE
R0027 4. EXTINGUISH ALL DSKY LAMPS, EXCEPT PROGRAM ALARM,GIMBAL LOCK AND
R0028 NO ATT
R0029 5. INITIALIZE IMU FLAGS
R0030 6. IF ENGINE COMMAND IS ON (FLAGWRD5,BIT 7), SET ENGINE ON (CHAN-
R0031 NEL 11, BIT 13)
R0032 7. TRANSFER CONTROL TO GOPROG3

R0033 ENEMA SOFTWARE RESTART INITIATED BY MAJOR MODE CHANGE

R0034 1. EXECUTE STARTSB2
R0035 2. KILL PROGRAMS THAT WERE INTEGRATING OR WAITING FOR INTEGRATION
R0036 ROUTINE
R0037 3. TRANSFER CONTROL TO GOPROG3

R0038 GOPROG3 SUBROUTINE COMMON TO GOPROG AND ENEMA

R0039 1. TEST PHASE TABLES - IF INCORRECT, DISPLAY ALARM 1107 AND
R0040 TRANSFER CONTROL TO DOFSTART
R0041 2. DISPLAY MAJOR MODE

```
R0042          3. IF ANY GROUPS WERE ACTIVE UPON RESTART,TRANSFER CONTROL TO THE
R0043             RESTARTS SUBROUTINE TO RESCHEDULE PENDING TASKS, LONGCALLS, AND
R0044             JOBS (P20 IS RESTARTED VIA FINDVAC)
R0045          4. IF NO GROUPS WERE ACTIVE UPON RESTART, DISPLAY ALARM CODE
R0046             1110 (RESTART WITH NO ACTIVE GROUPS).
R0047          5. TRANSFER CONTROL TO IDLE LOOP IN DUMMYJOB

R0048       STARTSUB    SUBROUTINE COMMON TO SLAP1 AND GOPROG

R0049          1. CLEAR OUTBIT CHANNELS 5 AND 6
R0050          2. INITIALIZE TIME5,TIME4,TIME3
R0051          3. TRANSFER CONTROL TO STARTSB2

R0052       STARTSB2    SUBROUTINE COMMON TO STARTSUB AND ENEMA

R0053          1. INITIALIZE OUTBIT CHANNELS 11,12,13 AND 14
R0054          2. REPLACE ALL TASKS ON WAITLIST WITH ENDTASK
R0055          3. MAKE ALL EXECUTIVE REGISTERS AVAILABLE
R0056          4. MAKE ALL VAC AREAS AVAILABLE
R0057          5. CLEAR DSKY REGISTERS
R0058          6. ZERO NUMEROUS SWITCHES
R0059          7. INITIALIZE OPTICS FLAGS
R0060          8. INITIALIZE PIPA AND TELEMETRY FAIL FLAGS
R0061          9. INITIALIZE DOWN TELEMETRY

R0062   INPUT/OUTPUT INITIALIZATION

R0063       A. CALLING SEQUENCE

R0064             SLAP1 -  TC   POSTJUMP    OR    VERB 36,ENTER
R0065                      CADR SLAP1

R0066             ENEMA -  TC   POSTJUMP    ***   DO NOT CALL ENEMA WITHOUT  ***
R0067                      CADR ENEMA       ***   CONSULTING POOH PEOPLE     ***

R0068       B. OUTPUT

R0069             ERASABLE MEMORY INITIALIZATION

R0070   PROGRAM ANALYSIS

R0071       A. SUBROUTINES CALLED

R0072             MR.KLEAN,WAITLIST,DSPMM,ALARM,RESTARTS,FINDVAC

R0073       B. ALARMS

R0074             1107  PHASE TABLE ERROR
R0075             1110  RESTART WITH NO ACTIVE GROUPS
```

L FRESH START AND RESTART USER'S PAGE NO. 3 E0 S3

```
0077   REF   1                05,2000                    SETLOC  FRANDRES
0078                            05,2367                    BANK

0079   REF   3  LAST  140      E3,1400                    EBANK=  LST1

0080   REF   1                                           COUNT*  $$/START
0081                           05,2367  0 0004 0  SLAP1   INHINT                 FRESH START. COMES HERE FROM PINBALL.
0082   REF   1                05,2370  0 3046 0          TC      STARTSUB        SUBROUTINE DOES MOST OF THE WORK.

0083   REF   1                05,2371  1 2376 0  STARTSW TCF     SKIPSIM

0084   REF  18  LAST  146      05,2372  3 4753 1  STARTSIM CAF    BIT14

0085   REF   1                05,2373  0 5135 0          TC      FINDVAC

0086                           05,2374   77777 0  SIM2CADR OCT    77777

0087                           05,2375   77777 0          OCT     77777
0088   REF  19  LAST  183      05,2376  3 1241 1  SKIPSIM  CA     DSPTAB +11D
0089   REF   1                05,2377  7 5004 1          MASK    BITS4&6
0090   REF  20  LAST  176      05,2400  6 4752 0          AD      BIT15
0091   REF  20  LAST  194      05,2401  55'241 0          TS      DSPTAB +11D     REQUESTED FRESH START.

0092   REF  11  LAST  177      05,2402  3 4772 1          CAF     ZERO            SAME STORY ON ZERODING FAILREG.
0093   REF   2  LAST   87      05,2403  55'365 1          TS      ERCOUNT
0094   REF   3  LAST  188      05,2404  54 375 1          TS      FAILREG
0095   REF   4  LAST  194      05,2405  54 376 1          TS      FAILREG +1
0096   REF   5  LAST  194      05,2406  54 377 0          TS      FAILREG +2
0097   REF   4  LAST  187      05,2407  55'306 1          TS      REDOCTR

0098                           05,2410  0 0006 1          EXTEND
0099   REF   1                05,2411  01 077 0          WRITE   CHAN77          ZERO CHANNEL 77
0100   REF   1                05,2412  4 4664 0          CS      PRIO12
0101   REF  10  LAST  145      05,2413  55'322 1          TS      DSRUPTSW

0102   REF  12  LAST  194      05,2414  3 4772 1  DOFSTART CAF    ZERO            DO A FRESH START.
0103   REF   2  LAST   87      05,2415  55'360 1          TS      ERESTORE        ***** MUST NOT BE REMOVED FROM DOFSTART
0104   REF   2  LAST   87      05,2416  55'362 0          TS      SMODE           ***** MUST NOT BE REMOVED FROM DOFSTART
0105   REF   3  LAST   89      05,2417  55'501 0          TS      UPSVFLAG        UPDATE STATE VECTOR REQUEST FLAGWORD
0106                           05,2420  0 0006 1          EXTEND
0107   REF   1                05,2421  01 005 0          WRITE   CHAN5           TURN OFF RCS JETS
0108                           05,2422  0 0006 1          EXTEND
0109   REF   1                05,2423  01 006 0          WRITE   CHAN6           TURN OFF RCS JETS
0110                           05,2424  0 0006 1          EXTEND
0111   REF   6  LAST  167      05,2425  01 011 0          WRITE   DSALMOUT        ZERO CHANNEL 11
0112                           05,2426  0 0006 1          EXTEND
0113   REF  22  LAST  178      05,2427  01 012 0          WRITE   CHAN12          ZERO CHANNEL 12
0114                           05,2430  0 0006 1          EXTEND
0115   REF   1                05,2431  01 013 1          WRITE   CHAN13          ZERO CHANNEL 13
0116                           05,2432  0 0006 1          EXTEND
```

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0117   REF   4  LAST  178   05,2433  01 014 0        WRITE  CHAN14          ZERO CHANNEL 14
0118   REF   7  LAST  172   05,2434  55'331 0        TS     WTOPTION
0119   REF   4  LAST  136   05,2435  54 332 1        TS     DNLSTCOD

0120   REF   1              05,2436  54 370 1        TS     NVSAVE
0121   REF   1              05,2437  55'275 1        TS     EBANKTEM
0122   REF   2  LAST  186   05,2440  54 772 1        TS     TRKMKCNT
0123   REF   4  LAST  185   05,2441  54 771 1        TS     VHFCNT
0124   REF   1              05,2442  55'247 0        TS     EXTVBACT

0125   REF   3  LAST  178   05,2443  54 735 1        TS     TRATE           ZERO AUTO OPTICS RATE REGS
0126   REF   3  LAST  178   05,2444  54 736 1        TS     SRATE
0127   REF   4  LAST  178   05,2445  54 740 0        TS     TOLD
0128   REF   3  LAST  178   05,2446  54 741 1        TS     SOLD
0129   REF  21  LAST  194   05,2447  4 1241 0        CS     DSPTAB +11D
0130   REF   2  LAST  194   05,2450  7 5004 1        MASK   BITS4&6
0131   REF  37  LAST  177   05,2451  10 000 0        CCS    A
0132                        05,2452  0 2456 1        TC     +4
0133   REF   3  LAST  195   05,2453  3 5004 0        CA     BITS4&6
0134                        05,2454  0 0006 1        EXTEND                  THE IMU WAS IN COARSE ALIGN IN GIMBAL
0135   REF  23  LAST  194   05,2455  05 012 1        WOR    CHAN12           LOCK, SO PUT IT BACK INTO COARSE ALIGN.
0136   REF   1              05,2456  0 2536 0        TC     MR.KLEAN

0137   REF  13  LAST  194   05,2457  4 4772 0        CS     ZERO
0138   REF   1              05,2460  55'214 0        TS     MODREG

0139   REF   2  LAST  155   05,2461  3 4346 1        CAF    PRIO30
0140   REF   1              05,2462  54 365 0        TS     RESTREG

0141   REF   1              05,2463  3 3247 0        CAF    IM30INIF        FRESH START IMU INITIALIZATION.
0142   REF  35  LAST  187   05,2464  55'333 1        TS     IMODES30

0143   REF   2  LAST  169   05,2465  3 7702 0        CAF    NEGONE
0144   REF  14  LAST  178   05,2466  55'323 0        TS     OPTIND          KILL COARSE OPTICS

0145   REF   1              05,2467  3 3251 1        CAF    OPTINITF
0146   REF  25  LAST  189   05,2470  55'337 0        TS     OPTMODES

0147   REF   1              05,2471  3 5055 1        CAF    IM33INIT
0148   REF  18  LAST  182   05,2472  55'334 0        TS     IMODES33

0149                        05,2473  0 0006 1        EXTEND                  LET T5 IDLE.
0150   REF   1              05,2474  3 3231 1        DCA    T5IDLER
0151   REF   2  LAST  140   05,2475  52 113 0        DXCH   T5LOC

0152   REF   1              05,2476  3 3252 1        CA     SWINIT
0153   REF  19  LAST  189   05,2477  54 074 0        TS     STATE

0154   REF   2  LAST  156   05,2500  3 0075 0        CA     FLAGWRD1
0155   REF   1              05,2501  7 4755 0        MASK   NOP01BIT         LEAVE NODOP01 FLAG UNTOUCHED
```

```
0156   REF   2  LAST  195   05,2502  6 3253 0          AD      SWINIT +1
0157   REF   3  LAST  195   05,2503  54 075 1          TS      FLAGWRD1

0158   REF   3  LAST  196   05,2504  3 3254 1          CA      SWINIT +2
0159   REF  20  LAST  195   05,2505  54 076 1          TS      STATE +2

0160   REF   1               05,2506  3 0077 1          CA      FLAGWRD3
0161   REF   1               05,2507  7 4754 1          MASK    REFSMBIT
0162   REF   4  LAST  196   05,2510  6 3255 0          AD      SWINIT +3
0163   REF   2  LAST  196   05,2511  54 077 0          TS      FLAGWRD3

0164                         05,2512  0 0006 1          EXTEND
0165   REF   5  LAST  196   05,2513  3 3257 1          DCA     SWINIT +4
0166   REF  21  LAST  196   05,2514  52 101 0          DXCH    STATE +4
0167                         05,2515  0 0006 1          EXTEND
0168   REF   6  LAST  196   05,2516  3 3261 1          DCA     SWINIT +6
0169   REF  22  LAST  196   05,2517  52 103 1          DXCH    STATE +6
0170   REF   3  LAST  162   05,2520  3 0104 1          CA      FLAGWRD8
0171   REF   1               05,2521  7 2562 0          MASK    OCT6200         CMOONFLG, LMOONFLG, AND SUFFLAG
0172   REF   7  LAST  196   05,2522  6 3262 1          AD      SWINIT +8D
0173   REF   4  LAST  196   05,2523  54 104 0          TS      FLAGWRD8

0174   REF   8  LAST  196   05,2524  3 3263 0          CA      SWINIT +9D
0175   REF  23  LAST  196   05,2525  54 105 1          TS      STATE +9D

0176   REF   1               05,2526  3 4756 1          CAF     HDSUPBIT
0177   REF   1               05,2527  7 0106 1          MASK    FLGWRD10
0178   REF   9  LAST  196   05,2530  6 3264 1          AD      SWINIT +10D
0179   REF   2  LAST  196   05,2531  54 106 1          TS      FLGWRD10

0180   REF  10  LAST  196   05,2532  3 3265 0          CAF     SWINIT +11D
0181   REF   1               05,2533  54 107 0          TS      FLGWRD11

0182   REF   2  LAST  151   05,2534  0 4655 0  ENDRSTRT TC      POSTJUMP
0183   REF   1               05,2535   03173 1          CADR    DUMMYJOB + 2    DOES A RELINT.  (IN A SWITCHED BANK.)

0184                         05,2536  0 0004 0  MR.KLEAN INHINT
0185                         05,2537  0 0006 1          EXTEND
0186   REF   5  LAST  178   05,2540  3 4772 1          DCA     NEGO
0187   REF   1               05,2541  53'160 0          DXCH    -PHASE2
0188                         05,2542  0 0006 1  POOKLEAN EXTEND
0189   REF   6  LAST  196   05,2543  3 4772 1          DCA     NEGO
0190   REF   1               05,2544  53'164 1          DXCH    -PHASE4
0191                         05,2545  0 0006 1          EXTEND
0192   REF   7  LAST  196   05,2546  3 4772 1          DCA     NEGO
0193   REF   1               05,2547  53'156 0          DXCH    -PHASE1
0194                         05,2550  0 0006 1  V37KLEAN EXTEND
0195   REF   8  LAST  196   05,2551  3 4772 1          DCA     NEGO
0196   REF   1               05,2552  53'162 1          DXCH    -PHASE3
0197                         05,2553  0 0006 1          EXTEND
```

L FRESH START AND RESTART

```
0198   REF   9  LAST  196    05,2554  3 4772 1            DCA     NEGO
0199   REF   1               05,2555  53'166 0            DXCH    -PHASE5
0200                         05,2556  0 0006 1  UPKLEAN   EXTEND
0201   REF  10  LAST  197    05,2557  3 4772 1            DCA     NEGO
0202   REF   1               05,2560  53'170 1            DXCH    -PHASE6
0203   REF  15  LAST  178    05,2561  0 0002 0            TC      Q

0204                         05,2562   06200 0  OCT6200   OCT     6200
```

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P0205 COMES HERE FROM LOCATION 4000, GOJAM. RESTART ANY PROGRAMS WHICH MAY HAVE BEEN RUNNING AT THE TIME.

```
0207  REF   5  LAST  194   05,2563  25'306 0  GOPROG  INCR    REDOCTR          ADVANCE RESTART COUNTER.

0208  REF  16  LAST  197   05,2564  22 002 0          LXCH    Q
0209                       05,2565  0 0006 1          EXTEND
0210  REF   1              05,2566  04 007 1          ROR     SUPERBNK
0211  REF   3  LAST  187   05,2567  53'433 0          DXCH    RSBBQ
0212  REF   1              05,2570  0 4636 0          TC      BANKCALL         STORE ERASABLES FOR DEBUGGING PURPOSES.
0213  REF   1              05,2571   40000 0          CADR    VAC5STOR
0214  REF  21  LAST  194   05,2572  3 4752 0          CA      BIT15            TEST OSC FAIL BIT TO SEE IF WE HAVE
0215                       05,2573  0 0006 1          EXTEND                   HAD A POWER TRANSIENT. IF SO, ATTEMPT
0216  REF   3  LAST  169   05,2574  03 033 1          WAND    CHAN33           A RESTART. IF NOT, CHECK THE PRESENT
0217                       05,2575  0 0006 1          EXTEND                   STATE OF AGC WARNING BIT.
0218  REF   1              05,2576  1 2604 0          BZF     BUTTONS

0219  REF  19  LAST  194   05,2577  3 4753 1          CA      BIT14            IF AGC WARNING ON (BIT = 0), DO A
0220                       05,2600  0 0006 1          EXTEND                   FRESH START ON ASSUMPTION THAT
0221  REF   4  LAST  198   05,2601  02 033 0          RAND    CHAN33           WE ARE IN A RESTART LOOP.
0222                       05,2602  0 0006 1          EXTEND
0223  REF   1              05,2603  1 3044 0          BZF     NONAVKEY +1

0224  REF   1              05,2604  0 3023 0  BUTTONS  TC      LIGHTSET         MAKE FRESH START CHECKS BEFORE ERESTORE.

R0225                                                                          ERASCHK TEMPORARILY STORES THE CONTENTS OF TWO ERASABLE LOCATIONS, X
R0227                                                                          AND X+1 INTO SKEEP5 AND SKEEP6. IT ALSO STORES X INTO SKEEP7 AND
R0229                                                                          ERESTORE. IF ERASCHK IS INTERRUPTED BY A RESTART, C(ERESTORE) SHOULD
R0231                                                                          EQUAL C(SKEEP7),AND BE A + NUMBER LESS THAN 2000 OCT. OTHERWISE
R0233                                                                          C(ERESTORE) SHOULD EQUAL +0.

0234  REF   2  LAST  143   05,2605  3 4344 0          CAF     HI5
0235  REF   3  LAST  194   05,2606  7 1360 1          MASK    ERESTORE
0236                       05,2607  0 0006 1          EXTEND
0237                       05,2610  1 2612 1          BZF     +2               IF ERESTORE NOT = +0 OR +N LESS THAN 2K,
0238  REF   2  LAST  198   05,2611  1 3044 0          TCF     NONAVKEY +1      DOUBT E MEMORY AND DO FRESH START.
0239  REF   4  LAST  198   05,2612  4 1360 1          CS      ERESTORE
0240                       05,2613  0 0006 1          EXTEND
0241  REF   1              05,2614  1 2631 0          BZF     ELRSKIP -1
0242  REF   1              05,2615  6 1377 0          AD      SKEEP7
0243                       05,2616  0 0006 1          EXTEND
0244                       05,2617  1 2621 1          BZF     +2               = SKEEP7, RESTORE E MEMORY.
0245  REF   3  LAST  198   05,2620  1 3044 0          TCF     NONAVKEY +1      NOT=SKEEP7, DOUBT EMEM, DO FRESH START
0246  REF   2  LAST   87   05,2621  3 1374 0          CA      SKEEP4
0247  REF   2  LAST  155   05,2622  54 003 0          TS      EBANK            EBANK OF E MEMORY THAT WAS UNDER TEST.
0248                       05,2623  0 0006 1          EXTEND                   (NOT DXCH SINCE THIS MIGHT HAPPEN AGAIN)
0249  REF   2  LAST   87   05,2624  3 1376 1          DCA     SKEEP5
0250  REF   2  LAST  198   05,2625  51'377 0          INDEX   SKEEP7
0251                       05,2626  52 001 1          DXCH    000              E MEMORY RESTORED.
0252  REF  14  LAST  195   05,2627  3 4772 1          CA      ZERO
0253  REF   5  LAST  198   05,2630  55'360 1          TS      ERESTORE
```

L FRESH START AND RESTART

```
0254   REF   2  LAST  194   05,2631  0 3046 0   -1        TC      STARTSUB      DO INITIALIZATION AFTER ERASE RESTORE.
0255   REF   1              05,2632  3 0102 1   ELRSKIP   CA      FLAGWRD6      RESTART AUTOPILOTS
0256   REF   1              05,2633  7 4076 0              MASK    DPCONFIG
0257                        05,2634  0 0006 1              EXTEND
0258   REF  14  LAST   85   05,2635  7 4766 0              MP      BIT3          BITS 15,14 00 T5IDLOC
0259   REF   5  LAST  172   05,2636  7 6211 1              MASK    SIX                      01 REDORCS
0260                        05,2637  0 0006 1              EXTEND                   10 REDOTVC
0261   REF  38  LAST  195   05,2640  5 0000 1              INDEX   A                11 REDOSAT
0262   REF   2  LAST  195   05,2641  3 3231 1              DCA     T5IDLER
0263   REF   3  LAST  195   05,2642  52 113 0              DXCH    T5LOC

0264   REF   1              05,2643  4 4753 0              CS      INTFLBIT
0265   REF   3  LAST  196   05,2644  7 0106 1              MASK    FLGWRD10
0266   REF   4  LAST  199   05,2645  54 106 1              TS      FLGWRD10

0267   REF  26  LAST  195   05,2646  3 1337 1              CA      OPTMODES
0268   REF   1              05,2647  7 5001 1              MASK    OPTINITR
0269   REF   2  LAST  169   05,2650  6 4762 0              AD      OCDUFBIT
0270   REF  27  LAST  199   05,2651  55'337 0              TS      OPTMODES

0271   REF   4  LAST  167   05,2652  3 4763 1              CAF     NOIMUDAP
0272   REF  19  LAST  195   05,2653  7 1334 0              MASK    IMODES33
0273   REF   2  LAST  195   05,2654  6 5055 1              AD      IM33INIT
0274   REF  20  LAST  199   05,2655  55'334 0              TS      IMODES33

0275   REF  15  LAST  198   05,2656  3 4772 1              CAF     ZERO
0276   REF   5  LAST  195   05,2657  54 740 0              TS      TOLD
0277   REF   4  LAST  195   05,2660  54 741 1              TS      SOLD
0278   REF   1              05,2661  3 3250 0              CA      9,6,4         LEAVE PROG ALARM,GIMBAL LOCK, NO ATT
0279   REF  22  LAST  195   05,2662  7 1241 0              MASK    DSPTAB +11D   LAMPS INTACT ON HARDWARE RESTART
0280   REF  22  LAST  198   05,2663  6 4752 0              AD      BIT15
0281   REF  23  LAST  199   05,2664  57'241 1              XCH     DSPTAB +11D
0282   REF  17  LAST  157   05,2665  7 4765 0              MASK    BIT4          IF NO ATT LAMP WAS ON, LEAVE ISS IN
0283                        05,2666  0 0006 1              EXTEND                COURSE ALIGN
0284   REF   1              05,2667  1 2676 0              BZF     NOCOARSE
0285   REF   7  LAST  162   05,2670  0 4714 1              TC      IBNKCALL      IF NO ATT LAMP ON, RETURN ISS TO
0286   REF   2  LAST  156   05,2671   17070 0              CADR    SETCOARS          COARSE ALIGN

0287   REF   6  LAST  199   05,2672  3 6211 0              CAF     SIX
0288   REF   4  LAST  156   05,2673  0 5233 0              TC      WAITLIST
0289   REF   4  LAST  156   E3,1474                       EBANK=  CDUIND
0290   REF   2  LAST  156   05,2674   03064 0             2CADR   CA+ECE
0290                        05,2675   16063 0
0291   REF   1              05,2676  3 3240 1   NOCOARSE  CAF     IFAILINH      LEAVE FAILURE INHIBITS INTACT ON
0292   REF  36  LAST  195   05,2677  7 1333 1              MASK    IMODES30          HARDWARE RESTART. RESET ALL
0293   REF   1              05,2700  6 7660 0              AD      IM30INIR          FAILURE CODES.
0294   REF  37  LAST  199   05,2701  55'333 1              TS      IMODES30

0295   REF   4  LAST  160   05,2702  4 0101 0              CS      FLAGWRD5
0296   REF   2  LAST  160   05,2703  7 4762 1              MASK    ENGONBIT
```

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```
0297   REF  39  LAST  199   05,2704  10 000 0            CCS    A
0298   REF   1                05,2705  1 2730 0            TCF    GOPROG3
0299   REF  18  LAST  176   05,2706  3 4754 0            CAF    BIT13
0300                         05,2707  0 0006 1            EXTEND
0301   REF   7  LAST  194   05,2710  05 011 1            WOR    DSALMOUT        TURN ENGINE ON
0302   REF   2  LAST  200   05,2711  1 2730 0            TCF    GOPROG3
0303                         05,2712  0 0004 0  ENEMA     INHINT
0304   REF   2  LAST  198   05,2713  0 3023 0            TC     LIGHTSET        EXIT TO DOFSTART IF ERROR RESET AND
0305   REF   1                05,2714  0 3054 0            TC     STARTSB2        MARK REJECT DEPRESSED SIMULTANEOUSLY
0306   REF   2  LAST  199   05,2715  4 4753 0            CS     INTFLBIT
0309   REF   5  LAST  199   05,2716  7 0106 1            MASK   FLGWRD10
0310   REF   6  LAST  200   05,2717  54 106 1            TS     FLGWRD10

0311   REF   2  LAST  199   05,2720  4 0102 0            CS     FLAGWRD6        IS TVC ON
0312   REF   2  LAST  199   05,2721  7 4076 0            MASK   DPCONFIG
0313                         05,2722  0 0006 1            EXTEND
0314   REF   3  LAST  200   05,2723  6 2730 1            BZMF   GOPROG3         NO

0315   REF   2  LAST  139   05,2724  3 5011 1            CAF    .5SEC           YES, CALL TVCEXEC TASK WHICH WAS KILLED
0316   REF   5  LAST  199   05,2725  0 5233 0            TC     WAITLIST             IN STARTSB2.
0317   REF   1                E6,1446                    EBANK= CNTR
0318   REF   1                05,2726   03037 0          2CADR  TVCEXEC
0318   REF   1                05,2727   34066 0
0319   REF   3  LAST  200   05,2730  3 0102 1  GOPROG3   CA     FLAGWRD6
0320   REF   3  LAST  200   05,2731  7 4076 0            MASK   DPCONFIG
0321                         05,2732  0 0006 1            EXTEND
0322   REF   1                05,2733  6 2744 1            BZMF   GOPROG4
0323   REF   1                05,2734  3 4764 0            CAF    TRACKBIT
0324   REF   4  LAST  196   05,2735  7 0075 1            MASK   FLAGWRD1
0325   REF  40  LAST  200   05,2736  10 000 0            CCS    A
0326   REF   2  LAST  200   05,2737  1 2744 0            TCF    GOPROG4
0327   REF   1                05,2740  0 4611 0            TC     E6SETTER
0328   REF   1                05,2741  0 4463 1            TC     STOPRATE
0329   REF   1                05,2742  3 5024 1            CAF    EBANK3
0330   REF   3  LAST  198   05,2743  54 003 0            TS     EBANK
0331   REF   1                05,2744  3 4773 0  GOPROG4   CAF    NUMGRPS         VERIFY PHASE TABLE AGREEMENTS
0332   REF   1                05,2745  54 161 0  PCLOOP    TS     MPAC +5
0333                         05,2746  6 0000 1            DOUBLE
0334                         05,2747  0 0006 1            EXTEND
0335   REF  41  LAST  200   05,2750  5 0000 1            INDEX  A
0336   REF   2  LAST  196   05,2751  3 1156 1            DCA    -PHASE1         COMPLEMENT INTO A, DIRECT INTO L.
0337                         05,2752  0 0006 1            EXTEND
0338   REF   9  LAST  176   05,2753  06 001 0            RXOR   LCHAN           RESULT MUST BE -0 FOR AGREEMENT.
0339   REF  42  LAST  200   05,2754  10 000 0            CCS    A
0340   REF   1                05,2755  1 3012 0            TCF    PTBAD           RESTART FAILURE.
0341   REF   2  LAST  200   05,2756  1 3012 0            TCF    PTBAD
0342   REF   3  LAST  200   05,2757  1 3012 0            TCF    PTBAD

0343   REF   2  LAST  200   05,2760  10 161 0            CCS    MPAC +5         PROCESS ALL RESTART GROUPS.
0344   REF   1                05,2761  1 2745 1            TCF    PCLOOP
```

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```
0345  REF   3  LAST  200   05,2762  54 162 0          TS      MPAC +6         SET TO +0.
0346  REF   1              05,2763  0 5350 1          TC      MMDSPLAY        DISPLAY MAJOR MODE

0347                       05,2764  0 0004 0          INHINT                  RELINT DONE IN MMDSPLAY

0348  REF   2  LAST  200   05,2765  3 4773 0          CAF     NUMGRPS         SEE IF ANY GROUPS RUNNING.
0349  REF   4  LAST  201   05,2766  54 161 0  NXTRST  TS      MPAC +5
0350                       05,2767  6 0000 1          DOUBLE
0351  REF  43  LAST  200   05,2770  50 000 1          INDEX   A
0352  REF   1              05,2771  11'156 0          CCS     PHASE1
0353  REF   1              05,2772  1 2774 0          TCF     PACTIVE         PNZ - GROUP ACTIVE.
0354  REF   1              05,2773  1 3001 1          TCF     PINACT          +0 - GROUP NOT RUNNING.

0355  REF   5  LAST  201   05,2774  54 154 0  PACTIVE  TS      MPAC
0356  REF   6  LAST  201   05,2775  24 154 1          INCR    MPAC            ABS OF PHASE.
0357  REF   7  LAST  201   05,2776  24 162 1          INCR    MPAC +6         INDICATE GROUP DEMANDS PRESENT.
0358  REF   2  LAST  198   05,2777  0 4636 0          TC      BANKCALL
0359  REF   1              05,3000   03467 1          CADR    RESTARTS

0360  REF   8  LAST  201   05,3001  10 161 0  PINACT  CCS     MPAC +5         PROCESS ALL RESTART GROUPS.
0361  REF   1              05,3002  1 2766 0          TCF     NXTRST

0362  REF   9  LAST  201   05,3003  10 162 0          CCS     MPAC +6         NO, CHECK PHASE ACTIVITY FLAG
0363  REF   1              05,3004  1 2534 0          TCF     ENDRSTRT        PHASE ACTIVE
0364  REF  23  LAST  199   05,3005  3 4752 0          CAF     BIT15           IS MODE -0
0365  REF   2  LAST  195   05,3006  7 1214 0          MASK    MODREG
0366                       05,3007  0 0006 1          EXTEND
0367  REF   1              05,3010  1 4103 0          BZF     GOTOPOOH        NO
0368  REF   2  LAST  201   05,3011  1 2534 0          TCF     ENDRSTRT        YES
0369  REF  10  LAST  175   05,3012  0 5671 1  PTBAD    TC      ALARM           SET ALARM TO SHOW PHASE TABLE FAILURE.
0370                       05,3013   01107 0          OCT     1107

0371  REF   1              05,3014  1 2414 0          TCF     DOFSTART        IN R2).

R0372  ******** ****** ******
R0373
R0374  DO NOT USE GOPROG2 OR ENEMA WITHOUT CONSULTING POOH PEOPLE
R0375
0376                       05,3015  0 0004 0  GOPROG2  INHINT
0377  REF   2  LAST  200   05,3016  0 3054 0          TC      STARTSB2
0378  REF   3  LAST  200   05,3017  4 4753 0          CS      INTFLBIT
0379  REF   7  LAST  200   05,3020  7 0106 1          MASK    FLGWRD10
0380  REF   8  LAST  201   05,3021  54 106 1          TS      FLGWRD10
0381  REF   3  LAST  200   05,3022  1 2744 0          TCF     GOPROG4
0382  REF  19  LAST  200     4754                 OCT10000 =       BIT13
0383  REF   3  LAST  195     4346                 OCT30000 =       PRIO30
0384  REF  16  LAST  173   05,3023  3 4762 0  LIGHTSET CAF     BIT7            DOFSTART IF MARK REJECT AND EITHER
0385                       05,3024  0 0006 1          EXTEND                  ERROR LIGHT RESET BUTTONS ARE DEPRESSED
0386  REF   1              05,3025  02 016 1          RAND    NAVKEYIN
0387                       05,3026  0 0006 1          EXTEND
```

```
0388   REF   4  LAST  198   05,3027  1 3043 1            BZF    NONAVKEY        NO MARK REJECT
0389   REF   1              05,3030  3 4342 0            CAF    OCT37
0390                        05,3031  0 0006 1            EXTEND
0391   REF   2  LAST  201   05,3032  02 016 1            RAND   NAVKEYIN        NAV DSKY KEYCODES,MARK,MARK REJECT
0392   REF   1              05,3033  6 3246 1            AD     -ELR
0393                        05,3034  0 0006 1            EXTEND
0394   REF   5  LAST  202   05,3035  1 3044 0            BZF    NONAVKEY +1
0395                        05,3036  0 0006 1            EXTEND
0396   REF   1              05,3037  00 015 0            READ   MNKEYIN         MAIN DSKY KEYCODES
0397   REF   2  LAST  202   05,3040  6 3246 1            AD     -ELR
0398                        05,3041  0 0006 1            EXTEND
0399                        05,3042  1 3044 0            BZF    +2

0400   REF  17  LAST  198   05,3043  0 0002 0  NONAVKEY  TC     Q

0401   REF   3  LAST  199   05,3044  0 3046 0    +1      TC     STARTSUB
0402   REF   2  LAST  201   05,3045  1 2414 0            TCF    DOFSTART
0403   REF   1              05,3046  3 3241 0  STARTSUB  CAF    LDNPHAS1        SET POINTER SO NEXT 20MS DOWNRUPT WILL
0404   REF   1              05,3047  54 334 1            TS     DNTMGOTO        CAUSE THE CURRENT DOWNLIST TO BE
A0405                                                                           INTERRUPTED AND START SENDING FROM THE
A0406                                                                           BEGINNING OF THE CURRENT DOWNLIST.

0407   REF   1              05,3050  3 7662 1            CAF    OCT37774        37774 TO TIME5
0408   REF   2  LAST  139   05,3051  54 030 0            TS     TIME5
0409   REF   7  LAST  177   05,3052  6 4770 0            AD     ONE             37775 TO TIME4
0410   REF   4  LAST  145   05,3053  54 027 0            TS     TIME4

0411   REF   1              05,3054  3 3244 0  STARTSB2  CAF    OCT77603        TURN OFF UPLINK ACTY, TEMP CAUTION, KR,
0412                        05,3055  0 0006 1            EXTEND                  FLASH, OP. ERROR. LEAVE OTHERS UNCHANGED
0413   REF   8  LAST  200   05,3056  03 011 1            WAND   DSALMOUT

0414   REF   5  LAST  177   05,3057  3 4750 1            CAF    POSMAX          37777 TO TIME3.
0415   REF   1              05,3060  54 026 1            TS     TIME3

0416   REF   1              05,3061  3 3245 1            CAF    OCT74777        TURN OFF TEST ALARMS, STANDBY ENABLE.
0417                        05,3062  0 0006 1            EXTEND
0418   REF   2  LAST  194   05,3063  03 013 0            WAND   CHAN13
0419   REF   1              05,3064  3 4753 1            CAF    R21BIT          CLEAR BITS
0420   REF   1              05,3065  6 4755 1            AD     P21BIT
0421   REF   1              05,3066  6 4757 0            AD     SKIPVBIT
0422                        05,3067  4 0000 0            COM
0423   REF   1              05,3070  7 0076 1            MASK   FLAGWRD2
0424   REF   2  LAST  202   05,3071  6 4757 0            AD     SKIPVBIT        NOW SET SKIPVHF FLAG.
0425   REF   2  LAST  202   05,3072  54 076 1            TS     FLAGWRD2
0426   REF   1              05,3073  4 4765 0            CS     MARKBIT
0427   REF   5  LAST  200   05,3074  7 0075 1            MASK   FLAGWRD1
0428   REF   6  LAST  202   05,3075  54 075 1            TS     FLAGWRD1

0429   REF   1              05,3076  4 4765 0            CS     CYC61BIT
0430   REF   6  LAST  162   05,3077  7 0074 0            MASK   FLAGWRD0
```

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```
0431  REF   7  LAST  202  05,3100  54 074 0   TS      FLAGWRD0
0432  REF   4  LAST  194  E3,1400              EBANK=  LST1
0433  REF   2  LAST  200  05,3101  3 5024 1    CAF     EBANK3
0434  REF   4  LAST  200  05,3102  54 003 0    TS      EBANK          SET FOR E3

0435  REF   3  LAST  176  05,3103  3 4751 0    CAF     NEG1/2         INITIALIZE WAITLIST DELTA-TS.
0436  REF   5  LAST  203  05,3104  55'407 1    TS      LST1 +7
0437  REF   6  LAST  203  05,3105  55'406 0    TS      LST1 +6
0438  REF   7  LAST  203  05,3106  55'405 0    TS      LST1 +5
0439  REF   8  LAST  203  05,3107  55'404 1    TS      LST1  +4
0440  REF   9  LAST  203  05,3110  55'403 0    TS      LST1  +3
0441  REF  10  LAST  203  05,3111  55'402 1    TS      LST1  +2
0442  REF  11  LAST  203  05,3112  55'401 1    TS      LST1  +1
0443  REF  12  LAST  203  05,3113  55'400 0    TS      LST1

0444  REF   1            05,3114  4 5274 1    CS      ENDTASK
0445  REF   1            05,3115  55'410 1    TS      LST2
0446  REF   2  LAST  203  05,3116  55'412 0    TS      LST2 +2
0447  REF   3  LAST  203  05,3117  55'414 0    TS      LST2 +4
0448  REF   4  LAST  203  05,3120  55'416 1    TS      LST2 +6
0449  REF   5  LAST  203  05,3121  55'420 1    TS      LST2 +8D
0450  REF   6  LAST  203  05,3122  55'422 0    TS      LST2 +10D
0451  REF   7  LAST  203  05,3123  55'424 0    TS      LST2 +12D
0452  REF   8  LAST  203  05,3124  55'426 1    TS      LST2 +14D
0453  REF   9  LAST  203  05,3125  55'430 0    TS      LST2 +16D
0454  REF   2  LAST  203  05,3126  4 5275 0    CS      ENDTASK +1
0455  REF  10  LAST  203  05,3127  55'411 0    TS      LST2 +1
0456  REF  11  LAST  203  05,3130  55'413 1    TS      LST2 +3
0457  REF  12  LAST  203  05,3131  55'415 1    TS      LST2 +5
0458  REF  13  LAST  203  05,3132  55'417 0    TS      LST2 +7
0459  REF  14  LAST  203  05,3133  55'421 0    TS      LST2 +9D
0460  REF  15  LAST  203  05,3134  55'423 1    TS      LST2 +11D
0461  REF  16  LAST  203  05,3135  55'425 1    TS      LST2 +13D
0462  REF  17  LAST  203  05,3136  55'427 0    TS      LST2 +15D
0463  REF  18  LAST  203  05,3137  55'431 1    TS      LST2 +17D

0464  REF  16  LAST  199  05,3140  4 4772 0    CS      ZERO           MAKE ALL EXECUTIVE REGISTER SETS
0465  REF   1            05,3141  54 167 0    TS      PRIORITY       AVAILABLE.
0466  REF   2  LAST  203  05,3142  54 203 1    TS      PRIORITY +12D
0467  REF   3  LAST  203  05,3143  54 217 1    TS      PRIORITY +24D
0468  REF   4  LAST  203  05,3144  54 233 1    TS      PRIORITY +36D
0469  REF   5  LAST  203  05,3145  54 247 1    TS      PRIORITY +48D
0470  REF   6  LAST  203  05,3146  54 263 1    TS      PRIORITY +60D
0471  REF   7  LAST  203  05,3147  54 277 1    TS      PRIORITY +72D

0472  REF  11  LAST  194  05,3150  55'322 1    TS      DSRUPTSW
0473  REF   1            05,3151  54 067 1    TS      NEWJOB         SHOWS NO ACTIVE JOBS.

0474  REF   1            05,3152  3 3243 1    CAF     VAC1ADRC       MAKE ALL VAC AREAS AVAILABLE.
0475  REF   1            05,3153  54 400 1    TS      VAC1USE
```

0476	REF	2	LAST	143	05,3154	6 5005 1		AD	LTHVACA	
0477	REF	1			05,3155	54 454 0		TS	VAC2USE	
0478	REF	3	LAST	204	05,3156	6 5005 1		AD	LTHVACA	
0479	REF	1			05,3157	54 530 0		TS	VAC3USE	
0480	REF	4	LAST	204	05,3160	6 5005 1		AD	LTHVACA	
0481	REF	1			05,3161	54 604 1		TS	VAC4USE	
0482	REF	5	LAST	204	05,3162	6 5005 1		AD	LTHVACA	
0483	REF	1			05,3163	54 660 0		TS	VAC5USE	
0484	REF	1			05,3164	3 4355 0		CAF	TEN	BLANK DSKY REGISTERS (PROGRAM,VERB,NOUN,
A0485										R1,R2,R3)
0486	REF	10	LAST	201	05,3165	54 154 0	DSPOFF	TS	MPAC	
0487	REF	15	LAST	85	05,3166	4 4755 0		CS	BIT12	
0488	REF	11	LAST	204	05,3167	50 154 1		INDEX	MPAC	
0489	REF	24	LAST	199	05,3170	55'226 1		TS	DSPTAB	
0490	REF	12	LAST	204	05,3171	10 154 0		CCS	MPAC	
0491	REF	1			05,3172	1 3165 1		TCF	DSPOFF	
0492	REF	1			05,3173	55'000 1		TS	DELAYLOC	
0493	REF	2	LAST	204	05,3174	55'001 0		TS	DELAYLOC +1	
0494	REF	3	LAST	204	05,3175	55'002 0		TS	DELAYLOC +2	
0495	REF	4	LAST	204	05,3176	55'003 1		TS	DELAYLOC +3	
0496	REF	1			05,3177	54 045 1		TS	INLINK	
0497	REF	7	LAST	143	05,3200	55'201 1		TS	DSPCNT	
0498	REF	1			05,3201	55'245 1		TS	CADRSTOR	
0499	REF	1			05,3202	55'216 1		TS	REQRET	
0500	REF	1			05,3203	55'220 1		TS	CLPASS	
0501	REF	1			05,3204	55'215 1		TS	DSPLOCK	
0502	REF	1			05,3205	55'223 1		TS	MONSAVE	KILL MONITOR
0503	REF	1			05,3206	55'224 0		TS	MONSAVE1	
0504	REF	1			05,3207	55'204 1		TS	VERBREG	
0505	REF	1			05,3210	55'205 0		TS	NOUNREG	
0506	REF	1			05,3211	55'246 1		TS	DSPLIST	
0507	REF	1			05,3212	55'335 1		TS	IMUCADR	
0508	REF	1			05,3213	55'324 1		TS	LGYRO	
0509	REF	1			05,3214	54 100 1		TS	FLAGWRD4	KILL INTERFACE DISPLAYS
0510	REF	2	LAST	73	05,3215	54 301 1		TS	MARKINDX	
0511	REF	2	LAST	195	05,3216	55'247 0		TS	EXTVBACT	
0512	REF	1			05,3217	3 4775 0		CAF	NOUTCON	
0513	REF	5	LAST	145	05,3220	55'221 0		TS	NOUT	
0514	REF	1			05,3221	3 3242 0		CAF	LESCHK	SELF CHECK GO-TO REGISTER.
0515	REF	2	LAST	87	05,3222	55'361 0		TS	SELFRET	
0516	REF	1			05,3223	4 4351 0		CS	VD1	
0517	REF	2	LAST	144	05,3224	55'202 1		TS	DSPCOUNT	
0518	REF	18	LAST	202	05,3225	0 0002 0		TC	Q	
0519	REF	13	LAST	178	05,3226	3 0001 0	T5IDLOC	CA	L	T5RUPT COMES HERE EVERY 163.84 SECS
0520	REF	1			05,3227	1 5326 1		TCF	NOQRSM +1	WHEN NOBODY IS USING IT.

```
0521   REF  2  LAST  110   E6,1645                          EBANK=  CGANOW
0522   REF  1               05,3230   03226 1  T5IDLER     2CADR   T5IDLOC
0522   REF  1               05,3231   12066 1
0523   REF  3  LAST  205   E6,1645                          EBANK=  CGANOW
0524   REF  1               05,3232   02123 0              2CADR   REDORCS
0524   REF  1               05,3233   42066 1
0525   REF  4  LAST  205   E6,1645                          EBANK=  CGANOW
0526   REF  1               05,3234   03222 0              2CADR   REDOTVC
0526   REF  1               05,3235   34066 0
0527   REF  5  LAST  205   E6,1645                          EBANK=  CGANOW
0528   REF  1               05,3236   02000 0              2CADR   REDOSAT
0528   REF  1               05,3237   54066 0
0529                        05,3240   00435 0  IFAILINH    OCT     435
0530   REF  1               05,3241   03446 1  LDNPHAS1    GENADR  DNPHASE1
0531   REF  1               05,3242   03270 1  LESCHK      GENADR  SELFCHK
0532   REF  2  LAST  203    05,3243   00400 0  VAC1ADRC    ADRES   VAC1USE
0533                        05,3244   77603 1  OCT77603    OCT     77603
0534                        05,3245   74777 0  OCT74777    OCT     74777
0535   REF  1                 4773            NUMGRPS     EQUALS  FIVE
0536                        05,3246   77755 0  -ELR        OCT     -22          -ERROR LIGHT RESET KEY CODE.
0537                        05,3247   37411 1  IM30INIF    OCT     37411        INHIBITS IMU FAIL FOR 5 SEC AND PIP ISSW
0538   REF  1                 7660            IM30INIR    =       PRIO37
0539   REF  2  LAST  168      5055            IM33INIT    =       PRIO16       NO PIP OR TM FAIL SIGNALS.
0540                        05,3250   00450 0  9,6,4       OCT     450
0541                        05,3251   00130 0  OPTINITF    OCT     130
0542   REF  4  LAST  174      5001            OPTINITR    =       BITS4&5
0543                        05,3252   00000 1  SWINIT      OCT     0
0544                        05,3253   00000 1               OCT     0
0545                        05,3254   00000 1               OCT     0
0546                        05,3255   00000 1               OCT     0

0547                        05,3256   00000 1               OCT     0
0548                        05,3257   00200 0               OCT     00200
0549                        05,3260   00004 0               OCT     00004        .05GSW
0550                        05,3261   00000 1               OCT     0
0551                        05,3262   00000 1               OCT     0
0552                        05,3263   00000 1               OCT     0
0553                        05,3264   00000 1               OCT     0
0554                        05,3265   00000 1               OCT     0
```

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P0555   ROUTINE NAME    GOTOPOOH -- ENTRANCE TO ROUTINE R00 (SELECTION OF NEW PROGRAM VIA V37)
R0557   FUNCTIONAL DESCRIPTION

R0558           1. FLASH V37 TO REQUEST SELECTION OF NEW PROGRAM
 0560   REF  1                  4000                    SETLOC  FFTAG10
 0561                           4103                    BANK

 0562   REF  1                                          COUNT*  $$/P00
 0563   REF  1                  4103  0 5561 0  GOTOPOOH TC      DOWNFLAG
 0564   REF  1                  4104   00236 0          ADRES   AUTOSEQ
 0565   REF  1                  4105  0 5402 1  MNKGOPOO TC      PHASCHNG
 0566 *                          4106   05024 1          OCT     05024
 0565 *                          4107   13000 0          OCT     13000
 0567   REF  3 LAST  196        4110  0 4655 0          TC      POSTJUMP
 0568   REF  1                  4111   10000 0          CADR    GOPOOFIX
 0569   REF  1                  4112  3 4762 0  AUTOCHK  CAF     AUTSQBIT        IS THIS AN AUTO SEQUENCE
 0570   REF  9 LAST  201        4113  7 0106 1          MASK    FLGWRD10
 0571                           4114  0 0006 1          EXTEND
 0572   REF  2 LAST  173        4115  1 6711 1          BZF     TCQ             NO, RETURN TO CALLER
 0573   REF  2 LAST  206        4116  0 5402 1  AUTOCHK1 TC      PHASCHNG
 0574                           4117   05024 1          OCT     05024
 0575                           4120   13000 0          OCT     13000

A0575 *                                                 GROUP 4 USE IS OK SINCE V37 TO FOLLOW
 0576   REF 20 LAST  201        4121  3 4754 0          CAF     BIT13
 0577   REF  1                  4122  56 004 0          XCH     FBANK           INCORRECT IF P80'S NOT IN BANK4 (BIT13)
 0578   REF  1                  4123  0 1012 0          TC      AUTPOINT
 0580   REF  1          04,2000                         SETLOC  VERB37
 0581                   04,2000                         BANK

 0582   REF  1                                          COUNT*  $$/P00
 0583   REF  1          04,2000  0 2767 0  GOPOOFIX TC      INITSUB
 0584   REF  1          04,2001  0 5531 0          TC      CLEARMRK +2
 0585   REF  1          04,2002  0 4112 1          TC      AUTOCHK
 0586   REF  1          04,2003  3 2006 0          CAF     V37N99
 0587   REF  1          04,2004  0 5535 1          TC      VNFLASH
 0588                   04,2005  0 2003 0          TC      -2

 0589                   04,2006   11343 0  V37N99   VN      3799
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R0590 PROGRAM NAME V37 ASSEMBLY SUNDISK
R0591 LOG SECTION FRESH START AND RESTART

R0592 FUNCTIONAL DESCRIPTION

R0593 1. CHECK IF NEW PROGRAM ALLOWED. IF BIT 1 OF FLAGWRD2(NODOFLAG) ISSET, AN ALARM 1520 IS CALLED.
R0595 2. CHECK FOR VALIDITY OF PROGRAM SELECTED. IF AN INVALID PROGRAM IS SELECTED, THE OPERATOR ERROR LIGHT IS
R0597 SET AND CURRENT ACTIVITY, IF ANY, CONTINUES.
R0598 3. SERVICER IS TERMINATED IF IT HAS BEEN RUNNING.
R0599 4. INSTALL IS EXECUTED TO AVOID INTERRUPTING INTEGRATION.
R0600 5. THE ENGINE IS TURNED OFF AND THE DAP IS INITIALIZED FOR COAST.
R0601 6. TRACK, UPDATE AND TARG1 FLAGS ARE SET TO ZERO.
R0602 7. DISPLAY SYSTEM IS RELEASED.
R0603 8. THE FOLLOWING ARE PERFORMED FOR EACH OF THE THREE CASES.
R0604 A. PROGRAM SELECTED IS P00.
R0605 1. RENDEZVOUS FLAG IS RESET (KILL P20).
R0606 2. STATINT1 IS SCHEDULED BY SETTING RESTART GROUP 2.
R0607 3. MAJOR MODE 00 IS STORED IN THE MODE REGISTER(MODREG).
R0608 4. SUPERBANK 3 IS SELECTED.
R0609 5. NODOFLAG IS RESET.
R0610 6. ALL RESTART GROUPS EXCEPT GROUP 2 ARE CLEARED. CONTROL ISTRANSFERRED TO RESTART PROGRAM (GOPROG2)
R0612 WHICH CAUSES ALL CURRENT ACTIVITY TO BE DISCONTINUED AND A 9 MINUTE INTEGRATION CYCLE TO BE
R0614 INITIATED.
R0615 B. PROGRAM SELECTED IS P20
R0616 1. IF THE CURRENT MAJOR MODE IS THE SAME AS THE SELECTED NEWPROGRAM, THE PROGRAM IS RE-INITIALIZED
R0618 VIA V37XEQ, ALL RESTART GROUPS, EXCEPT GROUP 4 ARE CLEARED.
R0620 2. IF THE CURRENT MAJOR MODE IS NOT EQUAL TO THE NEW REQUEST, A CHECK IS MADE TO SEE IF THE REQUEST-
R0622 ED MAJOR MODE HAS BEEN RUNNING IN THE BACKGROUND,
R0623 AND IF IT HAS, NO NEW PROGRAM IS SCHEDULED, THE EXISTING
R0624 P20 IS RESTARTED TO CONTINUE, AND ITS MAJOR MODE IS SET.
R0625 3. CONTROL IS TRANSFERRED TO GOPROG2.
R0626 C. PROGRAM SELECTED IS NEITHER P00 NOR P20
R0627 1. V37XEQ IS SCHEDULED (AS A JOB) BY SETTING RESTART GROUP 4
R0628 2. ALL CURRENT ACTIVITY EXCEPT RENDEZVOUS AND TRACKING IS DISCONTINUED BY CLEARING ALL RESTART
R0630 GROUPS. GROUP 2 IS CLEARED. IF THE RENDEZVOUS FLAG IS ON P20 IS RESTARTED IN GOPROG2 VIA REDOP20.
R0632 TO CONTINUE.

R0633 INPUT/OUTPUT INFORMATION

R0634 A. CALLING SEQUENCE

R0635 CONTROL IS DIRECTED TO V37 BY THE VERBFAN ROUTINE.
R0636 VERBFAN GOES TO C(VERBTAB+C(VERBREG)). VERB 37 = MMCHANG.
R0637 MMCHANG EXECUTES A TC POSTJUMP, CADR V37.

R0638 B. ERASABLE INITIALIZATION NONE

R0639 C. OUTPUT
R0640 MAJOR MODE CHANGE

RC641 D. DEBRIS
RC642 MMNUMBER, MPAC +1, MINDEX, BASETEMP +C(MINDEX), FLAGWRD0, FLAGWRD1, FLAGWRD2, MODREG, GOLOC -1,
RC644 GOLOC, GOLOC +1, GOLOC +2, BASETEMP, -PHASE2, PHASE2, -PHASE4

RC645 PROGRAM ANALYSIS

RC646 A. SUBROUTINES CALLED
RC647 ALARM, RELDSP, PINBRNCH, INTSTALL, ENGINOF2, ALLCOAST, V37KLEAN, GOPROG2, FALTON, FINDVAC, SUPERSW,
RC649 DSPMM

RC650 B. NORMAL EXIT TC ENDOFJOB

RC651 C. ALARMS 1520 (MAJOR MODE CHANGE NOT PERMITTED)

```
C653  REF  2  LAST  206      4000                          SETLOC FFTAG10
C654                         4124                          BANK

C655  REF  1                                               COUNT* $$/V37
C656                         4124   00024 1  OCT24         MM     20
C657                         4125   00031 0  OCT31         MM     25
C659  REF  2  LAST  206     04,2000                        SETLOC VERB37
C660                        04,2007                        BANK

C661  REF  1                                               COUNT* $$/V37
C662  REF  1                04,2007  55'200 0  V37         TS     MMNUMBER        SAVE MAJOR MODE
C663  REF  2  LAST  206     04,2010  0 5561 0               TC     DOWNFLAG
C664  REF  2  LAST  206     04,2011   00236 0               ADRES  AUTOSEQ
C665  REF  3  LAST  208     04,2012  0 5561 0               TC     DOWNFLAG
C666  REF  1                04,2013   00226 1              ADRES  PCMANFLG
C667  REF  4  LAST  208     04,2014  0 5561 0               TC     DOWNFLAG
C668  REF  1                04,2015   00215 1              ADRES  VHFRFLAG
C6681 REF  1                04,2016  0 4606 0               TC     E7SETTER
C6682 REF  3  LAST  140     E7,1722                        EBANK= MRKBUF1
C6683 REF  3  LAST  195     04,2017  3 7702 0               CAF    NEGONE
C6684 REF  4  LAST  208     04,2020  55'722 0              TS     MRKBUF1         TO PREVENT P20 FROM PROCESSING P50'S MRK
C669  REF  3  LAST  196     04,2021  4 0077 0               CS     FLAGWRD3
C670  REF  2  LAST  196     04,2022  7 4754 1               MASK   REFSMBIT
C671  REF  44 LAST  201     04,2023  10 000 0               CCS    A
C672  REF  1                04,2024  1 2044 1              TCF    AUTO37
C673  REF  2  LAST  208     04,2025  3 1200 1              CA     MMNUMBER
C674  REF  1                04,2026  6 2031 1              AD     NEG79
C675  REF  45 LAST  208     04,2027  10 000 0              CCS    A
C676  REF  1                04,2030  1 2375 0              TCF    V37NONO
C677                        04,2031   77660 1  NEG79       DEC    -79
C678  REF  1                04,2032  1 2035 1              TCF    MMOK
C679  REF  3  LAST  208     04,2033  3 1200 1  RENDP79     CA     MMNUMBER
C680  REF  1                04,2034  1 2410 1              TCF    REND30S +1
C681  REF  4  LAST  208     04,2035  3 1200 1  MMOK        CA     MMNUMBER
C682  REF  1                04,2036  6 2406 1              AD     NEG30
C683                        04,2037  0 0006 1              EXTEND
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0684  REF   2  LAST  208   04,2040  6 2044 0            BZMF    AUTO37     P01 - P30
0685  REF   1              04,2041  6 3770 1            AD      NEG6
0686                       04,2042  0 0006 1            EXTEND
0687  REF   2  LAST  208   04,2043  6 2407 0            BZMF    REND30S    P31 - P36 RENDEZVOUS
0688  REF   4  LAST  201   04,2044  3 4346 1  AUTO37    CAF     PRIO30
0689  REF   2  LAST  195   04,2045  54 365 0            TS      RESTREG

0690  REF  17  LAST  203   04,2046  3 4772 1            CAF     ZERO       ZERO OUT AUTO OPTICS RATE REGS
0691  REF   6  LAST  199   04,2047  54 740 0            TS      TOLD
0692  REF   5  LAST  199   04,2050  54 741 1            TS      SOLD
0693  REF   4  LAST  195   04,2051  54 735 1            TS      TRATE
0694  REF   4  LAST  195   04,2052  54 736 1            TS      SRATE
0695  REF   5  LAST  208   04,2053  0 5561 0            TC      DOWNFLAG
0696  REF   1              04,2054   00210 1            ADRES   P24FLAG
0697  REF  38  LAST  199   04,2055  3 1333 0            CA      IMODES30   IS IMU BEING INITIALIZED
0698  REF   3  LAST  156   04,2056  7 4763 0            MASK    IMUNITBT
0699  REF  46  LAST  208   04,2057  10 000 0            CCS     A
0700  REF   1              04,2060  1 2125 1            TCF     CANTROO

0701  REF   3  LAST  199   04,2061  3 4762 0            CAF     ENGONBIT   IS ENGINE ON
0702  REF   5  LAST  199   04,2062  7 0101 0            MASK    FLAGWRD5
0703  REF  47  LAST  209   04,2063  10 000 0            CCS     A
0704  REF   1              04,2064  1 2071 1            TCF     ROOTOPOO   YES, SET UP FOR POO

0705  REF   4  LAST  200   04,2065  4 0102 0            CS      FLAGWRD6   NO, IS TVC DAP ON
0706  REF   4  LAST  200   04,2066  7 4076 0            MASK    DPCONFIG
0707                       04,2067  0 0006 1            EXTEND
0708  REF   1              04,2070  6 2116 0            BZMF    ISITPOO    NO, CONTINUE WITH ROO

0709  REF   2  LAST  200   04,2071  0 4611 0  ROOTOPOO  TC      E6SETTER

0710  REF   6  LAST  187   E6,1465                      EBANK=  DAPDATR1
0711  REF   3  LAST  201   04,2072  0 4636 0            TC      BANKCALL   SPSOFF DOES AN INHINT
0712  REF   1              04,2073   51045 1            CADR    SPSOFF
0713  REF   8  LAST  199   04,2074  0 4714 1            TC      IBNKCALL
0714  REF   1              04,2075   13313 1            CADR    MASSPROP
0715  REF   1              04,2076  3 3054 0            CAF     3.1SEC
0716  REF   9  LAST  209   04,2077  0 4714 1            TC      IBNKCALL
0717  REF   1              04,2100   42043 0            CADR    RCSDAPON +1

0718  REF  10  LAST  209   04,2101  0 4714 1            TC      IBNKCALL
0719  REF   1              04,2102   51161 0            CADR    TVCZAP     DISABLE TVC
0720  REF  18  LAST  209   04,2103  3 4772 1            CAF     ZERO
0721  REF   5  LAST  208   04,2104  55'200 0            TS      MMNUMBER
0722                       04,2105  0 0003 1            RELINT
0723  REF   2  LAST  205   04,2106  3 4773 0            CAF     FIVE
0724  REF   4  LAST  209   04,2107  0 4636 0            TC      BANKCALL
0725  REF   1              04,2110   01731 0            CADR    DELAYJOB
0726  REF  19  LAST  209   04,2111  3 4772 1            CAF     ZERO
0727                       04,2112  0 0006 1            EXTEND
```

```
0728                          04,2113  01 005 0                WRITE  5
0729                          04,2114  0 0006 1                EXTEND
0730                          04,2115  01 006 0                WRITE  6
0731  REF   6  LAST  209      04,2116  3 1200 1  ISITPOO       CA     MMNUMBER
0732                          04,2117  0 0006 1                EXTEND
0733  REF   1                 04,2120  1 2151 1                BZF    ISSERVON       YES, CHECK SERVICER STATUS

0734  REF   3  LAST  202      04,2121  4 0076 1                CS     FLAGWRD2       NO, IS NODO V37 FLAG SET
0735  REF   1                 04,2122  7 4770 1                MASK   NODOBIT
0736  REF  48  LAST  209      04,2123  10 000 0                CCS    A
0737  REF   1                 04,2124  1 2132 1                TCF    CHECKTAB       NO
0738  REF  11  LAST  201      04,2125  0 5671 1  CANTROO       TC     ALARM
0739                          04,2126   01520 1                OCT    1520

0740  REF   1                 04,2127  0 4432 0  V37BAD        TC     RELDSP         RELEASES DISPLAY FROM ASTRONAUT

0741  REF   4  LAST  206      04,2130  0 4655 0                TC     POSTJUMP       BRING BACK LAST NORMAL DISPLAY IF THERE
0742  REF   1                 04,2131   21275 1                CADR   PINBRNCH       WAS ONE. OY

0743  REF   1                 04,2132  3 3173 1  CHECKTAB      CA     NOV37MM        THE NO. OF MM
0744  REF  13  LAST  204      04,2133  54 155 1  AGAINMM       TS     MPAC +1
0745  REF  14  LAST  210      04,2134  50 155 0                NDX    MPAC +1
0746  REF   1                 04,2135  3 3124 0                CA     PREMM1         OBTAIN WHICH MM THIS IS FOR
0747  REF   1                 04,2136  7 6043 1                MASK   LOW7
0748                          04,2137  4 0000 0                COM
0749  REF   7  LAST  210      04,2140  6 1200 1                AD     MMNUMBER
0750  REF  49  LAST  210      04,2141  10 000 0                CCS    A
0751  REF  15  LAST  210      04,2142  10 155 1                CCS    MPAC +1        IF GR, SEE IF ANYMORE IN LIST
0752  REF   1                 04,2143  1 2133 0                TCF    AGAINMM        YES, GET NEXT ONE
0753  REF   2  LAST  208      04,2144  1 2375 0                TCF    V37NONO        LAST TIME OR PASSED MM

0754  REF  16  LAST  210      04,2145  3 0155 0                CA     MPAC +1
0755  REF   1                 04,2146  55'177 0                TS     MINDEX         SAVE INDEX FOR LATER

0756  REF   1                 04,2147  0 5547 1                TC     UPFLAG
0757  REF   1                 04,2150   00055 1                ADRES  V50N18FL       66935 55  518 490731Y

0758  REF   1                 04,2151  4 0103 1  ISSERVON      CS     FLAGWRD7       V37 FLAG SET - I.E. IS SERVICER GOING
0759  REF   1                 04,2152  7 4763 0                MASK   V37FLBIT
0760  REF  50  LAST  210      04,2153  10 000 0                CCS    A
0761  REF   1                 04,2154  1 2162 1                TCF    CANV37         NO

0762                          04,2155  0 0004 0                INHINT
0763  REF   2  LAST  156      04,2156  4 4770 1                CS     AVEGBIT          YES TURN OFF AVERAGE G FLAG AND WAIT
0764  REF   7  LAST  202      04,2157  7 0075 1                MASK   FLAGWRD1       FOR SERVICER TO RETURN TO CANV37
0765  REF   8  LAST  210      04,2160  54 075 1                TS     FLAGWRD1

0766  REF   1                 04,2161  1 5205 1                TCF    ENDOFJOB

0767  REF   1                 04,2162  3 3053 1  CANV37        CAF    ROOAD
```

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```
 0768   REF   1              04,2163  54 373 1          TS      TEMPFLSH

 0769   REF   3  LAST  206   04,2164  0 5402 1          TC      PHASCHNG
 0770                        04,2165   00014 1          OCT     14

 0771   REF   1              04,2166  0 6006 1  ROO     TC      INTPRET

 0772                        04,2167   77624 1          CALL                    WAIT FOR INTEGRATION TO FINISH
 0773   REF   1              04,2170   27516 0                  INTSTALL
 0774                        04,2171   77776 1  DUMMYAD EXIT

 0775   REF   1              04,2172  4 5024 0          CS      OCT1400         CLEAR CAUTION RESET
 0776                        04,2173  0 0006 1          EXTEND                    AND TEST CONNECTOR OUTBIT
 0777                        04,2174  03 011 1          WAND    11

 0778   REF   1              04,2175  3 3046 0          CAF     OCT44571        CLEAR ENABLE OPTICS ERROR COUNTER, STAR
 0779                        04,2176  0 0006 1          EXTEND                    TRAKERS ON BIT, TVC ENABLE, ZERO OPTICS,
 0780                        04,2177  03 012 1          WAND    12              DISENGAGE OPTICS DAP, SIVB IN J SEQUENCE
A0781                                                                           START, AND SIVB CUTOFF BIT.
A0782
 0783   REF   1              04,2200  4 3047 0          CS      OCT600          CLEAR UNUSED BITS
 0784                        04,2201  0 0006 1          EXTEND
 0785                        04,2202  03 013 0          WAND    13

 0786   REF   2  LAST  206   04,2203  0 2767 0          TC      INITSUB

 0787   REF   2  LAST  206   04,2204  0 5527 1          TC      CLEARMRK

 0788   REF  20  LAST  209   04,2205  3 4772 1          CAF     ZERO
 0789   REF   1              04,2206  54 304 1          TS      STARIND

 0790   REF   6  LAST  209   04,2207  0 5561 0          TC      DOWNFLAG
 0791   REF   1              04,2210   00020 0          ADRES   STIKFLAG

 0792   REF   1              04,2211  0 4415 0          TC      UPACTOFF        TURN OFF UPLINK ACTIV LITE

 0793   REF   7  LAST  211   04,2212  0 5561 0          TC      DOWNFLAG
 0794   REF   1              04,2213   00037 0          ADRES   R21MARK

 0795   REF   8  LAST  210   04,2214  11'200 0          CCS     MMNUMBER        IS THIS A POOH REQUEST
 0796   REF   1              04,2215  1 2352 0          TCF     NOUVEAU         NO, PICK UP NEW PROGRAM

 0797   REF   2 LAST  206 TO  208:     7      7*                COUNT*  $$/POO
 0798   REF   2  LAST  210   04,2216  0 4432 0  POOH    TC      RELDSP          RELEASE DISPLAY SYSTEM

 0799   REF   1              04,2217  3 5047 1          CAF     PRIO5           SET VARIABLE RESTART REGISTER FOR POO.
 0800   REF   1              04,2220  55'262 1          TS      PHSPRDT2

 0801                        04,2221  0 0004 0          INHINT
```

```
0802   REF   2  LAST  210   04,2222  4 4770 1          CS     NODOBIT      TURN OFF NODOFLAG
0803   REF   4  LAST  210   04,2223  7 0076 1          MASK   FLAGWRD2
0804   REF   5  LAST  212   04,2224  54 076 1          TS     FLAGWRD2

0805   REF   3  LAST  209   04,2225  3 4773 0          CA     FIVE         SET 2.5 RESTART FOR STATEINT1
0806   REF  14  LAST  204   04,2226  54 001 1          TS     L
0807                        04,2227  4 0000 0          COM
08075  REF   1              01,2036           2P5SPT1  =      2.5SPOT
0808   REF   2  LAST  196   04,2230  53'160 0          DXCH   -PHASE2

0809   REF   2  LAST  162   04,2231  3 4761 0          CA     IMUSEBIT     RESET IMUSE AND
0810   REF   2  LAST  162   04,2232  6 4762 0          AD     RNDVZBIT     KILL P20
0811                        04,2233  4 0000 0          COM
0812   REF   8  LAST  203   04,2234  7 0074 0          MASK   FLAGWRD0
0813   REF   9  LAST  212   04,2235  54 074 0          TS     FLAGWRD0                  RENDFLG

0814   REF   2  LAST  162   04,2236  4 4760 0          CS     UTBIT
0815   REF   5  LAST  196   04,2237  7 0104 0          MASK   FLAGWRD8
0816   REF   6  LAST  212   04,2240  54 104 0          TS     FLAGWRD8     CLEAR UT FLAG IN POO

0817   REF   1              04,2241  3 4772 1          CAF    DNLADPOO

0818   REF   2 LAST 208 TO 211:  135  135*             COUNT* $$/V37
0819   REF   5  LAST  195   04,2242  54 332 1 SEUDOPOO TS     DNLSTCOD     SET UP APPROPRIATE DOWNLIST.
A0820                                                                     (OLD ONE WILL BE FINISHED FIRST)
0821   REF   2  LAST  200   04,2243  3 4764 0          CA     TRACKBIT
0822   REF   1              04,2244  6 4757 0          AD     TARG1BIT
0823   REF   1              04,2245  6 4762 0          AD     UPDATBIT
0824                        04,2246  4 0000 0          COM
0825   REF   2  LAST  195   04,2247  55'275 1          TS     EBANKTEM
0826   REF   9  LAST  210   04,2250  7 0075 1          MASK   FLAGWRD1
0827   REF  10  LAST  212   04,2251  54 075 1          TS     FLAGWRD1

0828   REF   1              04,2252  4 4767 1          CS     R67BIT       CLEAR R67FLAG. P20 WILL SET IT AGAIN
0829   REF   7  LAST  212   04,2253  7 0104 0          MASK   FLAGWRD8     IF APPROPRIATE
0830   REF   8  LAST  212   04,2254  54 104 0          TS     FLAGWRD8

0831   REF  11  LAST  209   04,2255  0 4714 1 GROUPKIL IC     IBNKCALL     KILL GROUPS 3,5,6
0832   REF   1              04,2256   12550 1          CADR   V37KLEAN

0833   REF   9  LAST  211   04,2257  11'200 0          CCS    MMNUMBER     IS IT POOH
0834   REF   1              04,2260  1 2270 1          TCF    RENDVOO      NO
0835   REF  12  LAST  212   04,2261  0 4714 1          TC     IBNKCALL
0836   REF   1              04,2262   12542 1          CADR   POOKLEAN     REDUNDANT EXCEPT FOR GROUP 4.

0837   REF   1              04,2263  0 3002 0          TC     INITSUBA
0838   REF  10  LAST  212   04,2264  3 1200 1 GOMOD    CA     MMNUMBER
0839   REF   3  LAST  201   04,2265  55'214 0          TS     MODREG
```

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0840   REF   5  LAST  210   04,2266  0 4655 0  GOGOPROG TC     POSTJUMP
0841   REF   1              04,2267   13015 1            CADR   GOPROG2

0842   REF  11  LAST  212   04,2270  4 1200 0  RENDVOO  CS     MMNUMBER      IS NEW PROG = 20
0843   REF   2  LAST  174   04,2271  6 4124 1           AD     OCT24         20
0844                        04,2272  0 0006 1           EXTEND
0845   REF   1              04,2273  1 2275 1           BZF    RENDNOO       YES
0846   REF   1              04,2274  1 2311 1           TCF    POOFIZZ

0847   REF  12  LAST  213   04,2275  4 1200 0  RENDNOO  CS     MMNUMBER
0848   REF   4  LAST  212   04,2276  6 1214 1           AD     MODREG
0849                        04,2277  0 0006 1           EXTEND
0850   REF   1              04,2300  1 2321 1           BZF    KILL20

0851   REF   9  LAST  212   04,2301  3 0104 1           CA     FLAGWRD8
0852   REF   3  LAST  212   04,2302  7 4760 0           MASK   UTBIT
0853   REF  51  LAST  210   04,2303  10 000 0           CCS    A
0854   REF   1              04,2304  1 2333 1           TCF    STATQUO1

0855   REF  10  LAST  212   04,2305  3 0074 1           CA     FLAGWRD0      IS RENDEZVOO FLAG SET
0856   REF   3  LAST  212   04,2306  7 4762 1           MASK   RNDVZBIT
0857   REF  52  LAST  213   04,2307  10 000 0           CCS    A
0858   REF   1              04,2310  1 2340 0           TCF    STATQUO

0859   REF  10  LAST  213   04,2311  3 0104 1  POOFIZZ  CA     FLAGWRD8
0860   REF   4  LAST  213   04,2312  7 4760 0           MASK   UTBIT
0861   REF  53  LAST  213   04,2313  10 000 0           CCS    A
0862   REF   2  LAST  213   04,2314  1 2325 0           TCF    KILL20 +4
0863   REF   4  LAST  213   04,2315  3 4762 0           CAF    RNDVZBIT
0864   REF  11  LAST  213   04,2316  7 0074 0           MASK   FLAGWRD0
0865   REF  54  LAST  213   04,2317  10 000 0           CCS    A
0866   REF   1              04,2320  1 2330 1           TCF    REV37
0867                        04,2321  0 0006 1  KILL20   EXTEND               NO, KILL GROUPS 1 + 2
0868   REF  11  LAST  197   04,2322  3 4772 1           DCA    NEG0
0869   REF   3  LAST  200   04,2323  53'156 0           DXCH   -PHASE1

0870   REF   2  LAST  212   04,2324  0 3002 0           TC     INITSUBA
0871                        04,2325  0 0006 1    +4     EXTEND
0872   REF  12  LAST  213   04,2326  3 4772 1           DCA    NEG0
0873   REF   3  LAST  212   04,2327  53'160 0           DXCH   -PHASE2

0874   REF   1              04,2330  3 3052 0  REV37    CAF    V37QCAD       SET RESTART POINT
0875   REF   2  LAST  211   04,2331  54 373 1           TS     TEMPFLSH

0876   REF   1              04,2332  1 2266 0           TCF    GOGOPROG

0877   REF   4  LAST  212   04,2333  3 4773 0  STATQUO1 CAF    FIVE          SET 2.5 RESTART FOR STATEINT1
0878   REF  15  LAST  212   04,2334  54 001 1           TS     L
08785  REF   2  LAST  212   01,2036                     =      2P5SPT2       2.5SPOT
0879                        04,2335  4 0000 0           COM
```

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0880   REF   4  LAST  213   04,2336  53'160 0          DXCH   -PHASE2
0881   REF   2  LAST  213   04,2337  1 2343 0          TCF    STATQUO +3
0882   REF  11  LAST  212   04,2340  4 0075 1  STATQUO  CS     FLAGWRD1      SET TRACK FLAG AND UPDATE FLAG
0883   REF   2  LAST  212   04,2341  7 4762 1          MASK   UPDATBIT
0884   REF  12  LAST  214   04,2342  26 075 1          ADS    FLAGWRD1
0885   REF  13  LAST  214   04,2343  4 0075 1  +3      CS     FLAGWRD1
0886   REF   3  LAST  212   04,2344  7 4764 1          MASK   TRACKBIT
0887   REF  14  LAST  214   04,2345  26 075 1          ADS    FLAGWRD1

0888                        04,2346  0 0006 1          EXTEND                KILL GROUP 4
0889   REF  13  LAST  213   04,2347  3 4772 1          DCA    NEGO
0890   REF   2  LAST  196   04,2350  53'164 1          DXCH   -PHASE4

0891   REF   1              04,2351  1 2264 1          TCF    GOMOD

0892   REF   5  LAST  213   04,2352  3 4762 0  NOUVEAU  CAF    RNDVZBIT
0893   REF  12  LAST  213   04,2353  7 0074 0          MASK   FLAGWRD0
0894   REF  55  LAST  213   04,2354  10 000 0          CCS    A
0895                        04,2355  1 2364 0          TCF    +7
0896   REF   5  LAST  213   04,2356  3 4760 1          CAF    UTBIT
0897   REF  11  LAST  213   04,2357  7 0104 0          MASK   FLAGWRD8
0898   REF  56  LAST  214   04,2360  10 000 0          CCS    A
0899                        04,2361  1 2364 0          TCF    +3
0900   REF   8  LAST  211   04,2362  0 5561 0          TC     DOWNFLAG      NO, RESET IMUSE FLAG.
0901   REF   1              04,2363   00007 0          ADRES  IMUSE         BIT 8 FLAG 0
0902   REF   2  LAST  210   04,2364  51'177 1  +3      INDEX  MINDEX
0903   REF   2  LAST  210   04,2365  3 3124 0          CAF    PREMM1        EXTRACT DOWNLIST ADDRESS
0904   REF   1              04,2366  54 022 0          TS     CYL           SHIFT BITS 15 - 13 TO BITS 3 - 1
0905   REF   2  LAST  214   04,2367  4 0022 0          CS     CYL
0906   REF   3  LAST  214   04,2370  4 0022 0          CS     CYL
0907   REF   4  LAST  214   04,2371  56 022 1          XCH    CYL
0908   REF   1              04,2372  7 4774 0          MASK   SEVEN         KEEP DOWNLIST CODE BITS
0909                        04,2373  0 0004 0          INHINT
0910   REF   1              04,2374  1 2242 0          TCF    SEUDOPOO

0911   REF   1              04,2375  0 4362 1  V37NONO  TC     FALTON        COME HERE IF MM REQUESTED DOESNT EXIST

0912   REF   1              04,2376  1 2127 0          TCF    V37BAD

0913   REF   3  LAST  208   04,2000                    SETLOC VERB37        MUST BE IN BANK 4 BECAUSE OF AUTOCHK
0914                        04,2377                    BANK
0915 5 REF   1                                         COUNT* $$/MNKEY
0916                        04,2377   00051 0  DEC41   DEC    41
0917                        04,2400   00114 0  DEC76   DEC    76
0918                        04,2401   00064 0  DEC52   DEC    52
0919   REF   3  LAST  213     4124                     DEC20  =      CCT24
0920   REF   1                4342                     DEC31  =      LOW5
0921   REF  19  LAST  174     4763                     DEC32  =      BIT6
0922   REF   1                5004                     DEC40  =      CCT50
       REF   1                5003                     DEC33  =      33DEC
```

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0923   REF   1                  4260                DEC34    =       34DEC
0924                        04,2402   00044 1      DEC36    DEC     36
0925                        04,2403   00043 0      DEC35    DEC     35
0926                        04,2404   00117 0      DEC79    DEC     79
0927   REF   1              04,3770                NEG6     =       DEC-6
0928                        04,2405   00126 1      DEC86    DEC     86
0929                        04,2406   77741 0      NEG30    DEC     -30
0930   REF   1                  5011                DEC50    =       OCT62
0931   REF   1                  4777                CKLSTAUT =       LOW4
0932   REF   1              04,2407   6 2405 1     REND30S  AD      DEC86       CHANGE P3X TO P8X
0933   REF   1              04,2410   55'113 1       +1     TS      TEMPMM          AND SAVE
0934   REF   6  LAST  214   04,2411   3 4760 1             CAF     UTBIT
0935   REF  12  LAST  214   04,2412   7 0104 0             MASK    FLAGWRD8
0936                        04,2413   0 0006 1             EXTEND
0937   REF   1              04,2414   1 2421 0             BZF     UTOFF

0938   REF   9  LAST  214   04,2415   0 5561 0             TC      DOWNFLAG
0939   REF   1              04,2416    00031 0             ADRES   TRACKFLG

0940   REF  10  LAST  215   04,2417   0 5561 0             TC      DOWNFLAG
0941   REF   1              04,2420    00176 1             ADRES   UTFLAG

0942   REF  13  LAST  214   04,2421   4 0074 0  UTOFF      CS      FLAGWRD0    HAS P20 BEEN ON
0943   REF   6  LAST  214   04,2422   7 4762 1             MASK    RNDVZBIT
0944                        04,2423   0 0006 1             EXTEND
0945   REF   1              04,2424   1 2431 1             BZF     NOP20       YES
0946   REF   2  LAST  210   04,2425   0 5547 1             TC      UPFLAG
0947   REF   3  LAST  208   04,2426    00236 0             ADRES   AUTOSEQ     SET TO CAUSE RETURN FROM P20

0948   REF   1              04,2427   3 4124 1             CAF     DEC20       NO - TURN ON P20
0949   REF   1              04,2430   0 2507 1             TC      AUTOSET
0950   REF   2  LAST  215   04,2431   3 1113 0  NOP20      CA      TEMPMM
0951   REF  13  LAST  213   04,2432   55'200 0  AUTOSETA   TS      MMNUMBER
0952   REF   3  LAST  209   04,2433   0 2044 0             TC      AUTO37
0953   REF  19  LAST  204   04,2434   3 0002 0  MINKDISP   CA      Q
0954   REF   2  LAST  206   04,2435   55'012 1             TS      AUTPOINT
0955   REF   1              04,2436   4 5011 0             CS      DEC50
0956   REF  14  LAST  215   04,2437   6 1200 1             AD      MMNUMBER
0957   REF   1              04,2440   0 5347 1             TC      NEWMODEA    CHANGE MAJOR MODE TO 30'S
0958   REF   3  LAST  211   04,2441   0 4432 0             TC      RELDSP
0959   REF   1              04,2442   3 4777 1             CAF     CKLSTAUT
0960   REF   5  LAST  209   04,2443   0 4636 0             TC      BANKCALL
0961   REF   1              04,2444    21067 0             CADR    GOPERF1
0962   REF   2  LAST  201   04,2445   1 4103 0             TCF     GOTOPOOH
0963   REF   1              04,2446   0 2452 0             TC      STARTAUT    PRO - DO MINKEY
0964   REF  11  LAST  215   04,2447   0 5561 0             TC      DOWNFLAG    ENTER - NO MINKEY
0965   REF   4  LAST  215   04,2450    00236 0             ADRES   AUTOSEQ
0966   REF   3  LAST  215   04,2451   0 1012 0             TC      AUTPOINT
0967   REF   2  LAST  196   04,2452   3 0107 1  STARTAUT   CA      FLGWRD11    INITIALIZE MINKEY
0968   REF   1              04,2453   7 4761 1             MASK    AZIMBIT
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0969  REF  57  LAST  214   04,2454  10 000 0            CCS   A
0970  REF   1              04,2455   1 2470 1            TCF   STRTAUT1
0971  REF   3  LAST  215   04,2456   0 5547 1            TC    UPFLAG
0972  REF   1              04,2457    00254 1            ADRES AZIMFLAG
0973                       04,2460  22 007 0             ZL
0974  REF  10  LAST  206   04,2461   4 0106 1            CS    FLGWRD10
0975  REF   2  LAST  196   04,2462   7 4756 0            MASK  HDSUPBIT
0976                       04,2463   0 0006 1            EXTEND
0977                       04,2464   1 2467 1            BZF   +3
0978                       04,2465   0 0006 1            EXTEND
0979  REF   3  LAST   34   04,2466   3 3760 0            DCA   XUNIT
0980  REF   1              04,2467  53'353 1             DXCH  AZIMANGL
0981  REF   6  LAST  209   04,2470   4 0101 0  STRTAUT1  CS    FLAGWRD5
0982  REF   1              04,2471   7 4770 1            MASK  RENDWBIT
0983                       04,2472   0 0006 1            EXTEND
0984                       04,2473   1 2500 1            BZF   +5          YES
0985  REF   4  LAST  216   04,2474   0 5547 1            TC    UPFLAG      NO
0986  REF   1              04,2475    00240 1            ADRES MANEUFLG
0987  REF   5  LAST  216   04,2476   0 5547 1            TC    UPFLAG
0988  REF   1              04,2477    00241 0            ADRES PTV93FLG
0989  REF   6  LAST  216   04,2500   0 5547 1            TC    UPFLAG
0990  REF   2  LAST  208   04,2501    00215 1            ADRES VHFRFLAG    EQUIVALENT TO A V87

0991  REF  12  LAST  215   04,2502   0 5561 0            TC    DOWNFLAG
0992  REF   1              04,2503    00244 0            ADRES PCFLAG
0993  REF   7  LAST  216   04,2504   0 5547 1            TC    UPFLAG
0994  REF   5  LAST  215   04,2505    00236 0            ADRES AUTOSEQ

0995  REF   4  LAST  215   04,2506   0 1012 0            TC    AUTPOINT
0996                       04,2507   0 0006 1  AUTOSET   EXTEND
0997  REF   1              04,2510  23'356 0             QXCH  AUTTEMP
0998  REF  15  LAST  215   04,2511  55'200 0    +2       TS    MMNUMBER
0999  REF   4  LAST  211   04,2512   0 5402 1            TC    PHASCHNG
1000                       04,2513    04024 0            OCT   04024

1001  REF   2  LAST  216   04,2514   3 1356 0            CA    AUTTEMP
1002  REF   5  LAST  216   04,2515  55'012 1             TS    AUTPOINT

1003  REF   4  LAST  215   04,2516   0 2044 0            TC    AUTO37

1004                       04,2517   0 0006 1  BURNHOW   EXTEND
1005  REF   3  LAST  216   04,2520  23'356 0             QXCH  AUTTEMP
1006  REF   2  LAST  211   04,2521   0 6006 1            TC    INTPRET
1007                       04,2522    51575 1            VLOAD ABVAL
1008  REF   1              04,2523    03405 0                  DELVLVC
1009                       04,2524    51025 1            DSU   BPL
1010  REF   1              04,2525    10536 0                  DV40/41     THRESHHOLD DELTA V FOR SPS BURN
1011  REF   1              04,2526    10532 1                  P40BURN
1012                       04,2527    77776 1            EXIT
1013  REF   1              04,2530   3 2377 0            CAF   DEC41       CALL P41
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1014  REF   2  LAST  215   04,2531  0 2511 0                TC      AUTOSET +2
1015                       04,2532   77776 1  P40BURN      EXIT
1016  REF   1              04,2533  3 5004 0                CAF     DEC40              CALL P40
1017  REF   3  LAST  217   04,2534  0 2511 0                TC      AUTOSET +2
1018                       04,2535   00002 0  DV40/41      2DEC    .021336 B-7        7 FPS IN M/CS B-7
1018                       04,2536   27311 1
1019  REF   1              04,2537  0 2434 0  P81          TC      MINKDISP
1020  REF   1              04,2540  3 4342 0  P81CONT1     CAF     DEC31
1021  REF   4  LAST  217   04,2541  0 2507 1                TC      AUTOSET
1022  REF   1              04,2542  0 2517 0                TC      BURNHOW
1023  REF   1              04,2543  0 2724 1                TC      AFTERBRN
1024  REF   1              04,2544  1 2546 0                TCF     P82CONT1
1025  REF   2  LAST  217   04,2545  0 2434 0  P82          TC      MINKDISP
1026  REF  13  LAST  216   04,2546  0 5561 0  P82CONT1     TC      DOWNFLAG
1027  REF   1              04,2547   00256 0                ADRES   CSISFLAG
1028  REF   1              04,2550  3 4763 1  P82CONT2     CAF     DEC32
1029  REF   5  LAST  217   04,2551  0 2507 1                TC      AUTOSET
1030  REF   2  LAST  217   04,2552  0 2517 0                TC      BURNHOW
1031  REF   2  LAST  217   04,2553  0 2724 1                TC      AFTERBRN
1032  REF   3  LAST  131   E7,1765                          EBANK=  NN
1033  REF   1              04,2554  3 5046 0                CAF     EBANK7
1034  REF   5  LAST  203   04,2555  54 003 0                TS      EBANK
1035  REF   4  LAST  217   04,2556  3 1765 1                CA      NN
1036  REF   1              04,2557  6 7701 0                AD      NEG2
1037  REF   4  LAST  185   04,2560  55'414 0                TS      RTARG

1038  REF   5  LAST  216   04,2561  0 5402 1                TC      PHASCHNG
1039                       04,2562   04024 0                OCT     04024

1040  REF   5  LAST  217   04,2563  3 1414 1                CA      RTARG
1041  REF   5  LAST  217   04,2564  55'765 0                TS      NN
1042  REF   2  LAST  217   04,2565  6 7701 0                AD      NEG2
1043                       04,2566  4 0000 0                COM
1044                       04,2567  0 0006 1                EXTEND
1045                       04,2570  6 2572 0                BZMF    +2                 N = 2 OR GREATER
1046  REF   1              04,2571  1 2607 0                TCF     P86CONT1           N = 1
1047  REF   8  LAST  216   04,2572  0 5547 1                TC      UPFLAG
1048  REF   2  LAST  217   04,2573   00256 0                ADRES   CSISFLAG
1049  REF   3  LAST  216   04,2574  0 6006 1                TC      INTPRET
1050                       04,2575   77745 1                DLOAD
1051  REF   1              04,2576   02351 1                        TCSI2
1052  REF   3  LAST  186   04,2577   02463 1                STORE   TCSI
1053                       04,2600   77776 1                EXIT
1054  REF   6  LAST  217   04,2601  3 1765 1                CA      NN
1055  REF   3  LAST  217   04,2602  6 7701 0                AD      NEG2
1056                       04,2603  0 0006 1                EXTEND
1057  REF   1              04,2604  6 2540 1                BZMF    P81CONT1           N = 2 HAM
1058  REF   2  LAST  217   04,2605  0 2546 1                TC      P82CONT1           MULTIPLE CSIS
1059  REF   3  LAST  217   04,2606  0 2434 0  P86          TC      MINKDISP
1060  REF   1              04,2607  3 2402 0  P86CONT1     CAF     DEC36
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1061  REF   6  LAST  217   04,2610  0 2507 1            TC      AUTOSET
1062  REF   4  LAST  217   04,2611  0 6006 1            TC      INTPRET
1063                        04,2612   51575 1            VLOAD   ABVAL
1064  REF   2  LAST  216   04,2613   03405 0                    DELVLVC
1065                        04,2614   77454 1            SZE     EXIT
1066  REF   1               04,2615   10642 0                    NOPC
1067  REF   1               04,2616  3 2401 0            CAF     DEC52
1068  REF   7  LAST  218   04,2617  0 2507 1            TC      AUTOSET
1069  REF  11  LAST  216   04,2620  4 0106 1            CS      FLGWRD10
1070  REF   1               04,2621  7 4770 1            MASK    PCBIT
1071                        04,2622  0 0006 1            EXTEND
1072  REF   1               04,2623  1 2637 0            BZF     DOP41       PULSE TORQUING NOT DONE - CALL P41
1073  REF   3  LAST  217   04,2624  0 2517 0            TC      BURNHOW     P40 OR P41
1074  REF   3  LAST  217   04,2625  0 2724 1            TC      AFTERBRN
1075  REF   9  LAST  217   04,2626  0 5547 1  P86CONT2  TC      UPFLAG
1076  REF   2  LAST  208   04,2627   00226 1            ADRES   PCMANFLG
1077  REF   2  LAST  215   04,2630  3 4124 1            CAF     DEC20       MANEUVER TO TRACK ATTITUDE
1078  REF   8  LAST  218   04,2631  0 2507 1            TC      AUTOSET
1079  REF  14  LAST  217   04,2632  0 5561 0            TC      DOWNFLAG
1080  REF   3  LAST  218   04,2633   00226 1            ADRES   PCMANFLG
1081  REF   2  LAST  218   04,2634  3 2401 0            CAF     DEC52
1082  REF   9  LAST  218   04,2635  0 2507 1            TC      AUTOSET
1083  REF   1               04,2636  0 2647 0            TC      P83CONT1
1084  REF   2  LAST  216   04,2637  3 2377 0  DOP41     CAF     DEC41
1085  REF  10  LAST  218   04,2640  0 2507 1            TC      AUTOSET
1086  REF   1               04,2641  0 2644 0            TC      PCP76
1087                        04,2642   77414 0  NOPC      SET     EXIT
1088  REF   1               04,2643   05065 1                    BURNFLAG
1089  REF   4  LAST  218   04,2644  0 2724 1  PCP76     TC      AFTERBRN
1090  REF   2  LAST  218   04,2645  0 2647 0            TC      P83CONT1
1091  REF   4  LAST  217   04,2646  0 2434 0  P83       TC      MINKDISP
1092  REF   1               04,2647  3 5003 1  P83CONT1  CAF     DEC33
1093  REF  11  LAST  218   04,2650  0 2507 1            TC      AUTOSET
1094  REF   4  LAST  218   04,2651  0 2517 0            TC      BURNHOW
1095  REF  10  LAST  218   04,2652  0 5547 1            TC      UPFLAG      SET TO INDICATE PASSIVE CDH
1096  REF   1               04,2653   00050 1            ADRES   AVFLAG
1097  REF   5  LAST  218   04,2654  0 2724 1            TC      AFTERBRN
1098  REF   1               04,2655  1 2657 0            TCF     P84CONT1
1099  REF   5  LAST  218   04,2656  0 2434 0  P84       TC      MINKDISP
1100  REF   1               04,2657  3 4260 1  P84CONT1  CAF     DEC34
1101  REF  12  LAST  218   04,2660  0 2507 1            TC      AUTOSET
1102  REF   5  LAST  218   04,2661  0 2517 0            TC      BURNHOW
1103  REF   6  LAST  218   04,2662  0 2724 1            TC      AFTERBRN
1104  REF   1               04,2663  1 2665 1            TCF     P85CONT1
1105  REF   6  LAST  218   04,2664  0 2434 0  P85       TC      MINKDISP
1106  REF   1               04,2665  3 2403 1  P85CONT1  CAF     DEC35
1107  REF  13  LAST  218   04,2666  0 2507 1            TC      AUTOSET
1108  REF   6  LAST  218   04,2667  0 2517 0            TC      BURNHOW
1109  REF   7  LAST  218   04,2670  0 2724 1            TC      AFTERBRN
1110  REF   2  LAST  218   04,2671  3 2403 1  P89CONT1  CAF     DEC35
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1111   REF  14  LAST  218   04,2672  0 2507 1          TC      AUTOSET
1112   REF   7  LAST  218   04,2673  0 2517 0          TC      BURNHOW
1113   REF   8  LAST  218   04,2674  0 2724 1          TC      AFTERBRN
-------------------------------------------------------------------------------
1114   REF   1              04,2675  3 2404 0          CAF     DEC79
1115   REF   1              04,2676  0 2432 0          TC      AUTOSETA
11155  REF   1                                         COUNT*  $$/P79
1116   REF  11  LAST  218   04,2677  0 5547 1  P79     TC      UPFLAG
1117   REF   4  LAST  218   04,2700    00226 1         ADRES   PCMANFLG      FORCE P20 TO EXIT AFTER MANEUVER
-------------------------------------------------------------------------------
1120   REF  12  LAST  219   04,2701  0 5547 1          TC      UPFLAG
1121   REF   2  LAST  215   04,2702    00031 0         ADRES   TRACKFLG

1122   REF  21  LAST  211   04,2703  3 4772 1          CAF     ZERO
1123   REF  16  LAST  213   04,2704  54 001 1          TS      L
1124   REF   2  LAST  130   04,2705  53'740 1          DXCH    UTPIT
-------------------------------------------------------------------------------
11241  REF   1              04,2706  3 2715 0          CAF     P79LOCRT
11242  REF   6  LAST  216   04,2707  55'012 1          TS      AUTPOINT
11243  REF   2  LAST  215   04,2710  1 2452 1          TCF     STARTAUT
1125   REF   1              04,2711  3 2714 1  P791     CAF     P79LOC
1126   REF   7  LAST  219   04,2712  55'012 1          TS      AUTPOINT

1127   REF   2  LAST  210   04,2713  0 5205 0          TC      ENDOFJOB
1128   REF   1              04,2714    02716 0 P79LOC  ADRES   P79A

11281  REF   1              04,2715    02711 1 P79LOCRT ADRES  P791
-------------------------------------------------------------------------------
1129   REF   2  LAST  211   04,2716  3 5047 1  P79A     CAF     PRIO5
1130   REF   2  LAST  194   04,2717  0 5135 0          TC      FINDVAC
1131   REF   2  LAST   96   E4,1760                    EBANK=  SUBEXIT
1132   REF   1              04,2720    02564 1         2CADR   V83PERF
1132   REF   1              04,2721    66104 1
1133   REF   6  LAST  213   04,2722  0 4655 0          TC      POSTJUMP      RETURN TO P20 FOR TRACKING
-------------------------------------------------------------------------------
1134   REF   1              04,2723    74207 1         CADR    P20TRACK
11345  REF   2 LAST  214 TO  219:    192   192*        COUNT*  $$/MNKEY
1135                        04,2724  0 0006 1  AFTERBRN EXTEND
1136   REF   4  LAST  216   04,2725  23'356 0          QXCH    AUTTEMP
1137  *REF   1              04,2726  3 5051 0          CAF     PRIO7
1138   REF   3  LAST  219   04,2727  0 5135 0          TC      FINDVAC
-------------------------------------------------------------------------------
1139   REF   2  LAST  134   E7,1777                    EBANK=  WHOCARES
1140   REF   1              04,2730    02000 0         2CADR   HARTBURN
1140   REF   1              04,2731    56067 0
1141   REF   3  LAST  219   04,2732  0 5205 0          TC      ENDOFJOB
1142                        04,2733    77776 1  TIG76   EXIT
1143   REF   1              04,2734  3 2400 1          CAF     DEC76         CALL P76
-------------------------------------------------------------------------------
1144   REF  15  LAST  219   04,2735  0 2511 0          TC      AUTOSET +2
1145   REF   1              27,2000                    SETLOC  JANESUB
1146                        27,2000                    BANK
11465  REF   1                                         COUNT*  $$/MNKEY
1147   REF   5  LAST  218   27,2000  0 6006 1  HARTBURN TC      INTPRET
-------------------------------------------------------------------------------
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1148                                27,2001  77201 1          SETPD   VLOAD
1149                                27,2002  00001 0                  0
1150  REF  2  LAST   34             27,2003  15336 0                  ZEROVECS
1151                                27,2004  77614 1          BON
1152  REF  2  LAST  218             27,2005  05305 1                  BURNFLAG
1153  REF  1                        27,2006  56042 1                  GOP76
1154                                27,2007  77214 0          BOFF    VLOAD
1155  REF  1                        27,2010  05354 0                  TPIMNFLG
1156  REF  1                        27,2011  56044 1                  NOTTPI
1157  REF  2  LAST  126             27,2012  03554 0                  RPASS3
1158  REF  2  LAST  105             27,2013  26561 1          STOVL   BURNTMP2
1159  REF  4  LAST  133             27,2014  03540 0                  RACT3
1160  REF  2  LAST  105             27,2015  26553 0          STOVL   BURNTMP1
1161  REF  3  LAST  133             27,2016  03546 0                  VACT3
1162  REF  2  LAST  105             27,2017  26567 1          STOVL   BURNTMP3
1163  REF  2  LAST  126             27,2020  03562 0                  VPASS3
1164  REF  1                        27,2021  02575 1          STORE   BURNTMP4
1165                                27,2022  77776 1          EXIT
1166  REF  6  LAST  217             27,2023  0 5402 1         TC      PHASCHNG
1167                                27,2024  04024 0          OCT     04024

1168  REF  6  LAST  219             27,2025  0 6006 1         TC      INTPRET
1169                                27,2026  77775 1          VLOAD
1170  REF  3  LAST  220             27,2027  02567 1                  BURNTMP3
1171  REF  3  LAST  220             27,2030  27562 0          STOVL   VPASS3
1172  REF  3  LAST  220             27,2031  02561 1                  BURNTMP2
1173  REF  5  LAST  220             27,2032  27540 0          STOVL   RACT3
1174  REF  3  LAST  220             27,2033  02553 0                  BURNTMP1
1175  REF  3  LAST  220             27,2034  27554 0          STOVL   RPASS3
1176  REF  2  LAST  220             27,2035  02575 1                  BURNTMP4
1177  REF  4  LAST  220             27,2036  37546 1          STCALL  VACT3
1178  REF  1                        27,2037  74000 1                  S34/35.1
1179                                27,2040  77624 1          CALL
1180  REF  1                        27,2041  72561 0                  S34/35.2        COMPUTE DV(LV)
1181  REF  3  LAST  131             27,2042  37540 1  GOP76   STCALL  DELVOV
1182  REF  1                        27,2043  10733 1                  TIG76
1183                                27,2044  71214 0  NOTTPI  BOFF    DLOAD
1184  REF  2  LAST  218             27,2045  01352 1                  AVFLAG
1185  REF  1                        27,2046  56066 1                  NOTCDH
1186  REF  2  LAST  121             27,2047  03450 0                  NOMTIG
1187                                27,2050  77624 1          CALL
1188  REF  1                        27,2051  76560 0                  ADVANCE
1189                                27,2052  77624 1          CALL
1190  REF  1                        27,2053  56674 1                  CDHMVR
1191                                27,2054  77624 1          CALL
1192  REF  1                        27,2055  32050 0                  S32/33.X
1193                                27,2056  64375 1          VLOAD   MXV
1194  REF  3  LAST  180             27,2057  03667 0                  DELVEET2
1195                                27,2060  00001 0                  0D
1196                                27,2061  77772 0          VSL1
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1197   REF   4  LAST  220   27,2062   17540 0            STODL   DELVOV
1198   REF   2  LAST   97   27,2063   02603 0            CMYDOT
1199                       27,2064   77650 1            GOTO
1200   REF   1             27,2065   56072 1            STORDV
1201                       27,2066   57575 1  NOTCDH    VLOAD   VCOMP
1202   REF   3  LAST  218   27,2067   03405 0            DELVLVC
1203   REF   5  LAST  221   27,2070   17540 0            STODL   DELVOV
1204   REF   1             27,2071   02605 0            LMYDOT
1205   REF   6  LAST  221   27,2072   37542 0  STORDV    STCALL  DELVOV +2
1206   REF   2  LAST  220   27,2073   10733 1            TIG76
1207   REF   2  LAST   34   30,2000                      SBANK=  LOWSUPER
1208   REF   4  LAST  214   04,2000                      SETLOC  VER837
1209                       04,2736                      BANK

12095  REF   3 LAST  212 TO  214:    93   228*           COUNT*  $$/V37
1210   REF  18  LAST  199      4765            OCT00010  EQUALS  BIT4
1211                       04,2736   0 0004 0  V37XEQ    INHINT
1212   REF   1             04,2737   3 5052 0            CAF     PRIO13
1213   REF   1             04,2740   55'266 0            TS      PHSPRDT4      PRESET GROUP4 RESTART PRIORITY
1214   REF   1             04,2741   54 063 0  V37XEQ+3  TS      NEWPRIO       STORE PRIO FOR SPVAC
1215   REF   3  LAST  214   04,2742   51'177 1            INDEX   MINDEX
1216   REF   3  LAST  214   04,2743   3 3124 0            CAF     PREMM1
1217   REF   1             04,2744   55'264 1            TS      MMTEMP        OBTAIN PRIORITY BITS 15 - 11
1218                       04,2745   0 0006 1            EXTEND
1219   REF  22  LAST  178   04,2746   7 4761 1            MP      BIT8
1220   REF   1             04,2747   7 4774 0            MASK    LOW3
1221   REF  17  LAST  219   04,2750   54 001 1            TS      L
1222   REF   4  LAST  221   04,2751   51'177 1            INDEX   MINDEX
1223   REF   1             04,2752   3 3055 1            CAF     FCADRMM1
1224   REF   1             04,2753   55'265 0            TS      BASETEMP
1225   REF   3  LAST  198   04,2754   7 4344 1            MASK    HI5
1226   REF  18  LAST  221   04,2755   26 001 1            ADS     L

1227   REF   2  LAST  221   04,2756   3 1265 1            CA      BASETEMP      OBTAIN GENADR PORTION OF 2CADR.
1228   REF   2  LAST   35   04,2757   7 5041 0            MASK    LOW10
1229   REF  14  LAST   85   04,2760   6 4756 1            AD      BIT11

1230   REF   1             04,2761   0 5146 1            TC      SPVAC

1231   REF   2  LAST  221   04,2762   3 1264 0  V37XEQC   CA      MMTEMP        UPON RETURN FROM FINDVAC PLACE THE
1232   REF   2  LAST  210   04,2763   7 6043 1            MASK    LOW7          NEW MM IN MODREG (THE LOW 7 BITS OF
1233   REF   2  LAST  215   04,2764   0 5347 1            TC      NEWMODEA      PHSBRDT1)

R1234  FOR SUNDISK ONLY
1235   REF   4  LAST  215   04,2765   0 4432 0            TC      RELDSP        RELEASE DISPLAY
1236   REF   4  LAST  219   04,2766   0 5205 0            TC      ENDOFJOB      AND EXIT

1237                       04,2767   0 0004 0  INITSUB   INHINT
1238   REF   2  LAST  174   04,2770   3 4775 0            CAF     ELEVEN        CLEAR INDICATED FLAG BITS
1239   REF  17  LAST  210   04,2771   54 154 0  RAKE      TS      MPAC          LOOP STARTS HERE
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1240   REF  18  LAST  221   04,2772  50 154 1          INDEX  MPAC
1241   REF   1              04,2773  4 3032 1          CS     FLAGTABL
1242   REF  19  LAST  222   04,2774  50 154 1          INDEX  MPAC
1243   REF  14  LAST  215   04,2775  7 0074 0          MASK   FLAGWRD
1244   REF  20  LAST  222   04,2776  50 154 1          INDEX  MPAC          RESTORE REVISED FLAGWORD
1245   REF  15  LAST  222   04,2777  54 074 0          TS     FLAGWRD

1246   REF  21  LAST  222   04,3000  10 154 0          CCS    MPAC
1247   REF   1              04,3001  1 2771 0          TCF    RAKE

1248                        04,3002  0 0006 1  INITSUBA EXTEND
1249   REF  22  LAST  222   04,3003  22 155 0          QXCH   MPAC +1

1250                        04,3004  0 0004 0          INHINT
1251   REF   4  LAST  214   04,3005  3 4764 0          CAF    TRACKBIT      BYPASS IF TRACKFLG ON
1252   REF  15  LAST  214   04,3006  7 0075 1          MASK   FLAGWRD1
1253   REF  58  LAST  216   04,3007  10 000 0          CCS    A
1254   REF   1              04,3010  1 3024 0          TCF    INITRET
1255   REF   3  LAST  209   04,3011  0 4611 0          TC     EGSETTER      FOR DB CODE.. STARTSB2 WILL RESET.
1256   REF   2  LAST  200   04,3012  0 4463 1          TC     STOPRATE

1257   REF   1              04,3013  3 0105 0          CA     FLAGWRD9      RESTORE DEADBAND
1258   REF   1              04,3014  7 4755 0          MASK   MAXDBBIT
1259   REF  59  LAST  222   04,3015  10 000 0          CCS    A
1260   REF   1              04,3016  1 3022 0          TCF    SETMAXER      MAX DB SELECTED
1261   REF   6  LAST  215   04,3017  0 4636 0          TC     BANKCALL      MIN DB SELECTED
1262   REF   1              04,3020   51203 1          CADR   SETMINDB
1263   REF   2  LAST  222   04,3021  1 3024 0          TCF    INITRET

1264   REF   7  LAST  222   04,3022  0 4636 0  SETMAXER TC     BANKCALL
1265   REF   1              04,3023   51217 1          CADR   SETMAXDB

1266                        04,3024  0 0003 1  INITRET  RELINT
1267   REF   4  LAST  208   04,3025  3 7702 0          CA     NEGONE
1268   REF  15  LAST  195   04,3026  55'323 0          TS     OPTIND
1269   REF  23  LAST  222   04,3027  0 0155 0          TC     MPAC +1       RETURN FROM INITSUB

1270   REF   3  LAST  213   04,3030  0 3002 0  INITSUBB TC     INITSUBA      ENTRANCE USED BY RTB CALL FROM V56
1271   REF   1              04,3031  0 6030 1          TC     DANZIG

1272                        04,3032   00001 0  FLAGTABL OCT    1             P29FLAG
1273                        04,3033   00040 0           OCT    4             IDLEFAIL
1274                        04,3034   06400 0           OCT    06400         P21FLAG,STEERSW,IMPULSW
1275                        04,3035   20400 1           OCT    20400         GLOKFAIL, POOFLAG
1276                        04,3036   00000 1           OCT
1277                        04,3037   05100 0           OCT    05100         V59FLAG,NEWTFLAG,ENGONFLG
1278                        04,3040   10000 0           OCT    10000         STRULLSW
1279                        04,3041   16000 0           OCT    16000         IGNFLAG,ASTNFLAG,TIMRFLAG
1280                        04,3042   00000 1           OCT
1281                        04,3043   42000 1           OCT    42000         SWTOVER, V94FLAG
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L FRESH START AND RESTART USER'S PAGE NO. 32 E7 S3

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1282                        04,3044   00000 1          OCT   0
1283                        04,3045   00000 1          OCT   0

1284  REF   1               20,2000                    SETLOC VAC5LOC
1285                        20,2000                    BANK
12855 REF   1                                          COUNT* $$/START
1286  REF  22 LAST  219     20,2000   3 4772 1 VAC5STOR CA     ZERO          INITIALIZE INDEX REGISTERS
1287  REF   7 LAST  177     20,2001   54 061 1         TS     ITEMP1
1288  REF   3 LAST   69     20,2002   54 062 1         TS     ITEMP2

1289                        20,2003   0 0006 1 V5LOOP1 EXTEND                LOOP TO STORE LOCS, BANKSETS, AND PRIOS.
1290  REF   8 LAST  223     20,2004   5 0061 0         INDEX  ITEMP1
1291  REF   1               20,2005   3 0165 0         DCA    LOC
1292  REF   4 LAST  223     20,2006   50 062 0         INDEX  ITEMP2
1293  REF   2 LAST   76     20,2007   52 662 1         DXCH   VAC5

1294  REF   9 LAST  223     20,2010   50 061 0         INDEX  ITEMP1
1295  REF   8 LAST  203     20,2011   3 0167 1         CA     PRIORITY
1296  REF   5 LAST  223     20,2012   50 062 0         INDEX  ITEMP2
1297  REF   3 LAST  223     20,2013   54 663 0         TS     VAC5 +2

1298  REF   6 LAST  223     20,2014   4 0062 1         CS     ITEMP2         HAVE WE STORED THEM ALL?
1299  REF   1               20,2015   6 5000 1         AD     EIGHTEEN
1300                        20,2016   0 0006 1         EXTEND
1301  REF   1               20,2017   1 2025 0         BZF    V5OUT1         YES, GET PHASE INFORMATION.

1302  REF   1               20,2020   3 5775 1         CA     TWELVE         NO, INCREMENT INDEXES AND LOOP.
1303  REF  10 LAST  223     20,2021   26 061 1         ADS    ITEMP1
1304  REF   3 LAST  141     20,2022   3 6214 0         CA     THREE
1305  REF   7 LAST  223     20,2023   26 062 1         ADS    ITEMP2
1306  REF   1               20,2024   1 2003 1         TCF    V5LOOP1

1307  REF   1               E3,1436                    EBANK= PHSNAME1
1308  REF   3 LAST  203     20,2025   3 5024 1 V5OUT1  CA     EBANK3         PHSNAME REGISTERS ARE IN EBANK3.
1309  REF   6 LAST  217     20,2026   54 003 0         TS     EBANK

1310  REF   3 LAST  221     20,2027   3 4775 0         CA     ELEVEN         GET PHASE 2CADRS.
1311  REF   1               20,2030   0 5607 0         TC     GENTRAN
1312  REF   2 LAST  223     20,2031    01436 1         ADRES  PHSNAME1
1313  REF   4 LAST  223     20,2032    00706 0         ADRES  VAC5 +21D

1314  REF  23 LAST  223     20,2033   3 4772 1         CA     ZERO           NOW INITIALIZE INDEXES AGAIN.
1315  REF  11 LAST  223     20,2034   54 061 1         TS     ITEMP1
1316  REF   8 LAST  223     20,2035   54 062 1         TS     ITEMP2

1317  REF  12 LAST  223     20,2036   50 061 0 V5LOOP2 INDEX  ITEMP1         LOOP TO GET PHASE TABLES.
1318  REF   2 LAST  201     20,2037   3 1156 1         CA     PHASE1
1319  REF   9 LAST  223     20,2040   50 062 0         INDEX  ITEMP2
1320  REF   5 LAST  223     20,2041   54 722 1         TS     VAC5 +33D
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1321   REF  10  LAST  223   20,2042  4 0062 1          CS     ITEMP2          DO WE HAVE THEM ALL?
1322   REF   5  LAST  213   20,2043  6 4773 0          AD     FIVE
1323                        20,2044  0 0006 1          EXTEND
1324   REF   1              20,2045  1 2052 0          BZF    V50UT2          YES, GO FINISH UP.

1325   REF   1              20,2046  3 4767 0          CA     TWO             NO, INCREMENT INDEXES AND LOOP.
1326   REF  13  LAST  223   20,2047  26 061 1          ADS    ITEMP1
1327   REF  11  LAST  224   20,2050  24 062 0          INCR   ITEMP2
1328   REF   1              20,2051  1 2036 1          TCF    V5LOOP2

1329   REF  24  LAST  222   20,2052  3 0157 1  V50UT2  CA     MPAC +3
1330   REF   6  LAST  223   20,2053  54 730 1          TS     VAC5 +39D

1331                        20,2054  0 0006 1          EXTEND
1332   REF   1              20,2055  3 0066 1          DCA    NEWLOC
1333   REF   7  LAST  224   20,2056  52 732 0          DXCH   VAC5 +40D

1334   REF   2  LAST  203   20,2057  3 0067 0          CA     NEWJOB
1335   REF   8  LAST  224   20,2060  54 707 0          TS     VAC5 +22D

1336   REF   2  LAST  221   20,2061  3 0063 1          CA     NEWPRIO
1337   REF   9  LAST  224   20,2062  54 713 0          TS     VAC5 +26D

1338   REF   1              20,2063  0 4651 1          TC     SWRETURN

1339   REF   1                   5000                  EIGHTEN EQUALS OCT22
1340   REF   5  LAST  221   04,2000                    SETLOC VERB37
1341                        04,3046                    BANK

13415  REF   4 LAST  221 TO  223:    72   300*         COUNT* $$/V37
1342   REF   1                   5736                  NEG7   EQUALS OCT77770

1343                        04,3046  44571 1  OCT44571 OCT    44571           CONSTANTS TO CLEAR CHANNEL BITS IN V37
1344                        04,3047  00600 1  OCT600   OCT    600
1345                        04,3050  00300 1  BIT7-8   OCT    300
1346                        04,3051  01120 0  OCT01120 OCT    01120

1347   REF   1              04,3052  10741 1  V37QCAD  CADR   V37XEQ+3
1348   REF   1              04,3053  10171 1  ROOAD    CADR   DUMMYAD
1349                        04,3054  37312 0  3.1SEC   OCT    37312           2.5 + 0.6 SEC
R1350  FOR VERB 37 TWO TABLES ARE MAINTAINED. EACH TABLE HAS AN ENTRY FOR EACH
R1351  MAJOR MODE THAT CAN BE STARTED FROM THE KEYBOARD. THE ENTRIES ARE PUT
R1352  INTO THE TABLE WITH THE ENTRY FOR THE HIGHEST MAJOR MODE COMING FIRST,

R1353  TO THE LOWEST MAJOR MODE WHICH IS THE LAST ENTRY IN EACH TABLE.

R1354            THE FCADRMM TABLE CONTAINS THE FCADR OF THE STARTING JOB OF
R1355  THE MAJOR MODE.   FOR EXAMPLE,

A1356                                      FCADRMM1 FCADR  P79               START OF P 79
```

```
A1357                                          FCADR  PROG18        START OF P 18
A1358                                          FCADR  P01           START OF P 01

1359                        04,3055            FCADRMM1 EQUALS
1360   REF   1              04,3055  10606 0           FCADR  P86
1361   REF   1              04,3056  10664 1           FCADR  P85
1362   REF   1              04,3057  10656 0           FCADR  P84
1363   REF   1              04,3060  10646 1           FCADR  P83
1364   REF   1              04,3061  10545 1           FCADR  P82
1365   REF   1              04,3062  10537 1           FCADR  P81
1366   REF   1              04,3063  10677 0           FCADR  P79
1367   REF   1              04,3064  26071 0           FCADR  P76ER77
1368   REF   2 LAST 225     04,3065  26071 0           FCADR  P76ER77
1369   REF   1              04,3066  72212 0           FCADR  P75
1370   REF   1              04,3067  72002 0           FCADR  P74
1371   REF   1              04,3070  11575 0           FCADR  P73
1372   REF   1              04,3071  11405 0           FCADR  P72
1373   REF   1              04,3072  54321 0           FCADR  P62
1374   REF   1              04,3073  54234 0           FCADR  P61
1375   REF   1              04,3074  30002 0           FCADR  P54
1376   REF   1              04,3075  31414 1           FCADR  P53
1377   REF   1              04,3076  30002 0           FCADR  PROG52
1378   REF   1              04,3077  31414 1           FCADR  P51
1379   REF   1              04,3100  51662 1           FCADR  P47CSM
1380   REF   1              04,3101  51563 0           FCADR  P41CSM
1381   REF   1              04,3102  50214 0           FCADR  P40CSM
1382   REF   1              04,3103  74476 1           FCADR  P37
1383   REF   1              04,3104  45334 1           FCADR  P36
1384   REF   1              04,3105  72206 0           FCADR  P35
1385   REF   1              04,3106  72000 1           FCADR  P34
1386   REF   1              04,3107  11573 0           FCADR  P33
1387   REF   1              04,3110  11403 0           FCADR  P32
1388   REF   1              04,3111  11303 1           FCADR  P31
1389   REF   1              04,3112  73433 1           FCADR  P30
1390   REF   1              04,3113  60000 1           FCADR  P29
1391   REF   1              04,3114  26254 0           FCADR  PROG24
1392   REF   1              04,3115  62444 1           FCADR  P23
1393   REF   1              04,3116  60153 0           FCADR  PROG22
1394   REF   1              04,3117  76000 0           FCADR  PROG21
1395   REF   1              04,3120  74016 0           FCADR  PROG20
1396   REF   1              04,3121  67455 1           FCADR  P15JOB
1397   REF   1              04,3122  55654 0           FCADR  P06
1398   REF   1              04,3123  66001 0           FCADR  GTSCPSS1      GYROCOMPASS STANDARD LEAD IN.

R1399                THE PREMM TABLE CONTAINS THE EBANK,MAGOR MODE AND DOWNLINK INFO
R1400   IT IS IN THE FOLLOWING FORMAT
R1401                DDD DDE EEM MMM MMM
R1402                WHERE THE 7 M BITS CONTAIN THE MAJOR MODE NUMBER
R1403                      3 E BITS CONTAIN THE E-BANK NUMBER
```

```
R1404                    3 0 BITS CONTAIN THE DOWNLIST ID

R1405          COAST AND ALIGN LIST =  0
R1406          EUTRY LIST           =  1
R1407          RENDEZVOUS LIST      =  2
R1408          POWERED FLIGHT LIST  =  3
R1409          P22 LIST             =  4

R1410          FOR EXAMPLE,

A1411                                      OCT    21137        DOWNLIST   = 2 (RENDEZVOUS)
A1412                                                          EBANK      = 4
A1413                                                          MAJOR MODE = 95

A1414                                      OCT    11476        DOWNLIST   = 1 (ENTRY)
A1415                                                          EBANK      = 6
A1416                                                          MAFOR MODE = 62

 1417                  04,3124             PREMM1 EQUALS
 1418                  04,3124  21526 0           OCT    21526        MM 86  EBANK 6  DOWNLIST 2
 1419                  04,3125  21525 0           OCT    21525        MM 85  EBANK 6  DOWNLIST 2
 1420                  04,3126  21524 1           OCT    21524        MM 84  EBANK 6  DOWNLIST 2
 1421                  04,3127  21523 0           OCT    21523        MM 83  EBANK 6  DOWNLIST 2
 1422                  04,3130  21522 1           OCT    21522        MM 82  EBANK 6  DOWNLIST 2
 1423                  04,3131  21521 1           OCT    21521        MM 81  EBANK 6  DOWNLIST 2
 1424                  04,3132  21717 0           OCT    21717        MM 79  EBANK 7  DOWNLIST 2
 1425                  04,3133  21715 1           OCT    21715
 1426                  04,3134  21714 0           OCT    21714        MM 76  EBANK 7  DOWNLIST 2
 1427                  04,3135  21113 1           OCT    21113        MM 75  EBANK 4  DOWNLIST 2
 1428                  04,3136  21112 0           OCT    21112        MM 74  EBANK 4  DOWNLIST 2
 1429                  04,3137  21111 0           OCT    21111        MM 73  EBANK 4  DOWNLIST 2
 1430                  04,3140  21110 1           OCT    21110        MM 72  EBANK 4  DOWNLIST 2
 1431                  04,3141  11476 1           OCT    11476        MM 62  EBANK 6  DOWNLIST 1
 1432                  04,3142  31475 0           OCT    31475        MM 61  EBANK 6  DOWNLIST 3
 1433                  04,3143  01266 1           OCT    01266        MM 54  EBANK 5  DOWNLIST 0
 1434                  04,3144  01265 1           OCT    01265        MM 53  EBANK 5  DOWNLIST 0
 1435                  04,3145  01264 0           OCT    01264        MM 52  EBANK 5  DOWNLIST 0
 1436                  04,3146  01263 1           OCT    01263        MM 51  EBANK 5  DOWNLIST 0
 1437                  04,3147  31657 1           OCT    31657        MM 47  EBANK 7  DOWNLIST 3
 1438                  04,3150  31451 0           OCT    31451        MM 41  EBANK 6  DOWNLIST 3
 1439                  04,3151  31450 1           OCT    31450        MM 40  EBANK 6  DOWNLIST 3
 1440                  04,3152  21645 0           OCT    21645        MM 37  EBANK 7  DOWNLIST 2
 1441                  04,3153  21044 1           OCT    21044        MM 36  EBANK 4  DOWNLIST 2
 1442                  04,3154  21043 0           OCT    21043        MM 35  EBANK 4  DOWNLIST 2
 1443                  04,3155  21042 1           OCT    21042        MM 34  EBANK 4  DOWNLIST 2
 1444                  04,3156  21041 1           OCT    21041        MM 33  EBANK 4  DOWNLIST 2
 1445                  04,3157  21040 0           OCT    21040        MM 32  EBANK 4  DOWNLIST 2
 1446                  04,3160  21037 0           OCT    21037        MM 31  EBANK 4  DOWNLIST 2
 1447                  04,3161  21636 1           OCT    21636        MM 30  EBANK 7  DOWNLIST 2
 1448                  04,3162  21635 1           OCT    21635        MM 29  EBANK 7  DOWNLIST 2
```

```
1449                        04,3163   41230 0   OCT     41230       MM 24  EBANK 5  DOWNLIST 4
1450                        04,3164   21627 1   OCT     21627       MM 23  EBANK 7  DOWNLIST 2
1451                        04,3165   41626 0   OCT     41626       MM 22  EBANK 7  DOWNLIST 4
1452                        04,3166   21025 0   OCT     21025       MM 21  EBANK 4  DOWNLIST 2
1453                        04,3167   21424 0   OCT     21424       MM 20  EBANK 6  DOWNLIST 2
1454                        04,3170   31617 0   OCT     31617       MM 15 EBANK 7  DOWNLIST 3
1455                        04,3171   01006 0   OCT     01006       MM 06  EBANK 4  DOWNLIST 0
1456                        04,3172   01201 0   OCT     01201       MM 01  EBANK 5  DOWNLIST 0
R1457

R1458  NOTE,    THE FOLLOWING CONSTANT IS THE NUMBER OF ENTRIES IN EACH OF
R1459  ----     THE ABOVE LISTS-1(IE, THE NUMBER OF MAJOR MODES(EXCEPT P00)
R1460           THAT CAN BE CALLED FROM THE KEYBOARD MINUS ONE)

1461                        04,3173             EPREMM1  EQUALS              END OF PREMM1 TABLE
1462  REF  4  LAST  221     04,3124                      SETLOC  PREMM1       THIS CODING WILL AUTOMATICALLY CHANGE
1463  REF  1                   0047             NO.MMS   =MINUS  EPREMM1     THE 'NOV37MM' CONSTANT AS ENTRIES ARE
1464  REF  6  LAST  224     04,2000                      SETLOC  VERB37       INSERTED(IN) OR DELETED(FROM) THE
1465                        04,3173                      BANK                 'PREMM1' TABLE.

1466  REF  1               04,3173   00046 0   NOV37MM  ADRES   NO.MMS -1   ITEMS IN 'PREMM1'TABLE - 1. *DON'T MOVE*

1467  REF 24  LAST  223        4772             DNLADPOO =       ZERO
R1468  ORBITAL INTEGRATION CONSTANTS

R1469  THESE CONSTANTS ARE USED IN COMPUTING THE SETTING OF MIDFLAG.
1470                        04,3174   00465 0   RMM      2DEC    2538.09 E3 B-27 800 KM ABOVE LUNAR SURFACE
1470                        04,3175   32324 0
1471                        04,3176   00333 1   RME      2DEC    7178165 B-29    800 KM ABOVE EQ. RADIUS
1471                        04,3177   01733 1
1473  REF  1                13,2000             SETLOC   INTINIT
1474                        13,2000             BANK

1475  REF  1                                    COUNT*   $$/INTIN

1476  REF  2  LAST   90     E3,1554             EBANK=   RRECTCSM

1477                        13,2000   43014 0   STATEUP  SET     BOF         EXTRAPOLATE CM STATE VECTOR
1478  REF  1                13,2001   01474 1                    VINTFLAG
1479  REF  1                13,2002   01751 0                    ORBWFLAG    ALSO 6X6 W-MATRIX IF VALID
1480                        13,2003   26006 0                    +3               FOR ORBITAL NAVIGATION
1481                        13,2004   77614 1            SET
1482  REF  1                13,2005   01476 0                    DIMOFLAG
1483                        13,2006   45014 0            CLEAR   CALL
1484  REF  1                13,2007   01667 1                    PRECIFLG
1485  REF  1                13,2010   27236 0                    INTEGRV
1486                        13,2011   71214 0            BON     DLOAD
1487  REF  1                13,2012   04307 1                    SURFFLAG
```

L FRESH START AND RESTART USER'S PAGE NO. 37 E3 S3

```
1488  REF  1                 13,2013  26031 1                STATEND
1489  REF  2  LAST   90       13,2014  01571 0                TETCSM
1490  REF  1                 13,2015  34041 0          STCALL TDEC1
1491  REF  2  LAST  211       13,2016  27516 0                INTSTALL
1492                          13,2017  45014 0          CLEAR CALL          EXTRAPOLATE LM STATE VECTOR
1493  REF  2  LAST  227       13,2020  01674 0                VINTFLAG
1494  REF  1                 13,2021  26744 1                SETIFLGS            AND 6X6 W-MATRIX IF VALID
1495                          13,2022  43014 0          BOF   SET
1496  REF  1                 13,2023  02756 1                RENDWFLG            FOR RENDEZVOUS NAVIGATION
1497                          13,2024  26026 1                +2
1498  REF  2  LAST  227       13,2025  01476 0                DIMOFLAG
1499                          13,2026  45014 0          SET   CALL
1500  REF  2  LAST  227       13,2027  01467 0                PRECIFLG
1501  REF  2  LAST  227       13,2030  27236 0                INTEGRV
1502                          13,2031  77614 1  STATEND CLRGO
1503  REF  1                 13,2032  01236 1                NODOFLAG
1504  REF  1                 13,2033  26732 0                ENDINT

R1505    THISVINT IS CALLED BY MIDTOAV1 AND2

1506                          13,2034  43414 1  THISVINT SET  RVQ
1507  REF  3  LAST  228       13,2035  01474 1                VINTFLAG
```

L RESTART TABLES USER'S PAGE NO. 1 ED S3

PC001 RESTART TABLES

R0002 ----------

R0003 THERE ARE TWO FORMS OF RESTART TABLES FOR EACH GROUP. THEY ARE KNOWN AS THE EVEN RESTART TABLES AND THE ODD
R0005 RESTART TABLES. THE ODD TABLES HAVE ONLY ONE ENTRY OF THREE LOCATIONS WHILE THE EVEN TABLES HAVE TWO ENTRIES
R0007 EACH USING THREE LOCATIONS. THE INFORMATION AS TO WHETHER IT IS A JOB, WAITLIST, OR A LONGCALL IS GIVEN BY THE
R0009 WAY THINGS ARE PUT INTO THE TABLES.
R0010 A JOB HAS ITS PRIORITY STORED IN PRDTTAB OF THE CORRECT PHASE SPOT - A POSITIVE PRIORITY INDICATES A
R0012 FINDVAC JOB, A NEGATIVE PRIORITY A NOVAC. THE 2CADR OF THE JOB IS STORED IN THE CADRTAB.
R0014 FOR EXAMPLE,

```
A0015                                   5.7SPOT  OCT     23000
A0016                                            2CADR   SOMEJOB
```

R0017 A RESTART OF GROUP 5 WITH PHASE SEVEN WOULD THEN CAUSE SOMEJOB TO BE RESTARTED AS A FINDVAC WITH PRIORITY 23.

```
R0019 5.5SPOT  OCT     -23000
A0020                                            2CADR   ANYJOB
```

R0021 HERE A RESTART OF GROUP 5 WITH PHASE 7 WOULD CAUSE ANYJOB TO BE RESTARTED AS A NOVAC WITH PRIORITY 23.
R0023 A LONGCALL HAS ITS GENADR OF ITS 2CADR STORED NEGATIVELY AND ITS BBCON STORED POSITIVELY. IN ITS PRDTTAB IS
R0025 PLACED THE LOCATION OF A DP REGISTER THAT CONTAINS THE DELTA TIME THAT LONGCALL HAD BEEN ORIGINALLY STARTED
R0027 WITH. EXAMPLE,

```
A0028                                   3.6SPOT  GENADR  DELTAT
A0029                                            -GENADR  LONGTASK
A0030                                            BBCON    LONGTASK

A0031                                            OCT      31000
A0032                                            2CADR    JOBAGAIN
```

R0033 THIS WOULD START UP LONGTASK AT THE APPROPRIATE TIME, OR IMMEDIATELY IF THE TIME HAD ALREADY PASSED. IT SHOULD
R0035 BE NOTED THAT IF DELTAT IS IN A SWITCHED E BANK, THIS INFORMATOIN SHOULD BE IN THE BBCON OFTHE 2CADR OF THE
R0037 TASK. FROM ABOVE, WE SEE THAT THE SECOND PART OF THIS PHASE WOULD BE STARTED AS A JOB WITH A PRIORITY OF 31.

R0039 WAITLIST CALLS ARE IDENTIFIED BY THE FACT THAT THEIR 2CADR IS STORED NEGATIVELY. IF PRDTTAB OF THE PHASE SPOT
R0041 IS POSITIVE, THEN IT CONTAINS THE DELTA TIME, IF PRDTTAB IS NEGATIVE THEN IT IS THE -GENADR OF AN ERASABLE
R0043 LOCATION CONTAINING THE DELTA TIME, THAT IS, THE TIME IS STORED INDIRECTLY. IT SHOULD BE NOTED AS ABOVE, THAT
R0045 IF THE TIME IS STORED INDIRECTLY, THE BBCON MUST CONTAIN THE NECESSARY E BANK INFORMATION IF APPLICABLE. WITH
R0047 WAITLIST WE HAVE ONE FURTHER OPTION, IF -0 IS STORED IN PRDTTAB, IT WILL CAUSE AN IMMEDIATE RESTART OF THE
R0049 TASK. EXAMPLES,

```
A0050                                            OCT      77777          THIS WILL CAUSE AN IMMEDIATE RESTART
A0051                                            -2CADR   ATASK          OF THE TASK :ATASK:

A0052                                            DEC      200            IF THE TIME OF THE 2 SECONDS SINCE DUMMY
A0053                                            -2CADR   DUMMY          WAS PUT ON WAITLIST IS UP, IT WILL BEGIN
A0054                                                                    IN 1 MS, OTHERWISE IT WILL BEGIN WHEN
A0055                                                                    IT NORMALLY WOULD HAVE BEGUN.
```

L RESTART TABLES USER'S PAGE NO. 2 E0 S3

```
A0056                                   -GENADR DTIME       WHERE DTIME CONTAINS THE DELTA TIME
A0057                                   -2CADR  TASKTASK    OTHERWISE THIS IS AS ABOVE

R0058  *****  NOW THE TABLES THEMSELVES *****

 0060  REF  1          01,2000                 SETLOC RESTART
 0061                  01,2000                 BANK

 0062  REF  1                                  COUNT* $$/RSTAB
 0063                  01,2000          PRDTTAB EQUALS 12000     USED TO FIND THE PRIORITY OR DELTATIME
 0064                  01,2001          CADRTAB EQUALS 12001     THIS AND THE NEXT RELATIVE LOC CONTAIN
A0065                                                           RESTART 2CADR

 0066  REF  1          01,2000  0 0044 1 SIZETAB TC     1.2SPOT -12006
 0067  REF  1          01,2001  0 0010 0         TC     1.3SPOT -12004
 0068  REF  1          01,2002  0 0044 1         TC     2.2SPOT -12006
 0069  REF  1          01,2003  0 0027 1         TC     2.3SPOT -12004
 0070  REF  1          01,2004  0 0044 1         TC     3.2SPOT -12006
 0071  REF  1          01,2005  0 0054 0         TC     3.3SPOT -12004
 0072  REF  1          01,2006  0 0074 1         TC     4.2SPOT -12006
 0073  REF  1          01,2007  0 0120 1         TC     4.3SPOT -12004
 0074  REF  1          01,2010  0 0226 1         TC     5.2SPOT -12006
 0075  REF  1          01,2011  0 0244 0         TC     5.3SPOT -12004
 0076  REF  1          01,2012  0 0311 1         TC     6.2SPOT -12006
 0077  REF  1          01,2013  0 0321 1         TC     6.3SPOT -12004
 0078  REF  2  LAST 230 01,2052          1.2SPOT EQUALS 3.2SPOT
R0079  ANY MORE GROUP 1.EVEN RESTART VALUES SHOULD GO HERE

 0080                  01,2014  00170 1 1.3SPOT DEC    120              THIS NUMBER MUST EQUAL C(JTAGTIME)
 0081  REF  2  LAST 115 E6,1661                 EBANK= AOG
 0082  REF  1          01,2015  75141 1         -2CADR  SETJTAG
 0082  REF  1          01,2016  45711 1
 0083                  01,2017  10000 0 1.5SPOT OCT    10000
 0084  REF  7  LAST 209 E6,1465                 EBANK= DAPDATR1
 0085  REF  1          01,2020  02502 1         2CADR  RED040.9
 0085  REF  1          01,2021  34066 0
 0086                  01,2022  10000 0 1.7SPOT OCT    10000
 0087  REF  2  LAST 120 E6,1774                 EBANK= R61CNTR
 0088  REF  1          01,2023  02170 0         2CADR  RELINUS
 0088  REF  1          01,2024  56066 1
 0089                  01,2025  10000 0 1.11SPOT OCT    10000
 0090  REF  3  LAST 230 E6,1774                 EBANK= R61CNTR
 0091  REF  1          01,2026  02157 0         2CADR  PIKUP20
 0091  REF  1          01,2027  74066 1
 00911                 01,2030  10000 0 1.13SPOT OCT    10000
 00912 REF  4  LAST 230 E6,1774                 EBANK= R61CNTR
 00913 REF  1          01,2031  02374 0         2CADR  R67RSTRT
 00913 REF  1          01,2032  74066 1
R0092  ANY MORE GROUP 1.ODD RESTART VALUES SHOULD GO HERE
```

L RESTART TABLES

```
 0093   REF   2  LAST  230   01,2052                  2.2SPOT  EQUALS 1.2SPOT
R0094   ANY MORE GROUP 2.EVEN RESTART VALUES SHOULD GO HERE

 0095   REF   1              01,2033   02730 1  2.3SPOT  GENADR 600SECS
 0096   REF   1              01,2034   75075 1           -GENADR STATEINT
 0097   REF   3  LAST  227   E3,1554                    EBANK=  RRECTCSM
 0098   REF   2  LAST  231   01,2035   26063 0          BBCON   STATEINT

 0099                        01,2036   05000 1  2.5SPOT  OCT     05000
 0100   REF   4  LAST  231   E3,1554                    EBANK=  RRECTCSM
 0101   REF   1              01,2037   02711 1          2CADR   STATINT1
 0101   REF   1              01,2040   26063 0
 0102                        01,2041   10000 0  2.7SPOT  OCT     10000
 0103   REF   5  LAST  208   E7,1722                    EBANK=  MRKBUF1
 0104   REF   1              01,2042   02625 1          2CADR   R22
 0104   REF   1              01,2043   70067 1
 0105                        01,2044   14000 1  2.11SPOT OCT     14000
 0106   REF   3  LAST  189   E7,1751                    EBANK=  LANDMARK
 0107   REF   1              01,2045   03532 0          2CADR   V94NTR
 0107   REF   1              01,2046   62067 1
 0108                        01,2047   10000 0  2.13SPOT OCT     10000
 0109   REF   6  LAST  231   E7,1722                    EBANK=  MRKBUF1
 0110   REF   1              01,2050   02516 1          2CADR   REDOR22
 0110   REF   1              01,2051   56067 0

R0114   ANY MORE GROUP 2.ODD RESTART VALUES SHOULD GO HERE

 0115                        01,2052   77777 0  3.2SPOT  DEC     -0
 0116   REF   2  LAST  128   E7,1672                    EBANK=  P40TMP
 0117   REF   1              01,2053   75456 1          -2CADR  T6CHNSET
 0117   REF   1              01,2054   37710 0

 0118                        01,2055   01750 1          DEC     1000
 0119   REF   3  LAST  231   E7,1672                    EBANK=  P40TMP
 0120   REF   1              01,2056   75446 0          -2CADR  T6RESET
 0120   REF   1              01,2057   37710 0

R0121   ANY MORE GROUP 3 EVEN RESTART VALUES SHOULD GO HERE

 0122                        01,2060   20000 0  3.3SPOT  OCT     20000
 0123   REF   3  LAST  180   E7,1427                    EBANK=  TGO
 0124   REF   1              01,2061   02534 1          2CADR   S40.13
 0124   REF   1              01,2062   34067 1
 0125   REF   4  LAST  231   01,2063   76347 0  3.5SPOT -GENADR TGO +1
 0126   REF   5  LAST  231   E7,1427                    EBANK=  TGO
 0127   REF   1              01,2064   74754 1          -2CADR  ENGINOFF
 0127   REF   1              01,2065   27710 1
 0128                        01,2066   22000 1  3.7SPOT  OCT     22000
 0129   REF   4  LAST  183   E5,1757                    EBANK=  CGC
 0130   REF   1              01,2067   02115 0          2CADR   MATRXJOB
 0130   REF   1              01,2070   70065 0
```

L RESTART TABLES

```
0131                              01,2071  22000 1  3.11SPOT OCT    22000
0132   REF   2  LAST   91         E3,1706                    EBANK= TEPHEM
0133   REF   1                   01,2072  02250 1           2CADR  REP11
0133   REF   1                   01,2073  70063 0
0134                              01,2074  22000 1  3.13SPOT OCT    22000
0135   REF   3  LAST  232         E3,1706                    EBANK= TEPHEM
0136   REF   1                   01,2075  02024 0           2CADR  REP11A
0136   REF   1                   01,2076  70063 0
0137   REF   4  LAST  231         01,2077  01672 0  3.15SPOT GENADR P40TMP
0138   REF   1                   01,2100  75466 1           -GENADR T6SET
0139   REF   5  LAST  232         E7,1672                    EBANK= P40TMP
0140   REF   2  LAST  232         01,2101  40067 1           BBCON  T6SET

RC144  ANY MORE GROUP 3.ODD RESTART VALUES SHOULD GO HERE

0145                              01,2102  77777 0  4.2SPOT  OCT    77777
0146   REF   8  LAST  185         E7,1412                    EBANK= TIG
0147   REF   1                   01,2103  75152 0           -2CADR PRECHECK
0147   REF   1                   01,2104  27710 1
0148                              01,2105  47777 0           OCT    47777          PRIO 30 NOVAC
0149   REF   2  LAST  128         E7,1674                    EBANK= DELVIMU
0150   REF   1                   01,2106  03730 0           2CADR  P47BODY
0150   REF   1                   01,2107  50067 0
0151                              01,2110  77777 0  4.4SPOT  OCT    77777
0152   REF   9  LAST  232         E7,1412                    EBANK= TIG
0153   REF   2  LAST  232         01,2111  75152 0           -2CADR PRECHECK
0153                              01,2112  27710 1
0154                              01,2113  05664 0           DEC    2996
0155   REF   8  LAST  230         E6,1465                    EBANK= DAPDATR1
0156   REF   1                   01,2114  74160 0           -2CADR TTG/0
0156   REF   1                   01,2115  27711 0
0157                              01,2116  77777 0  4.6SPOT  OCT    77777
0158   REF  10  LAST  232         E7,1412                    EBANK= TIG
0159   REF   3  LAST  232         01,2117  75152 0           -2CADR PRECHECK
0159                              01,2120  27710 1
0160                              01,2121  04700 1           DEC    2496
0161   REF  11  LAST  232         E7,1412                    EBANK= TIG
0162   REF   1                   01,2122  75143 0           -2CADR TIG-5
0162   REF   1                   01,2123  27710 1
RC163  ANY MORE GROUP 4.EVEN RESTART VALUES SHOULD GO HERE

0164                              01,2124  00050 1  4.3SPOT  DEC    40
0165   REF   4  LAST  183         E6,1423                    EBANK= PACTOFF
0166   REF   1                   01,2125  75053 0           -2CADR DOTVCON
0166   REF   1                   01,2126  27711 0
0167                              01,2127  00240 1  4.5SPOT  DEC    160
0168   REF   5  LAST  232         E6,1423                    EBANK= PACTOFF
0169   REF   1                   01,2130  75022 0           -2CADR DOSTROLL
0169   REF   1                   01,2131  27711 0
0170                              01,2132  00764 1  4.7SPOT  DEC    500
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0171   REF   6  LAST  232   E6,1423                        EBANK=  PACTOFF
0172   REF   1             01,2133   75126 0              -2CADR  TIG-0
0172   REF   1             01,2134   27711 0
0173                       01,2135   77777 0  4.11SPOT    DEC     -0
0174   REF   7  LAST  233   E6,1423                        EBANK=  PACTOFF
0175   REF   2  LAST  233   01,2136   75126 0              -2CADR  TIG-0
0175                       01,2137   27711 0
0176                       01,2140   47777 0  4.13SPOT    OCT     47777          PRIO 30 NOVAC
0177   REF   3  LAST  188   E6,1473                        EBANK=  CSMMASS
0178   REF   1             01,2141   03411 0              2CADR   V97PJOB
0178   REF   1             01,2142   50066 1
0179                       01,2143   16000 0  4.15SPOT    OCT     16000           PRELAUNCH OPTICAL VERIFICATION
0180   REF   5  LAST  231   E5,1757                        EBANK=  CGC
0181   REF   1             01,2144   02000 0              2CADR   COMPVER         CALLS FOR OPTICS DATA AGAIN (STD LEADIN)
0181   REF   1             01,2145   66065 1
0182                       01,2146   16000 0  4.17SPOT    OCT     16000           PRELAUNCH AZIMUTH CHANGE
0183   REF   2  LAST   99  E5,1671                        EBANK=  XSM
0184   REF   1             01,2147   03132 1              2CADR   AZMTHCG1
0184   REF   1             01,2150   66105 0
0185   REF   6  LAST  232   01,2151   01672 0  4.21SPOT    GENADR  P40TMP         DELTA TIME USED IN SETTING UP
0186   REF   1             01,2152   75212 1              -GENADR TIGBLNK         LONG CALL OF TIGBLNK  BY P40,P41
0187   REF   7  LAST  233   E7,1672                        EBANK=  P40TMP
0188   REF   2  LAST  233   01,2153   50067 0              BBCON   TIGBLNK
0189                       01,2154   12000 1  4.23SPOT    OCT     12000          PROTECT  P40S/SV BY P40 P41
0190   REF  12  LAST  232   E7,1412                        EBANK=  TIG
0191   REF   1             01,2155   02523 1              2CADR   P40S/SV
0191   REF   1             01,2156   50067 0

0192                       01,2157   24000 1  4.25SPOT    OCT     24000
0193   REF   4  LAST  183     0302                         EBANK=  BESTI
0194   REF   2  LAST  225   01,2160   02002 1              2CADR   PROG52
0194                       01,2161   30060 1

0195                       01,2162   77777 0  4.27SPOT    DEC     -0
0196   REF   8  LAST  233   E6,1423                        EBANK=  PACTOFF
0197   REF   1             01,2163   75113 0              -2CADR  IGNITION
0197   REF   1             01,2164   27711 0
0198                       01,2165   13000 0  4.31SPOT    OCT     13000
0199   REF   2  LAST   99  E5,1765                        EBANK=  STAR
0200   REF   1             01,2166   02622 0              2CADR   R51
0200   REF   1             01,2167   30065 1
0201                       01,2170   04064 1  4.33SPOT    DEC     210            PROTECT CONTINUING JOB TO START P63
0202   REF   3  LAST  230   E6,1661                        EBANK=  AOG
0203   REF   1             01,2171   75402 0              -2CADR  WAKEP62
0203   REF   1             01,2172   23711 1
0204                       01,2173   65777 0  4.35SPOT    OCT     65777          PRIO 12 NOVAC
0205   REF   9  LAST  232   E6,1465                        EBANK=  DAPDATR1
0206   REF   1             01,2174   03174 0              2CADR   POSTBURN
0206   REF   1             01,2175   50066 1
0207                       01,2176   00764 1  4.37SPOT    DEC     500
```

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0208   REF  13 LAST 233  E7,1412                      EBANK= TIG
0209   REF   1           01,2177  75175 0            -2CADR  TIGAVEG
0209   REF   1           01,2200  27710 1
0210                      01,2201  17000 1 4.41SPOT OCT     17000          PROTECT DISPLAY JOB IN P67
0211   REF   4 LAST 233  E6,1661                      EBANK= AOG
0212   REF   1           01,2202  02511 0            2CADR  P67.1
0212   REF   1           01,2203  54066 0
0213   REF   1           01,2204  76003 0 4.43SPOT-GENADR S61DT          PROTECT TASK TO START PREREAD,ENTRY
0214   REF   2 LAST 234  E6,1774                      EBANK= S61DT         S61.1C WILL CHANGE EBANK=E7 FOR PREREAD
0215   REF   1           01,2205  75210 0            -2CADR  S61.1C
0215   REF   1           01,2206  23711 1
0216                      01,2207  13000 0 4.45SPOT OCT     13000          PROTECT CONTINUING JOB S61.1
0217   REF   5 LAST 234  E6,1661                      EBANK= AOG           (ENTRY IMU ALIGNMENT)
0218   REF   1           01,2210  02604 1            2CADR  S61.1A-1
0218   REF   1           01,2211  54066 0
0219                      01,2212  17000 1 4.47SPOT OCT     17000          PROTECT HUNTEST ITERATION.
0220   REF   6 LAST 234  E6,1661                      EBANK= AOG
0221   REF   1           01,2213  03013 0            2CADR  PRE-HUNT
0221   REF   1           01,2214  52066 0
0222                      01,2215  77777 0 4.51SPOT OCT     77777          PROTECT FDAI ATTITUDE
0223   REF   2 LAST 119  E6,1704                      EBANK= SPOLYARG
0224   REF   1           01,2216  75462 0            -2CADR  ATERTASK
0224   REF   1           01,2217  07711 1
0225                      01,2220  47777 0 4.53SPOT OCT     47777          PRIO 30 NOVAC
0226   REF   4 LAST 233  E6,1473                      EBANK= CSMMASS
0227   REF   1           01,2221  03322 1            2CADR  V97EJOB
0227   REF   1           01,2222  50066 1
0228                      01,2223  64777 1 4.55SPOT OCT     -13000         PROTECT P65 RESPONSIVE DISPLAY
0229   REF   2 LAST 122  E7,1451                      EBANK= RTINIT
0230   REF   1           01,2224  02456 1            2CADR  P65.1
0230   REF   1           01,2225  54067 1
0231   REF   8 LAST 233  01,2226  76105 1 4.57SPOT-GENADR P40TMP
0232   REF   9 LAST 234  E7,1672                      EBANK= P40TMP
0233   REF   1           01,2227  74101 1            -2CADR  TIGON
0233   REF   1           01,2230  27710 1
02331  REF   2 LAST 128  01,2231  76317 0 4.61SPOT-GENADR AVEGDT +1
02332  REF   6 LAST 231  E7,1427                      EBANK= TGO
02333  REF   1           01,2232  74140 1            -2CADR  SIVBOFF
02333  REF   1           01,2233  11710 1
R0234  ANY MORE GROUP 4.ODD RESTART VALUES SHOULD GO HERE

0235                      01,2234  32000 0 5.2SPOT  OCT     32000
0236   REF   2 LAST 121  E7,1425                      EBANK= DVTOTAL
0237   REF   1           01,2235  03154 1            2CADR  NORMLIZE
0237   REF   1           01,2236  76067 1
0238                      01,2237  00310 0            DEC     200
0239   REF   7 LAST 234  E6,1661                      EBANK= AOG
0240   REF   1           01,2240  74555 1            -2CADR  REREADAC
0240   REF   1           01,2241  01711 1
0241                      01,2242  20000 0 5.4SPOT  OCT     20000
```

L RESTART TABLES

```
0242   REF   3  LAST  234   E7,1425                          EBANK=  DVTOTAL
0243   REF   1              01,2243   03010 0               2CADR   SERVICER
0243   REF   1              01,2244   76067 1
0244                        01,2245   00310 0               DEC     200
0245   REF   8  LAST  234   E6,1661                          EBANK=  AOG
0246   REF   2  LAST  234   01,2246   74555 1               -2CADR  REREADAC
0246                        01,2247   01711 1
R0247  ANY MORE GROUP 5.EVEN RESTART VALUES SHOULD GO HERE

0248                        01,2250   00310 0   5.3SPOT     DEC     200
0249   REF   9  LAST  235   E6,1661                          EBANK=  AOG
0250   REF   3  LAST  235   01,2251   74555 1               -2CADR  REREADAC
0250                        01,2252   01711 1
0251                        01,2253   77777 0   5.5SPOT     OCT     77777
0252   REF  10  LAST  235   E6,1661                          EBANK=  AOG
0253   REF   1              01,2254   75120 0               -2CADR  REDO5.5
0253   REF   1              01,2255   01711 1
0254                        01,2256   20000 0   5.7SPOT     OCT     20000          USED BY PRELAUNCH
0255   REF   3  LAST  233   E5,1671                          EBANK=  XSM
0256   REF   1              01,2257   02232 0               2CADR   RSTGTS1
0256   REF   1              01,2260   66065 1
0257                        01,2261   77777 0   5.11SPOT    OCT     77777
0258   REF   4  LAST  235   E5,1671                          EBANK=  XSM
0259   REF   1              01,2262   75421 1               -2CADR  ALLOOP1
0259   REF   1              01,2263   11712 0
0260                        01,2264   20000 0   5.13SPOT    OCT     20000
0261   REF   5  LAST  235   E5,1671                          EBANK=  XSM
0262   REF   1              01,2265   02303 0               2CADR   WTLISTNT
0262   REF   1              01,2266   66065 1
0263                        01,2267   20000 0   5.15SPOT    OCT     20000
0264   REF   6  LAST  235   E5,1671                          EBANK=  XSM
0265   REF   1              01,2270   03100 0               2CADR   RESTEST1
0265   REF   1              01,2271   66065 1
0266                        01,2272   77777 0   5.17SPOT    OCT     77777
0267   REF   4  LAST  235   E7,1425                          EBANK=  DVTOTAL
0268   REF   1              01,2273   75170 0               -2CADR  PREREAD
0268   REF   1              01,2274   01710 0
0269                        01,2275   22000 1   5.21SPOT    OCT     22000
0270   REF   7  LAST  235   E5,1671                          EBANK=  XSM
0271   REF   1              01,2276   02412 1               2CADR   ALFLT1
0271   REF   1              01,2277   66065 1
0272                        01,2300   77777 0   5.23SPOT    OCT     77777
0273   REF   8  LAST  235   E5,1671                          EBANK=  XSM
0274   REF   1              01,2301   75376 1               -2CADR  SPECSTS
0274   REF   1              01,2302   11712 0
0275                        01,2303   20000 0   5.25SPOT    OCT     20000
0276   REF   9  LAST  235   E5,1671                          EBANK=  XSM
0277   REF   1              01,2304   03111 0               2CADR   RESTEST3
0277   REF   1              01,2305   66065 1
0278                        01,2306   20000 0   5.27SPOT    OCT     20000
```

```
0279   REF  10  LAST  235   E5,1671                          EBANK= XSM
0280   REF   1              01,2307   03057 0                2CADR  RESTAIER
0280   REF   1              01,2310   66065 1
0281                        01,2311   77777 0   5.31SPOT     OCT    77777
0282   REF  11  LAST  235   E6,1661                          EBANK= AOG
0283   REF   1              01,2312   75037 1               -2CADR  CHEKAVEG
0283   REF   1              01,2313   01711 1
0284                        01,2314   20000 0   5.33SPOT     OCT    20000
0285   REF  11  LAST  236   E5,1671                          EBANK= XSM
0286   REF   1              01,2315   03134 1                2CADR  RESCHNG
0286   REF   1              01,2316   66065 1
R0287  ANY MORE GROUP 5.ODD RESTART VALUES SHOULD GO HERE

0288                        01,2317   77777 0   6.2SPOT      OCT    77777          USED BY P40 AFTER GIMB DR TST TO REPOS'N
0289   REF   5  LAST  181   E6,1476                          EBANK=   AK           ENGINE UNTIL TVCDAPON
0290   REF   1              01,2320   75422 1               -2CADR  PRE40.6
0290   REF   1              01,2321   37711 1

0291                        01,2322   00144 0                DEC    100
0292   REF   2  LAST  127   E7,1660                          EBANK= TTOGO
0293   REF   1              01,2323   74552 0               -2CADR  CLOKTASK
0293   REF   1              01,2324   27710 1

R0294  ANY MORE 6.ODD RESTART VALUES SHOULD GO HERE

0295                        01,2325   00144 0   6.3SPOT      DEC    100
0296   REF  14  LAST  234   E7,1412                          EBANK= TIG
0297   REF   2  LAST  236   01,2326   74552 0               -2CADR  CLOKTASK
0297                        01,2327   27710 1
0298                        01,2330   30000 1   6.5SPOT      OCT    30000          PROTECT INCREMENTING OF TIME2,TIME1 BY
0299   REF   4  LAST  232   E3,1706                          EBANK= TEPHEM         P27NUPDATE PROGRAM)
0300   REF   1              01,2331   03575 0                2CADR  TIMEDIDR
0300   REF   1              01,2332   56063 1
0301                        01,2333   50777 0   6.7SPOT      OCT    50777          PRIO 27 NOVAC
0302   REF   5  LAST  234   E6,1473                          EBANK= CSMMASS
0303   REF   1              01,2334   03365 1                2CADR  V97TJOB
0303   REF   1              01,2335   50066 1
0304   REF   2  LAST  116   01,2336   76052 1   6.11SPOT-GENADR  CM/GYMDT        PROTECT TASK TO READ CDUS.
0305   REF   3  LAST  236   E6,1725                          EBANK= CM/GYMDT       FOR ENTRY DAP
0306   REF   1              01,2337   75714 1               -2CADR  READGYMB
0306   REF   1              01,2340   45711 1
```

```
R0307   PROGRAM DESCRIPTION: NEWPHASE                          DATE: 11 NOV 1966
R0309   MOD: 1                                                 ASSEMBLY: SUNBURST REV
R0311   MOD BY: COPPS                                          LOG SECTION: PHASE TABLE MAINTENANCE
R0313   FUNCTIONAL DESCRIPTION:
R0314                NEWPHASE IS THE QUICK WAY TO MAKE A NON VARIABLE PHASE CHANGE. IT INCLUDES THE OPTION OF SETTING
R0316          TBASE OF THE GROUP. IF TBASE IS TO BE SET,  -C(TIME1) IS STORED IN THE TBASE TABLE AS FOLLOWS:

R0318                  (L-1) TBASE0
R0319                  (L)   TBASE1 (IF GROUP=1)
R0320                  (L+1)
R0321                  (L+2) TBASE2 (IF GROUP=2)
R0322                  -----
R0323                  (L+6) TBASE4 (IF GROUP=4)
R0324                  (L+7)
R0325                  (L+8) TBASE5 (IF GROUP=5)

R0326          IN ANY CASE, THE NEGATIVE OF THE PHASE, FOLLOWED (IN THE NEXT REGISTER)  BY THE PHASE, IS STORED IN THE
R0328          PHASE TABLE AS FOLLOWS:

R0329                  (L)   -PHASE1 (IF GROUP=1)
R0330                  (L+1) PHASE1
R0331                  (L+2) -PHASE2 (IF GROUP=2)
R0332                  (L+3) PHASE2
R0333                  -----
R0334                  (L+7) PHASE4
R0335                  (L+8) -PHASE5 (IF GROUP=5)
R0336                  (L+9) PHASE5

R0337   CALLING SEQUENCE:
R0338                EXAMPLE IS FOR PLACING A PHASE OF FIVE INTO GROUP THREE:

R0339          1) IF TBASE IS NOT TO BE SET:
A0340                                  L-1     CA      FIVE
A0341                                  L       TC      NEWPHASE
A0342                                  L+1     OCT     00003

R0343          2) IF TBASE IS TO BE SET:
A0344                                  L-1     CS      FIVE
A0345                                  L       TC      NEWPHASE
A0346                                  L+1     OCT     00003

R0347   SUBROUTINES CALLED: NONE

R0348   NORMAL EXIT MODE: AT L+2 OF CALLING SEQUENCE

R0349   ALARM OR ABORT EXITS: NONE

R0350   OUTPUT: PHASE TABLE AND TBASE TABLE UPDATED

R0351   ERASABLE INITIALIZATION REQ,D: NONE
```

L RESTART TABLES USER'S PAGE NO. 10 EQ S3

R0352 DEBRIS: A,L,TEMPG

R0353 ***WARNING*** THIS PROGRAM IS TO BE PLACED IN FIXED-FIXED AND UNSWITCHED ERASABLE.

```
0356  REF   1                  4000                    SETLOC FFTAG1
0357                           4126                    BANK

0358  REF   1                                          COUNT* $$/PHASE

0359                           4126  0 0004 0  NEWPHASE INHINT

0360  REF  19  LAST  221       4127  54 001 1          TS     L          SAVE FOR FURTHER USE

0361  REF  20  LAST  215       4130  50 002 0          NDX    Q          OBTAIN THE GROUP NUMBER
0362                           4131  3 0000 1          CA     Q
0363  REF  21  LAST  238       4132  24 002 0          INCR   Q          OBTAIN THE RETURN ADDRESS
0364                           4133  6 0000 1          DOUBLE            SAVE THE GROUP IN A FORM USED FOR
0365  REF   1                  4134  54 061 1          TS     TEMPG      INDEXING

0366  REF  20  LAST  238       4135  10 001 1          CCS    L          SEE IF WE ARE TO SET TBASE
0367                           4136  1 4145 1          TCF    +7         NO, THE DELTA T WAS POSITIVE
0368                           4137  1 4145 1          TCF    +6

0369  REF  60  LAST  222       4140  24 000 1  NUFAZ+10 INCR   A          SET TBASE AND STORE PHASE CORRECTLY
0370  REF  21  LAST  238       4141  54 001 1          TS     L

0371  REF   7  LAST  190       4142  4 0025 1          CS     TIME1      SET TBASE
0372  REF   2  LAST  238       4143  50 061 0          NDX    TEMPG
0373  REF   1                  4144  55'255 0          TS     TBASE1 -2

0374  REF  22  LAST  238       4145  4 0001 1          CS     L          NOW PUT THE PHASE IN THE RIGHT TABLE LOC
0375  REF   3  LAST  238       4146  50 061 0          NDX    TEMPG
0376  REF   4  LAST  213       4147  53'154 1          DXCH   -PHASE1 -2

0377  REF   1                  4150  1 5642 0          TCF    REQ        NOW RETURN TO CALL
```

L SXTMARK USER'S PAGE NO. 1 EQ S3

R0001 PROGRAM NAME - SXTMARK

R0002 MOD. 1 8 AUG. 69 BY P.RYE

R0003 FUNCTIONAL DESCRIPTION

R0004 SXTMARK IS CALLED BY P03 AND BY P22, P23, P51, AND P52 VIA R53
R0005 THE REGISTER MARKINDX IS SET TO 5 IF THE CALLING PROGRAM IS P22, OR TO 1 FOR OTHER USERS.
R0007 THIS REGISTER INDICATES THE NUMBER OF MARKS DESIRED.
R0008 THE REGISTER EXTVBACT IS CHECKED (SUBROUTINE TESTMARK) TO INSURE THAT THE MARK DISPLAY SYSTEM
R0010 IS FREE. IF NOT, BAILOUT (31211) IS DONE.
R0011 BIT 2 OF THE REGISTER EXTVBACT IS SET BY SXTMARK, RESERVING THE MARKING AND EXTENDED VERB SYSTEM.
R0013 SXTMARK DISPLAYS A FLASHING VERB 51, CALLING FOR MARKS. A PROCEED RESPONSE TO THIS DISPLAY
R0015 WILL RELEASE THE MARKING SYSTEM (SUBROUTINES MKRELEAS, CLEARMARK) AND RETURN TO THE
R0017 CALLING PROGRAM.

R0018 WHEN SUFFICIENT MARKS HAVE BEEN MADE (MARKINDX = 0) A FLASHING V5 N25, R1 = 16, IS DISPLAYED.
R0020 A PROCEED RESPONSE TO THIS DISPLAY WILL RETURN TO THE CALLING PROGRAM AFTER RELEASING THE
R0022 MARKING SYSTEM.

R0023 MARKS ARE PROCESSED BY THE ROUTINE MARKRUPT AS FOLLOWS:
R0024 IF NO MARKS ARE CALLED FOR, ALARM CODE 114 IS SENT AND THE MARKRUPT ROUTINE EXITS.
R0026 IF A MARK IS ACCEPTED, MARKFLG IS SET TO ENABLE A REJECT.
R0028 IF R21(P20) IS RUNNING, DATA IS MOVED FROM STORAGE MRKBUF1 INTO MRKBUF2. NEW MARK DATA
R0030 IS STORED INTO MRKBUF1.
R0031 IF P22 IS RUNNING, MARK DATA IS STORED INTO SVMRKDAT, USING THE REGISTER P22DEX AS AN
R0033 INDEX AND THE REGISTER BNN AS A COUNTER. MARKINDX IS DECREMENTED.
R0035 IF R57 IS RUNNING, MARK DATA IS STORED INTO MARKDOWN FOR DOWNLINK, THEN PROCESSED AS FOR
R0037 R21. MARKRUPT THEN CALLS MARKDISP (IN R57)
R0038 FOR OTHER USERS, MARK DATA IS STORED INTO MRKBUF1 AND MARKINDX IS DECREMENTED.

R0040 MARK REJECTS ARE PROCESSED BY THE ROUTINE MARKRUPT AS FOLLOWS:
R0041 IF MARKFLG IS CLEAR (I.E., NO MARK WAS TAKEN), ALARM CODE 11[illegible] IS SENT AND THE ROUTINE EXITS.
R0043 OTHERWISE, MARKINDX IS INCREMENTED, THE P22 INDICATORS BNN AND P22DEX ARE DECREMENTED
R0045 (IF THE USER IS P22), AND THE V51FL DISPLAY IN SXTMARK IS REESTABLISHED.

R0047 IF THE ERASABLE REGISTER CDUCHKWD IS SET TO A NON-ZERO VALUE, VALIDITY OF THE MARKS IS CHECKED
R0049 BY THE MARKRUPT ROUTINE AS FOLLOWS:
R0050 IF THE CDU'S CHANGE BY MORE THAN 3 BITS OVER THE TIME PERIOD INDICATED BY THE VALUE OF
R0052 CDUCHKWD, ALARM CODE 121 IS SENT AND THE ROUTINE EXITS.

R0054 CALLING SEQUENCE -

R0055 TC BANKCALL
R0056 CADR SXTMARK

```
R0057   NORMAL EXIT MODE -

R0058           RETURN TO USER VIA BANKJUMP (RETURN ADDRESS IN OPTCADR)


R0059   ALARM OR ABORT EXIT MODES

R0060           1. ALARM 110 - MARK REJECT WITH NO MARK
R0061           2. ALARM 113 - NO INBITS
R0062           3. ALARM 121 - CDU'S NO GOOD AT MARK TIME
R0063           4. ALARM 114 - MARK MADE BUT NOT DESIRED
R0064           5. BAILOUT 31211 - MARK DISPLAY SYSTEM BUSY


R0065   ERASABLE INITIALIZATION REQUIRED -

R0066           NONE


R0067   OUTPUT -

R0068           FOR P22:
R0069              MARK DATA IN SVMRKDAT
R0070              MARKINDX DECREMENTED BY ONE FOR EACH MARK TAKEN
R0071              NO. OF MARKS IN 8NN
R0072           FOR R57:
R0073              MARK DATA IN MARKDOWN AND MRKBUF1
R0074           FOR OTHER USERS:
R0075              MARKINDX DECREMENTED TO ZERO IF A MARK WAS TAKEN
R0076              MARK DATA IN MRKBUF1


R0077   CONDITIONS AT EXIT -

R0078           MARKINDX = INITIAL VALUE - NO. MARKS TAKEN
R0079           MARKING SYSTEM IS RELEASED :
R0080                 EXTVBACT =0
R0081                 BIT 9 OPTMODES = 0
R0082                 OPTIND = -1
R0083                 BIT 2 CHAN12 = 0
R0084           MARKFLG = 0
R0085           OPTCADR CONTAINS CADR OF SXTMARK CALLER
```

L SXTMARK USER'S PAGE NO. 3 EQ S3

```
P0086
 0087   REF   1                 07,2000                       SETLOC  SXTMARKE
 0088                           07,2000                       BANK

 0089   REF   7  LAST  231      E7,1722                       EBANK=  MRKBUF1
 0090   REF   1                                               COUNT*  $$/SXTMK
 0091   REF   1                 07,2000   0 2062 1  SXTMARK   TC      TESTMARK
 00912  REF   1                 07,2001   0 5354 0            TC      CHECKMM       IS THIS P24
 00914                          07,2002    00030 1            MM      24
 00916                          07,2003   1 2005 1            TCF     +2            NO
 00918  REF   1                 07,2004   1 2010 0            TCF     SXTMRKA       YES
 0092   REF   2  LAST  241      07,2005   0 5354 0            TC      CHECKMM
 0093                           07,2006    00026 0            MM      22
 0094   REF   1                 07,2007   1 2015 0            TCF     SETMRK
 0095   REF  25  LAST  227      07,2010   3 4772 1  SXTMRKA   CAF     ZERO          INITIALIZE MARK COUNTER
 0096   REF   3  LAST  189      07,2011   55'747 0            TS      8NN

 0097   REF   2  LAST  134      07,2012   55'753 0            TS      P22DEX
 0098   REF   6  LAST  224      07,2013   3 4773 0            CAF     FIVE          5 MARKS FOR P22, ONE FOR ALL OTHERS
 0099   REF   2  LAST  241      07,2014   1 2016 0            TCF     SETMRK +1
 0100   REF   8  LAST  202      07,2015   3 4770 0  SETMRK    CAF     ONE
 0101   REF   3  LAST  204      07,2016   54 301 1            TS      MARKINDX

 0102   REF   1                 07,2017   0 4665 0            TC      MAKECADR      STORE RETURN TO USER WHO CALLED
 0103   REF   1                 07,2020   55'336 1            TS      OPTCADR         SXTMARK IN OPTCADR

 0104   REF   8  LAST  222      07,2021   0 4636 0  MKVB51    TC      BANKCALL      CLEAR DISPLAY FOR MARK VERB
 0105   REF   1                 07,2022    20575 1            CADR    KLEENEX
 0106   REF   1                 07,2023   3 2061 1  MKVBDSP   CAF     V851          DISPLAY MARK VERB 51
 0107   REF   9  LAST  241      07,2024   0 4636 0    +1      TC      BANKCALL
 0108   REF   1                 07,2025    20604 1            CADR    GOMARK4
 0109   REF   1                 07,2026   1 2031 0            TCF     TERMSXT       V34-TERMINATE
 0110   REF   1                 07,2027   1 2042 1            TCF     ENTANSWR      V33-PROCEED-MARKING DONE
 0111   REF   1                 07,2030   1 2052 0            TCF     MKVB5X        ENTER-RECYCLE TO INITIAL MARK DISPLAY

 0112   REF   3  LAST  211      07,2031   0 5527 1  TERMSXT   TC      CLEARMRK      CLEAR MARK ACTIVITY.

 0113   REF   1                 07,2032   0 2073 1            TC      MKRLEES

 0114   REF   3  LAST  241      07,2033   0 5354 0            TC      CHECKMM
 0115                           07,2034    00003 1            MM      03
 0116                           07,2035   1 2037 0            TCF     +2
 0117   REF   1                 07,2036   0 2040 1            TC      TERMP03
 0118   REF   3  LAST  215      07,2037   0 4103 1            TC      GOTOPOOH

 0119   REF   7  LAST  219      07,2040   0 4655 0  TERMP03   TC      POSTJUMP
 0120   REF   1                 07,2041    67370 1            CADR    GCOMP5

 0121   REF   1                 07,2042   3 7645 1  ENTANSWR  CAF     PRIO24
 01211  REF   1                 07,2043   0 5121 0            TC      NOVAC
```

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01212  REF   3  LAST  219   E7,1777                        EBANK=  WHOCARES
01213  REF   1              07,2044   05524 1              2CADR   ENDEXT
01213  REF   1              07,2045   04067 1
-------------------------------------------------------------------------------
01214  REF   2  LAST  221   07,2046  3 5052 0              CAF     PRIO13        ALLOW LEFTOVER SLEEPING JOB IF ANY
01215  REF   1              07,2047  0 5176 1              TC      PRIOCHNG

0123   REF   2  LAST  241   07,2050  3 1336 0  MKVRET      CA      OPTCADR       OPTCADR HAS RETURN CADR OF USER WHO
0124   REF   1              07,2051  0 4660 0              TC      BANKJUMP         CALLED SXTMARK

-------------------------------------------------------------------------------
0125   REF   4  LAST  241   07,2052  10 301 1  MKVB5X      CCS     MARKINDX      REDISPLAY VB51 IF MORE MARKS WANTED
0126   REF   1              07,2053  1 2021 1              TCF     MKVB51
0127   REF   1              07,2054  3 4321 0  MKVB50      CAF     R1D1          OCT 16
0128   REF   2  LAST   82   07,2055  55'250 0              TS      DSPTEM1
0129   REF   1              07,2056  3 2060 0              CAF     V50N25        DISPLAY V50N25 IF MARKING DONE.
0130   REF   1              07,2057  1 2024 1              TCF     MKVBDSP +1
-------------------------------------------------------------------------------
0131                        07,2060   14431 1  V50N25      VN      5025
0132                        07,2061   14600 1  VB51        VN      5100

0133   REF   7  LAST  199   07,2062  3 6211 0  TESTMARK    CAF     SIX
0134   REF   3  LAST  204   07,2063  7 1247 0              MASK    EXTVBACT
-------------------------------------------------------------------------------
0135   REF  61  LAST  238   07,2064  10 000 0              CCS     A
0136   REF   1              07,2065  1 2071 1              TCF     MKABORT
0137   REF  18  LAST  178   07,2066  3 4767 0              CAF     BIT2
0138   REF   4  LAST  242   07,2067  27'247 0              ADS     EXTVBACT
0139   REF  22  LAST  238   07,2070  0 0002 0              TC      Q
-------------------------------------------------------------------------------
0140   REF   1              07,2071  0 7706 1  MKABORT     TC      BAILOUT
0141                        07,2072   31211 1              OCT     31211

0142   REF   2  LAST  241   07,2073                        MKRELEAS EQUALS MKRLEES

0143                        07,2073  0 0004 0  MKRLEES     INHINT
-------------------------------------------------------------------------------
0147   REF   5  LAST  222   07,2074  3 7702 0              CA      NEGONE
0148   REF  16  LAST  222   07,2075  55'323 0              TS      OPTIND        KILL COARS OPTICS

0149   REF  26  LAST  241   07,2076  3 4772 1              CAF     ZERO
0150   REF   5  LAST  242   07,2077  54 301 1              TS      MARKINDX
-------------------------------------------------------------------------------
0152   REF   2  LAST  202   07,2100  4 4765 0              CS      MARKBIT
01521  REF  16  LAST  222   07,2101  7 0075 1              MASK    FLAGWRD1
01522  REF  17  LAST  242   07,2102  54 075 1              TS      FLAGWRD1

0153                        07,2103  0 0003 1              RELINT
-------------------------------------------------------------------------------
0154   REF  23  LAST  242   07,2104  0 0002 0              TC      Q
```

```
P0155
 0156   REF   2  LAST  141   07,2105  54 016 1  MARKRUPT TS     BANKRUPT        STORE  CDUS AND OPTICS NOW
 0157   REF   5  LAST  182   07,2106  3 0035 1            CA     CDUT
 0158   REF   1              07,2107  54 361 1            TS     MKCDUT
 0159   REF   6  LAST  181   07,2110  3 0036 1            CA     CDUS
 0160   REF   1              07,2111  54 357 1            TS     MKCDUS
 0161   REF   2  LAST  182   07,2112  3 0033 1            CA     CDUY
 0162   REF   1              07,2113  54 356 0            TS     MKCDUY
 0163   REF   4  LAST  180   07,2114  3 0034 0            CA     CDUZ
 0164   REF   1              07,2115  54 360 0            TS     MKCDUZ
 0165   REF   3  LAST  181   07,2116  3 0032 0            CA     CDUX
 0166   REF   1              07,2117  54 362 1            TS     MKCDUX
 0167                        07,2120  0 0006 1            EXTEND
 0168   REF   7  LAST  189   07,2121  3 0025 0            DCA    TIME2           GET TIME
 0169   REF   1              07,2122  52 355 0            DXCH   MKT2T1
 0170                        07,2123  0 0006 1            EXTEND
 0171   REF   2  LAST  243   07,2124  3 0355 1            DCA    MKT2T1
 0172   REF   1              07,2125  52 014 0            DXCH   SAMPTIME        RUPT TIME FOR NOUN 65.

 0173   REF  24  LAST  242   07,2126  56 002 0            XCH    Q
 0174   REF   2  LAST  141   07,2127  54 012 0            TS     QRUPT

 0175   REF  20  LAST  214   07,2130  3 4763 1            CAF    BIT6            SEE IF MARK OR MKREJECT
 0176                        07,2131  0 0006 1            EXTEND
 0177   REF   3  LAST  202   07,2132  02 016 1            RAND   NAVKEYIN
 0178   REF  62  LAST  242   07,2133  10 000 0            CCS    A
 0179   REF   1              07,2134  0 2154 0            TC     MARKIT          ITS A MARK

 0180   REF  17  LAST  201   07,2135  3 4762 0            CAF    BIT7            NOT A MARK, SEE IF MKREJECT
 0181                        07,2136  0 0006 1            EXTEND
 0182   REF   4  LAST  243   07,2137  02 016 1            RAND   NAVKEYIN
 0183   REF  63  LAST  243   07,2140  10 000 0            CCS    A
 0184   REF   1              07,2141  0 2344 0            TC     MKREJECT        ITS A MARK REJECT

 0185   REF   2  LAST  202   07,2142  3 4342 0  KEYCALL   CAF    OCT37           NOT MARK OR MKREJECT, SEE IF KEYCODE
 0186                        07,2143  0 0006 1            EXTEND
 0187   REF   5  LAST  243   07,2144  02 016 1            RAND   NAVKEYIN
 0188                        07,2145  0 0006 1            EXTEND
 0189                        07,2146  1 2151 1            BZF    +3              IF NO INBITS
 0190   REF   8  LAST  241   07,2147  0 4655 0            TC     POSTJUMP
 0191   REF   1              07,2150  17675 0             CADR   KEYCOM          IT,S A KEY CODE, NOT A MARK.

 0192   REF  12  LAST  210   07,2151  0 5671 1  +3        TC     ALARM           ALARM IF NO INBITS
 0193                        07,2152  00113 1             OCT    113
 0194   REF  13  LAST  178   07,2153  0 5323 0            TC     RESUME
```

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R0195   PROGRAM NAME - MARKIT                          DATE- 19 SEPT 1967

R0196   CALLING SEQUENCE
R0197      FROM MARKRUPT IF CHAN 16 BIT 6 = 1

R0198   EXIT
R0199      RESUME

R0200   INPUT
R0201      CDUCHKWD. ALSO ALL INITIALIZATION FOR MARKCONT

R0202   OUTPUT
R0203      MKT2T1,MKCDUX,MKCDUY,MKCDUZ,MKCDUS,MKCDUT

R0204   ALARM EXIT
R0205      NONE

 0206   REF   1                  07,2154  11'341 1  MARKIT  CCS     CDUCHKWD
 0207                            07,2155  1 2160 0           TCF     +3          DELAY OF CDUCHKWD CS IF PNZ
 0208                            07,2156  1 2160 0           TCF     +2
 0209   REF  27  LAST  242       07,2157  3 4772 1           CAF     ZERO
 0210   REF   9  LAST  241       07,2160  6 4770 0           AD      ONE         10 MS IF NO CHECK
 0211   REF   6  LAST  200       07,2161  0 5233 0           TC      WAITLIST
 0212   REF   8  LAST  241       E7,1722                     EBANK=  MRKBUF1
 0213   REF   1                  07,2162   02165 1           2CADR   MARKDIF
 0213   REF   1                  07,2163   16067 1
 0214   REF  14  LAST  243       07,2164  1 5323 1           TCF     RESUME

 0215   REF   1                  07,2165  3 4753 1  MARKDIF  CAF     P24BIT      IS THIS P24
02152   REF   2  LAST  222       07,2166  7 0105 1           MASK    FLAGWRD9
02153   REF  64  LAST  243       07,2167  10 000 0           CCS     A
02154   REF   1                  07,2170  1 2204 1           TCF     MARKCONT    YES ACCEPT MARK
02156   REF   2  LAST  244       07,2171  3 1341 0           CA      CDUCHKWD    IF DELAY CHECK IS ZERO OR NEG,ACP MARK
 0216                            07,2172  0 0006 1           EXTEND
 0217   REF   2  LAST  244       07,2173  6 2204 0           BZMF    MARKCONT
 0218   REF  19  LAST  172       07,2174  4 4770 1           CS      BIT1
 0219   REF   1                  07,2175  54 353 0           TS      MKNDX       SET INDEX -1
 0220   REF   2  LAST  243       07,2176  3 0362 0           CA      MKCDUX
 0221   REF   1                  07,2177  0 2325 1           TC      DIFCHK      SEE IF VEHICLE RATE  TO MUCH AT MARK
 0222   REF   2  LAST  243       07,2200  3 0356 1           CA      MKCDUY
 0223   REF   2  LAST  244       07,2201  0 2325 1           TC      DIFCHK
 0224   REF   2  LAST  243       07,2202  3 0360 1           CA      MKCDUZ
 0225   REF   3  LAST  244       07,2203  0 2325 1           TC      DIFCHK

 0226   REF   2  LAST  202       07,2204  3 4753 1  MARKCONT CAF     R21BIT      R21 MARKING
 0227   REF   6  LAST  212       07,2205  7 0076 1           MASK    FLAGWRD2
 0228   REF  65  LAST  244       07,2206  10 000 0           CCS     A
 0229   REF   1                  07,2207  1 2314 1           TCF     PUTMARK     YES

 0230   REF   1                  07,2210  3 4755 1           CAF     V59FLBIT
```

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0231   REF   7  LAST  216   07,2211  7 0101 0          MASK   FLAGWRD5      V59FLAG
0232   REF  66  LAST  244   07,2212  10 000 0          CCS    A
0233   REF   1              07,2213  1 2304 0          TCF    DOWNMRK
-----------------------------------------------------------------------------------
0234   REF   6  LAST  242   07,2214  10 301 1          CCS    MARKINDX      MARKS CALLED FOR
0235   REF   1              07,2215  1 2221 0          TCF    MARK2         YES
-----------------------------------------------------------------------------------
0236   REF  13  LAST  243   07,2216  0 5671 1  114ALM  TC     ALARM
0237                        07,2217   00114 0          OCT    114           MARKS NOT CALLED FOR
-----------------------------------------------------------------------------------
0238   REF   5  LAST  174   07,2220  0 5314 1          TC     TASKOVER
-----------------------------------------------------------------------------------
0239   REF   7  LAST  245   07,2221  54 301 1  MARK2   TS     MARKINDX      DECREMENT NO. MARKS WANTED
-----------------------------------------------------------------------------------
0240   REF  13  LAST  219   07,2222  0 5547 1          TC     UPFLAG
0241   REF   1              07,2223   00032 0          ADRES  MARKFLG       SET FLAG TO ENABLE REJECT
-----------------------------------------------------------------------------------
02411  REF   4  LAST  241   07,2224  0 5354 0          TC     CHECKMM       IS THIS P24
02412                       07,2225   00030 1          MM     24
02413  REF   1              07,2226  1 2235 0          TCF    MRKCHK22      NO
02414  REF   8  LAST  245   07,2227  24 301 0          INCR   MARKINDX      RESTORE THIS REGISTER
02415  REF  14  LAST  245   07,2230  0 5547 1          TC     UPFLAG
-----------------------------------------------------------------------------------
02416  REF   1              07,2231   00061 0          ADRES  P22MKFLG      DOWNLINK CONTAINS P24 MARKS
02417  REF  15  LAST  245   07,2232  0 5547 1          TC     UPFLAG
02418  REF   1              07,2233   00052 0          ADRES  P24MKFLG      NEW P24MARK TAKEN
02419  REF   1              07,2234  1 2240 1          TCF    VACSTOR -1
0242   REF   5  LAST  245   07,2235  0 5354 0  MRKCHK22 TC     CHECKMM
0243                        07,2236   00026 0          MM     22
-----------------------------------------------------------------------------------
0244   REF   2  LAST  244   07,2237  1 2314 1          TCF    PUTMARK
0245   REF   4  LAST  241   07,2240  25'747 1  -1      INCR   8NN           NO. MARKS TAKEN.
0246                        07,2241  0 0006 1  VACSTOR EXTEND
0247   REF   3  LAST  243   07,2242  3 0355 1          DCA    MKT2T1
0248   REF   3  LAST  241   07,2243  51'753 1          INDEX  P22DEX
0249   REF  20  LAST  190   07,2244  53'540 0          DXCH   SVMRKDAT
-----------------------------------------------------------------------------------
0250                        07,2245  0 0006 1          EXTEND
0251   REF   3  LAST  244   07,2246  3 0357 0          DCA    MKCDUY
0252   REF   4  LAST  245   07,2247  51'753 1          INDEX  P22DEX
0253   REF  21  LAST  245   07,2250  53'542 1          DXCH   SVMRKDAT +2
0254                        07,2251  0 0006 1          EXTEND
0255   REF   3  LAST  244   07,2252  3 0361 0          DCA    MKCDUZ
-----------------------------------------------------------------------------------
0256   REF   5  LAST  245   07,2253  51'753 1          INDEX  P22DEX
0257   REF  22  LAST  245   07,2254  53'544 1          DXCH   SVMRKDAT +4
0258   REF   3  LAST  244   07,2255  3 0362 0          CA     MKCDUX
0259   REF   6  LAST  245   07,2256  51'753 1          INDEX  P22DEX
0260   REF  23  LAST  245   07,2257  55'545 0          TS     SVMRKDAT +6
-----------------------------------------------------------------------------------
026005 REF   6  LAST  245   07,2260  0 5354 0          TC     CHECKMM       IS THIS P24
02601                       07,2261   00030 1          MM     24
026015 REF   1              07,2262  1 2273 1          TCF    INDINC        NO
02602  REF   1              07,2263  4 4172 0          CS     OCT34         YES DEC 28
026025 REF   7  LAST  245   07,2264  6 1753 1          AD     P22DEX
-----------------------------------------------------------------------------------
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02603                          07,2265  0 0006 1          EXTEND                ARE THERE ANY MORE LOC LEFT IN MARK
026035                         07,2266  1 2270 1          BZF     +2            DOWNLINK BUFFER
026045 REF   2  LAST  245      07,2267  1 2273 1          TCF     INDINC        YES
02605  REF  28  LAST  244      07,2270  3 4772 1          CA      ZERO          REINITIALIZE INDEX FOR
026055 REF   8  LAST  245      07,2271  55'753 0          TS      P22DEX        BEGINNING OF BUFFER
02606  REF   1                 07,2272  1 2275 1          TCF     MARKDONE
0261   REF   2  LAST  214      07,2273  3 4774 1 INDINC   CAF     SEVEN
0262   REF   9  LAST  246      07,2274  27'753 0          ADS     P22DEX
0263   REF   9  LAST  245      07,2275  10 301 1 MARKDONE CCS     MARKINDX      ANY MORE MARKS TO BE TAKEN
02631  REF   6  LAST  245      07,2276  1 5314 0          TCF     TASKOVER
02632  REF   1                 07,2277  3 7644 0          CAF     PRIO22
0264   REF   4  LAST  219      07,2300  0 5135 0          TC      FINDVAC
0265   REF   9  LAST  244      E7,1722                    EBANK=  MRKBUF1
0266   REF   2  LAST  241      07,2301    02052 1         2CADR   MKVB5X
0266                           07,2302    16067 1
0267   REF   7  LAST  246      07,2303  1 5314 0          TCF     TASKOVER

0268   REF   8  LAST  242      07,2304  3 6211 0 DOWNMRK  CAF     SIX           FOR CALIBRATION MARK
0269   REF   2  LAST  223      07,2305  0 5607 0          TC      GENTRAN
0270   REF   4  LAST  245      07,2306    00354 0         ADRES   MKT2T1
0271   REF   5  LAST  185      07,2307    01674 0         ADRES   MARKDOWN

0272   REF   3  LAST  219      07,2310  3 5047 1          CAF     PRIO5
0273   REF   2  LAST  241      07,2311  0 5121 0          TC      NOVAC
0274   REF  10  LAST  246      E7,1722                    EBANK=  MRKBUF1
0275   REF   1                 07,2312    02230 1         2CADR   MARKDISP
0275   REF   1                 07,2313    76067 1

0280   REF   9  LAST  246      07,2314  3 6211 0 PUTMARK  CAF     SIX
0281   REF   3  LAST  246      07,2315  0 5607 0          TC      GENTRAN
0282   REF   5  LAST  246      07,2316    00354 0         ADRES   MKT2T1
0283   REF  11  LAST  246      07,2317    01722 1         ADRES   MRKBUF1

0284   REF   3  LAST  244      07,2320  3 4753 1          CAF     R21BIT        DONT CALL VB50 DISPLAY FOR R21
0285   REF   7  LAST  244      07,2321  7 0076 1          MASK    FLAGWRD2
0286   REF  67  LAST  245      07,2322  10 000 0          CCS     A
0287   REF   8  LAST  246      07,2323  1 5314 0          TCF     TASKOVER

0288   REF   2  LAST  246      07,2324  1 2275 1          TCF     MARKDONE

0289   REF   2  LAST  244      07,2325  24 353 1 DIFCHK   INCR    MKNDX         INCREMENT INDEX

0290                           07,2326  0 0006 1          EXTEND
0291   REF   3  LAST  246      07,2327  5 0353 1          INDEX   MKNDX
0292   REF   4  LAST  243      07,2330  20 032 1          MSU     CDUX          GET MARK(ICDU) - CURRENT(ICDU)
0293   REF  68  LAST  246      07,2331  10 000 0          CCS     A
0294                           07,2332  1 2336 1          TCF     +4
0295   REF  25  LAST  243      07,2333  0 0002 0          TC      Q
0296                           07,2334  1 2336 1          TCF     +2
0297   REF  26  LAST  246      07,2335  0 0002 0          TC      Q
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0298  REF   4 LAST  217   07,2336  6 7701 0          AD      NEG2       SEE IF DIFFERENCE GREATER THAN 3 BITS
0299                      07,2337  0 0006 1          EXTEND
0300                      07,2340  6 2335 0          BZMF    -3         NOT GREATER

0301  REF  14 LAST  245   07,2341  0 5671 1          TC      ALARM      COUPLED WITH PROGRAM ALARM
0302                      07,2342   00121 0          OCT     00121

0303  REF   9 LAST  246   07,2343  1 5314 0          TCF     TASKOVER   DO NOT ACCEPT

0304  REF   4 LAST  246   07,2344  3 4753 1 MKREJECT CAF     R21BIT
0305  REF   8 LAST  246   07,2345  7 0076 1          MASK    FLAGWRD2   R21 MARK (SPECIAL MARKING FOR R21)
0306                      07,2346  0 0006 1          EXTEND
0307  REF   1             07,2347  1 2367 0          BZF     MRKREJCT   NOT SET THEREFORE REGULAR REJECT
03071 REF  12 LAST  246   07,2350  3 1722 1          CA      MRKBUF1    IS THERE A MARK IN THE BUFFER?
03072                     07,2351  0 0006 1          EXTEND
03073                     07,2352  1 2355 1          BZF     +3         YES - REJECT MARK IN BUFFER

03074                     07,2353  0 0006 1          EXTEND
03075 REF   1             07,2354  6 2360 0          BZMF    REJCTR22   NO,SET FLAG TO REJECT MARK PROCESSED-R22

0308  REF   6 LAST  242   07,2355  3 7702 0          CA      NEGONE     -1 (FOR R22)
0309  REF  13 LAST  247   07,2356  55'722 0          TS      MRKBUF1    -0 IN TIME IS FLAG TO R22 SIGNIFYING A
0310  REF  15 LAST  244   07,2357  0 5323 0          TC      RESUME

03101 REF   1             07,2360  3 4762 0 REJCTR22 CAF     R22CABIT   IS R22 PROCESSING A MARK?
03102 REF   3 LAST  244   07,2361  7 0105 1          MASK    FLAGWRD9
03103                     07,2362  0 0006 1          EXTEND
03104 REF  16 LAST  247   07,2363  1 5323 1          BZF     RESUME     NO IGNORE MARK REJECT

03105 REF  16 LAST  245   07,2364  0 5547 1          TC      UPFLAG
03106 REF   1             07,2365   00231 1          ADRES   REJCTFLG   YES - SET FLAG FOR R22
03107 REF  17 LAST  247   07,2366  0 5323 0          TC      RESUME

0311  REF   3 LAST  242   07,2367  3 4765 1 MRKREJCT CAF     MARKBIT
0312  REF  18 LAST  242   07,2370  7 0075 1          MASK    FLAGWRD1
0313  REF  69 LAST  246   07,2371  10 000 0          CCS     A
0314  REF   1             07,2372  0 2376 1          TC      REJECT3

0315  REF  15 LAST  247   07,2373  0 5671 1          TC      ALARM      DONT ACCEPT TWO REJECTS TOGETHER
0316                      07,2374   00110 1          OCT     110
0317  REF  18 LAST  247   07,2375  0 5323 0          TC      RESUME

0318  REF  15 LAST  218   07,2376  0 5561 0 REJECT3  TC      DOWNFLAG
0319  REF   2 LAST  245   07,2377   00032 0          ADRES   MARKFLG

03190 REF   7 LAST  245   07,2400  0 5354 0          TC      CHECKMM    IS THIS P24
03191                     07,2401   00030 1          MM      24
03191 REF   1             07,2402  1 2422 0          TCF     REJECT4    NO
03192 REF  16 LAST  247   07,2403  0 5561 0          TC      DOWNFLAG   YES
03192 REF   2 LAST  245   07,2404   00052 0          ADRES   P24MKFLG
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031926 REF  10 LAST 246  07,2405  11'753 0          CCS    P22DEX    IS MARK TO BE REJ, THE LAST MARK IN BUF
031927                   07,2406  1 2411 0          TCF    +3        NO
031928 REF   2 LAST 245  07,2407  3 4172 1          CA     OCT34     YES
-------------------------------------------------------------------------------------------------------------
031929                   07,2410  1 2413 1          TCF    +3
03193  REF   3 LAST 246  07,2411  4 4774 0          CS     SEVEN
031935 REF  11 LAST 248  07,2412  6 1753 1          AD     P22DEX
03194  REF  15 LAST 169  07,2413  54 070 1 REJECT5  TS     RUPTREG1
031945                   07,2414  0 0006 1          EXTEND
03195  REF  16 LAST 248  07,2415  5 0070 0          INDEX  RUPTREG1
-------------------------------------------------------------------------------------------------------------
031955 REF  24 LAST 245  07,2416  4 1540 0          DCS    SVMRKDAT
03196  REF  17 LAST 248  07,2417  50 070 0          INDEX  RUPTREG1
031965 REF  25 LAST 248  07,2420  53'540 0          DXCH   SVMRKDAT
03197  REF   1           07,2421  1 2433 0          TCF    REJEXIT
0320   REF  10 LAST 246  07,2422  24 301 0 REJECT4  INCR   MARKINDX  CALL FOR ANOTHER MARK
0321   REF   8 LAST 247  07,2423  0 5354 0          TC     CHECKMM
-------------------------------------------------------------------------------------------------------------
0322                     07,2424   00026 0          MM     22
0323   REF   2 LAST 248  07,2425  1 2433 0          TCF    REJEXIT

0324   REF  10 LAST 244  07,2426  4 4770 1          CS     ONE       FOR P22
0325   REF   5 LAST 245  07,2427  27'747 0          ADS    8NN
0326   REF   4 LAST 248  07,2430  4 4774 0          CS     SEVEN
-------------------------------------------------------------------------------------------------------------
0327   REF  12 LAST 248  07,2431  27'753 0          ADS    P22DEX    DECREMENT P22 INDEX

03271  REF   1           07,2432  1 2413 1          TCF    REJECT5

0328   REF   2 LAST 246  07,2433  3 7644 0 REJEXIT  CAF    PRIO22
0329   REF   5 LAST 246  07,2434  0 5135 0          TC     FINDVAC
-------------------------------------------------------------------------------------------------------------
0330   REF  14 LAST 247  E7,1722                    EBANK= MRKBUF1
0331   REF   2 LAST 242  07,2435   02023 1         2CADR  MKVBDSP
0331                     07,2436   16067 1
0332   REF  19 LAST 247  07,2437  1 5323 1          TCF    RESUME
```

L EXTENDED VERBS

```
 0002   REF   1                 43,2000                       SETLOC EXTVERBS
 0003                           43,2000                       BANK

 0004   REF   6  LAST  233      E5,1757                       EBANK= OGC

 0005   REF   1                                               COUNT* $$/EXTVB
R0006   FAN-OUT

 0007   REF  25  LAST  224      43,2000  50 154 1  GOEXTVB    INDEX  MPAC      VERB-40 IS IN MPAC
 0008   REF   1                 43,2001  0 2002 1             TC     LST2FAN   FAN AS BEFORE.

 0009   REF   1                 43,2002  0 2121 1  LST2FAN    TC     VBZERO    VB40 ZERO (USED WITH NOUN 20 ONLY).
 0010   REF   1                 43,2003  0 2133 1             TC     VBCOARK   VB41 COARSE ALIGN (USED WITH NOUN 20 OR
A0011                                                                          91 ONLY)
 0012   REF   1                 43,2004  0 2227 1             TC     IMUFINEK  VB42 FINE ALIGN IMU
 0013   REF   1                 43,2005  0 2364 1             TC     IMUATTCK  VB43  LOAD IMU ATTITUDE ERROR METERS.
 0014   REF   1                 43,2006  0 3064 0             TC     SETSURF   VB44 SET SURFACE FLAG
 0015   REF   1                 43,2007  0 3062 0             TC     RESTSRF   VB45 RESET SURFACE FLAG
 0016   REF   1                 43,2010  0 2451 0             TC     STABLISH  VB46 ESTABLISH G+C CONTROL.
 0017   REF   1                 43,2011  0 3001 0             TC     LMTOCMSV  VB47 MOVE LM STATE VECTOR INTO CM
 0018   REF   1                 43,2012  0 2544 0             TC     DAPDISP   VB48 LOAD A/P DATA.
 0019   REF   1                 43,2013  1 2535 1             TCF    CREWMANU  VB 49  START AUTOMATIC ATTITUDE MANEUVER
 0020   REF   1                 43,2014  0 2265 1             TC     GOLOADLV  VB50 PLEASE PERFORM
 0021   REF   2  LAST  249      43,2015  0 2265 1             TC     GOLOADLV  VB51 PLEASE MARK
 0022   REF   1                 43,2016  0 3037 0             TC     V52       VB52 SET OFFSET NO. FOR P22
 0023   REF   3  LAST  249      43,2017  0 2265 1             TC     GOLOADLV  VB 53 PLEASE PERFORM COAS MARK
 0024   REF   1                 43,2020  0 2600 0             TC     GOTOR23   V54 START R23 (R21-BACKUP)
 0025   REF   1                 43,2021  0 2312 0             TC     ALINTIME  VB55 ALIGN TIME
 0026   REF   1                 43,2022  0 2641 0             TC     TRACKTRM  VB56 TERMINATE TRACKING (P20 +P25)
 0027   REF   1                 43,2023  0 3102 1             TC     V57CALL   V57  FULTKFLG SETTING OPTION
 0028   REF   1                 43,2024  0 2445 0             TC     ENATMA    VB58 ENABLE AUTOMATIC ATTITUDE MANEUVER
 0029   REF   4  LAST  249      43,2025  0 2265 1             TC     GOLOADLV  VB59 PLEASE CALIBRATE
 0030   REF   1                 43,2026  0 2273 0             TC     V60       VB60 SET CPHIX (N17) EQUAL TO CDU
 0031   REF   1                 43,2027  0 2301 1             TC     V61       VB61 SELECT MODE I
 0032   REF   1                 43,2030  0 2304 1             TC     V62       VB62 SELECT MODE II, ERROR WRT N22
 0033   REF   1                 43,2031  0 2307 1             TC     V63       VB63 SELECT MODE III, ERROR WRT N17
 0034   REF   1                 43,2032  0 2437 0             TC     VB64      VB64 CALCULATE,DISPLAY S-BAND ANT ANGLES
 0035   REF   1                 43,2033  0 2342 0             TC     CKOPTVB   V 65 E OPTICAL VERIFICATION FOR PRELAUNC
 0036   REF   1                 43,2034  0 2774 1             TC     ATTACHED  VB 66 ATTACHED. MOVE THIS TO OTHER STATE
 0037   REF   1                 43,2035  0 3054 0             TC     V67       VB67 WMATRIX MONITOR
 0038   REF   1                 43,2036  0 2116 0             TC     ALM/END   VB68 SPARE
 0039   REF   1                 43,2037  0 2037 1  VERB69     TC     VERB69    VB 69 CAUSE RESTART
 0040   REF   1                 43,2040  0 3656 1             TC     V70UPDAT  VB70 UPDATE LIFTOFF TIME.
 0041   REF   1                 43,2041  0 3660 1             TC     V71UPDAT  VB71 UNIVERSAL UPDATE - BLOCK ADDRESS.
 0042   REF   1                 43,2042  0 3662 0             TC     V72UPDAT  VB72 UNIVERSAL UPDATE - SINGLE ADDRESS.
 0043   REF   1                 43,2043  0 3664 0             TC     V73UPDAT  VB73 UPDATE AGC TIME (OCTAL).
 0044   REF   1                 43,2044  0 2706 1             TC     DNEDUMP   VB74 INITIALIZE DOWN-TELEMETRY PROGRAM
A0045                                                                          FOR ERASABLE DUMP.
 0046   REF   1                 43,2045  0 2713 0             TC     LFTFLGON  VB75 SET LIFTOFF FLAG.
 0047   REF   2  LAST  249      43,2046  0 2116 0             TC     ALM/END   VB76 SPARE
```

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```
0048  REF  3  LAST  249   43,2047  0 2116 0        TC    ALM/END     VB77 SPARE
0049  REF  1             43,2050  0 2352 1        TC    CHAZFDGC    CHANGE GYROCOMPASS LAUNCH AZIMUTH V78
0050  REF  4  LAST  250   43,2051  0 2116 0        TC    ALM/END     VB79 SPARE
0051  REF  1             43,2052  0 2703 1        TC    LEMVEC      VB80 UPDATE LEM STATE VECTOR
0052  REF  1             43,2053  0 2705 1        TC    CSMVEC      VB81 UPDATE CSM STATE VECTOR
0053  REF  1             43,2054  0 2557 1        TC    V82PERF     VB82 REQUEST ORBIT PARAM DISPLAY (R30)
0054  REF  2  LAST  219   43,2055  0 2564 1        TC    V83PERF     VB83 RANGE, RANGE RATE, +X AXIS  (R31)
0055  REF  5  LAST  250   43,2056  0 2116 0        TC    ALM/END     V84 SPARE
0056  REF  1             43,2057  0 2574 0        TC    V85PERF     VB85 RANGE, RANGE RATE, SLOS     (R34)
0057  REF  1             43,2060  0 2621 0        TC    V86PERF     VB86 BACKUP MARK REJECT
0058  REF  1             43,2061  0 2773 0        TC    SETVHFLG    VB87 SET VHF RANGE FLAG
0059  REF  1             43,2062  0 2770 0        TC    RESETVHF    VB88 RESET VHF RANGE FLAG
0060  REF  1             43,2063  0 2722 1        TC    V89PERF     V89-ALIGN X OR PRF CSM AXIS TO LOS (R63)
0061  REF  1             43,2064  0 3022 1        TC    V90PERF     VB90-OUT OF PLANE PARAMETERS %R36"
0062  REF  1             43,2065  0 2735 1        TC    GOSHOSUM    VB91 TEMP FOR HYBRID AND STG.
0063  REF  6  LAST  250   43,2066  0 2116 0        TC    ALM/END     VB92 SPARE
0064  REF  1             43,2067  0 2731 0        TC    WMATRXNG    VB93 CLEAR RENDWFLG
0065  REF  1             43,2070  0 3006 1        TC    VERB94      VB94 DO R64
0066  REF  7  LAST  250   43,2071  0 2116 0        TC    ALM/END     VB95 SPARE
0067  REF  1             43,2072  1 3030 0        TCF   VERB96      VB96 SET QUITFLAG TO STOP INTEGRATION
0068  REF  5  LAST  249   43,2073  0 2265 1        TC    GOLOADLV    V97 PLEASE PERFORM ENGINE-FAIL (R41)
0069  REF  8  LAST  250   43,2074  0 2116 0        TC    ALM/END     VB98 SPARE
0070  REF  6  LAST  250   43,2075  0 2265 1        TC    GOLOADLV    VB99 PLEASE ENABLE ENGINE

R0071  END OF EXTENDED VERB FAN

0072  REF  5  LAST  242   43,2076  11'247 0  TESTXACT CCS   EXTVBACT
0073  REF  9  LAST  250   43,2077  0 2116 0          TC    ALM/END     YES. TURN ON OPERATOR ERROR LIGHT
00731 REF  2  LAST  204   43,2100  3 0100 0          CA    FLAGWRD4    ARE PRIOS USING DSKY
00732 REF  1             43,2101  7 7646 0          MASK  14,12,7
00733 REF  70 LAST  247   43,2102  10 000 0          CCS   A
00734 REF  10 LAST  250   43,2103  0 2116 0          TC    ALM/END

0074  REF  4  LAST  214   43,2104  3 4124 1          CAF   OCT24       SET BITS 3 AND 5
0075  REF  6  LAST  250   43,2105  55'247 0  SETXTACT TS    EXTVBACT    NO. SET FLAG TO SHOW EXT VERB DISPLAY
A0076                                                                 SYSTEM BUSY

0077  REF  27 LAST  246   43,2106  3 0002 0          CA    Q
0078  REF  26 LAST  249   43,2107  54 155 1          TS    MPAC +1

0083  REF  2  LAST  224   43,2110  4 4767 1          CS    TWO         BLANK EVERYTHING EXCEPT MM AND VERB
0084  REF  1             43,2111  0 4202 0          TC    NVSUB
0085                     43,2112  0 2113 0          TC    +1
00851 REF  3  LAST  224   43,2113  10 067 1          CCS   NEWJOB      ALLOW POSSIBLE WAITING DISPLAY (FROM
00852 REF  1             43,2114  0 5152 1          TC    CHANG1          RELDSP) TO COME UP.

0086  REF  27 LAST  250   43,2115  0 0155 0          TC    MPAC +1

0089  REF  2  LAST  242      5524             TERMEXTV EQUALS ENDEXT
```

L EXTENDED VERBS

```
0090   REF   3  LAST  250      5524            ENDEXTVB EQUALS ENDEXT

0093   REF   2  LAST  214   43,2116  0 4362 1  ALM/END  TC     FALTON      TURN ON OPERATOR ERROR LIGHT
0094   REF   9  LAST  243   43,2117  0 4655 0  GOPIN    TC     POSTJUMP
0095   REF   2  LAST  210   43,2120   21275 1           CADR   PINBRNCH
```

L EXTENDED VERBS

```
P0096                VBZERO        VERB 40                DESCRIPTION
 0110   REF   3  LAST   85   43,2121  3 1335 0  VBZERO   CA     MODECADR      KEYBOARD REQUEST FOR ISS CDU ZERO
 011002                      43,2122  0 0006 1            EXTEND
 011004                      43,2123  1 2125 1            BZF    +2
 011006 REF  11  LAST  250   43,2124  0 2116 0            TC     ALM/END
 0110I  REF  10  LAST  241   43,2125  0 4636 0            TC     BANKCALL
 0111   REF   1              43,2126   16627 0            CADR   IMUZERO

 0112   REF  11  LAST  252   43,2127  0 4636 0            TC     BANKCALL      STALL
 0113   REF   1              43,2130   17644 1            CADR   IMUSTALL
 0114                        43,2131  0 2132 0            TC     +1

 0115   REF   1              43,2132  0 2117 1            TC     GOPIN
```

```
R0126            VBCOARK     VERB 41            DESCRIPTION
R0127                COURSE ALIGN IMU OR OPTICS
R0128                1. REQUIRE NOUN 20 OR NOUN 91 OR TURN ON OPERATOR ERROR
R0129                2. REQUIRE EXT VERB DISPLAY SYS AVAILABLE OR TURN ON OPERATOR ERROR LIGHT AND GO TO PINBRNCH.
R0131                CASE 1     NOUN 20     (ICDU ANGLES)
R0132                3. SET EXT VERB DISPLAY ACTIVE FLAG.
R0133                4. DISPLAY FLASHING V25,N22 (LOAD NEW ICDU ANGLES).
R0134                   RESPONSES
R0135                     A. TERMINATE
R0136                        1. RELEASE EXT VERB DISPLAY SYSTEM
R0137                     B. PROCEED
R0138                        1. DISPLAY FLASHING V25,N23 (LOAD DELTA ICDU ANGLES).
R0140                           RESPONSES
R0141                             A. TERMINATE
R0142                                1. RELEASE EXT VERB DISPLAY SYSTEM.
R0143                             B. PROCEED
R0144                                1. EXECUTE ICORK2.
R0145                             C. ENTER
R0146                                1. INCREMENT CDU ANGLES
R0147                                2. EXECUTE ICORK2.
R0148                     C. ENTER
R0149                        1. EXECUTE ICORK2.
R0150                ICORK2
R0151                   1. RE-DISPLAY VERB 41.
R0152                   2. EXECUTE IMUCOARS (IMU COARSE ALIGN).
R0153                   3. EXECUTE IMUSTALL (ALLOW TIME FOR DATA TRANSFER).
R0154                   4. RELEASE EXT VERB DISPLAY SYSTEM.
R0155                CASE 2     NOUN 91     (OCDU ANGLES)
R0156                5. (REQUIRE OPTICS SWITCH TO BE AT COMPUTER OR TURN ON OPERATOR ERROR AND ALARM 115) AND (REQUIRE
R0158                   OPTICS AVAILABLE AND DISPLAY FLASHING V24,N92....LOAD NEW OPTICS ANGLES....OR TURN ON ALARM 117
R0160                   AND RELEASE EXT VERB DISPLAY SYSTEM).
R0161                6. RESPONSES TO V29,N92.
R0162                   A. TERMINATE
R0163                      RELEASE EXT VERB DISPLAY SYSTEM
R0164                   B. PROCEED OR ENTER
R0165                      RE-DISPLAY V41,    SET SWITCH TO INDICATE COURSE ALIGN OPTICS WORKING.
R0167                      RELEASE EXT VERB DISPLAY SYSTEM.

 0168  REF   5  LAST  250   43,2133  4 4124 0  VBCOARK  CS      OCT24
 01683 REF   2  LAST  204   43,2134  6 1205 1            AD      NOUNREG
 01685                      43,2135  0 0006 1            EXTEND
 01687 REF   1              43,2136  1 2143 1            BZF     IMUCOARK        NOUN 20

 0169  REF   1              43,2137  6 2165 1            AD      OPIMDIFF        -71
 01695                      43,2140  0 0006 1            EXTEND
 0170  REF   1              43,2141  1 2166 0            BZF     OPTCOARK        NOUN 91

 0171  REF  12  LAST  252   43,2142  0 2116 0            TC      ALM/END         WRONG NOUN

 0172  REF   1              43,2143  0 2076 1  IMUCOARK  TC      TESTXACT        COARSE ALIGN FROM KEYBOARD
```

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```
0173   REF   1                  43,2144  3 2163 1            CAF     VNLODCDU      CALL FOR THETAD LOAD
0174   REF  12  LAST  252       43,2145  0 4636 0            TC      BANKCALL
0175   REF   1                  43,2146    20576 1           CADR    GOXDSPF
0176   REF   1                  43,2147  0 5524 1            TC      TERMEXTV
0177                             43,2150  1 2151 1            TCF     +1

0178   REF   1                  43,2151  3 2164 0  ICORK2    CAF     IMUCOARV      RE-DISPLAY COARSE ALIGN VERB.
0179   REF  13  LAST  254       43,2152  0 4636 0            TC      BANKCALL
0180   REF   1                  43,2153    21064 0           CADR    EXDSPRET

01805  REF   1                  43,2154  0 2260 1            TC      CKMODCAD
0181   REF  14  LAST  254       43,2155  0 4636 0            TC      BANKCALL      CALL MODE SWITCHING PROG
0182   REF   1                  43,2156    16724 1           CADR    IMUCOARS

0183   REF  15  LAST  254       43,2157  0 4636 0            TC      BANKCALL      STALL
0184   REF   2  LAST  252       43,2160    17644 1           CADR    IMUSTALL
0185   REF   1                  43,2161  0 5524 1            TC      ENDEXTVB
0186   REF   2  LAST  254       43,2162  0 5524 1            TC      ENDEXTVB

0187                             43,2163    06226 1  VNLODCDU VN      2522
0188                             43,2164    12200 0  IMUCOARV VN      4100
01881                            43,2165    77670 0  OPIMDIFF DEC     -71
```

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P0189 TEMPORARY ROUTINE TO RUN THE OPTICS CDUS FROM THE KEYBOARD

```
01895  REF   1                 43,2166  0 2714 1  CPTCOARK TC      CHKPOOH          ENSURE IN POO
0190   REF   2  LAST  253      43,2167  0 2076 1           TC      TESTXACT
01901  REF   1                 43,2170  3 5043 0           CAF     EBANK5
01902  REF   7  LAST  223      43,2171  54 003 0           TS      EBANK

0191   REF   9  LAST  177      43,2172  11'354 0           CCS     SWSAMPLE         SEE IF SWITCH AT COMPUTER
0192                           43,2173  0 2200 1           TC      +5               SWITCH AT COMPUTER
0193                           43,2174  0 2175 0           TC      +1               NOT ON COMPUTER
0194   REF   3  LAST  251      43,2175  0 4362 1           TC      FALTON           TURN ON OPERATOR ERR
0195   REF  16  LAST  247      43,2176  0 5671 1           TC      ALARM            AND ALARM
0196                           43,2177   00115 1           OCT     00115

0197   REF  17  LAST  242      43,2200  11'323 0           CCS     OPTIND           SEE IF OPTICS AVAILABLE
0198   REF   1                 43,2201  0 2207 0           TC      OPTC1            IN USE
0199   REF   2  LAST  255      43,2202  0 2207 0           TC      OPTC1            IN USE
0200   REF   3  LAST  255      43,2203  0 2207 0           TC      OPTC1            IN USE

0201   REF  17  LAST  255      43,2204  0 5671 1           TC      ALARM            OPTICS RESERVED (OPTIND=-0)
0202                           43,2205   00117 0           OCT     00117
0203   REF   4  LAST  251      43,2206  0 5524 1           TC      ENDEXT

0204   REF   1                 43,2207  3 2226 0  OPTC1    CAF     VNLDOCDU         VERB-NOUN TO LOAD OPTICS CDUS
0205   REF  16  LAST  254      43,2210  0 4636 0           TC      BANKCALL
0206   REF   2  LAST  254      43,2211   20576 1           CADR    GOXDSPF
0207   REF   2  LAST  254      43,2212  0 5524 1           TC      TERMEXTV
0208                           43,2213  0 2214 1           TC      +1               PROCEED

02082  REF   2  LAST   99      43,2214  3 1773 0           CA      SAC
02084  REF   2  LAST  176      43,2215  55'313 0           TS      DESOPTS
02086  REF   2  LAST   99      43,2216  3 1775 0           CA      PAC
02088  REF   3  LAST  177      43,2217  55'312 1           TS      DESOPTT
0209   REF   1                 43,2220  3 2164 0           CAF     OPTCOARV         RE-DISPLAY OUR OWN VERB
0210   REF  17  LAST  255      43,2221  0 4636 0           TC      BANKCALL
0211   REF   2  LAST  254      43,2222   21064 0           CADR    EXDSPRET

0212   REF  11  LAST  248      43,2223  3 4770 0           CAF     ONE
0213   REF  18  LAST  255      43,2224  55'323 0           TS      OPTIND           SET COARS WORKING

0215   REF   3  LAST  254      43,2225  0 5524 1           TC      ENDEXTV8

0216                           43,2226   06134 1  VNLDOCDU VN      2492
0217   REF   2  LAST  254      43,2164           OPTCOARV EQUALS IMUCOARV          DIFFERENT NOUNS.
```

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```
R0218            IMUFINEK     VERB 42              DESCRIPTION
R0219                FINE ALIGN IMU
R0220                1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG OR TURN ON OPER ERROR AND GO TO PINBRNCH.
R0222                2. DISPLAY FLASHING V25,N93....LOAD DELTA GYRO ANGLES....
R0223                   RESPONSES
R0224                   A. TERMINATE
R0225                      1. RELEASE EXT VERB DISPLAY SYSTEM.
R0226                   B. PROCEED OR ENTER
R0227                      1. RE-DISPLAY VERB 42
R0228                      2. EXECUTE IMUFINE (IMU FIVE ALIGN MODE SWITCHING).
R0229                      3. EXECUTE IMUSTALL (ALLOW FOR DATA TRANSFER)
R0230                         A. FAILED
R0231                            1. RELEASE EXT VERB DISPLAY SYSTEM.
R0232                         B. GOOD
R0233                            1. EXECUTE IMUPULSE (TORQUE IRIGS).
R0234                            2. EXECUTE IMUSTALL AND RELEASE EXT VERB DISPLAY SYSTEM.

 0236  REF   3  LAST  255   43,2227  0 2076 1  IMUFINEK TC     TESTXACT        FINE ALIGN WITH GYRO TORQUING
 0237  REF   1              43,2230  3 2256 1           CAF    VNLODGYR        CALL FOR LOAD OF GYRO COMMANDS
 0238  REF  18  LAST  255   43,2231  0 4636 0           TC     BANKCALL
 0239  REF   3  LAST  255   43,2232   20576 1           CADR   GOXDSPF
 0240  REF   3  LAST  255   43,2233  0 5524 1           TC     TERMEXTV
 0241                       43,2234  0 2235 1           TC     +1              PROCEED WITHOUT A LOAD

 0242  REF   1              43,2235  3 2257 0           CAF    IMUFINEV        RE-DISPLAY OUR OWN VERB
 0243  REF  19  LAST  256   43,2236  0 4636 0           TC     BANKCALL
 0244  REF   3  LAST  255   43,2237   21064 0           CADR   EXDSPRET

02445  REF   2  LAST  254   43,2240  0 2260 1           TC     CKMODCAD
 0245  REF  20  LAST  256   43,2241  0 4636 0           TC     BANKCALL        CALL MODE SWITCH PROG
 0246  REF   1              43,2242   17133 0           CADR   IMUFINE

 0247  REF  21  LAST  256   43,2243  0 4636 0           TC     BANKCALL        HIBERNATION
 0248  REF   3  LAST  254   43,2244   17644 1           CADR   IMUSTALL
 0249  REF   4  LAST  255   43,2245  0 5524 1           TC     ENDEXTVB

 0250  REF   1              43,2246  3 2255 1  FINEK2   CAF    LGYROBIN        PINBALL LEFT COMMANDS IN OGC REGIST5RS
 0251  REF  22  LAST  256   43,2247  0 4636 0           TC     BANKCALL
 0252  REF   1              43,2250   17244 0           CADR   IMUPULSE

 0253  REF  23  LAST  256   43,2251  0 4636 0           TC     BANKCALL        WAIT FOR PULSES TO GET OUT.
 0254  REF   4  LAST  256   43,2252   17644 1           CADR   IMUSTALL
 0255  REF   5  LAST  256   43,2253  0 5524 1           TC     ENDEXTVB
 0256  REF   6  LAST  256   43,2254  0 5524 1           TC     ENDEXTVB

 0257  REF   7  LAST  249   43,2255   02757 0  LGYROBIN ECADR  OGC
 0258                       43,2256   06335 1  VNLODGYR VN     2593
 0259                       43,2257   12400 0  IMUFINEV VN     4200            FINE ALIGN VERB

02591  REF   4  LAST  252   43,2260  3 1335 0  CKMODCAD CA     MODECADR
```

```
02592                          43,2261  0 0006 1                EXTEND
02593  REF   3  LAST  206      43,2262  1 6711 1                BZF     TCQ
02594  REF   4  LAST  255      43,2263  0 4362 1                TC      FALTON
02595  REF   7  LAST  256      43,2264  0 5524 1                TC      ENDEXTVB

R0260                GOLOADLV    VERB 50              DESCRIPTION
R0261                            AND OTHER PLEASE
R0262                            DO SOMETHING VERBS
R0263                     PLEASE PERFORM, MARK, CALIBRATE, ETC.
R0264                     1. PRESSING ENTER ON DSKY INDICATES REQUESTED ACTION HAS BEEN  PERFORMED, AND THE PROGRAM DOES THE
R0266                        SAME RECALL AS A COMPLETED LOAD.
R0267                     2. THE EXECUTION OF A VERB 33 (PROCEED WITHOUT DATA) INDICATES THE REQUESTED ACTION IS NOT DESIRED.

0269   REF   1                43,2265  0 4417 1  GOLOADLV TC      FLASHOFF
0270   REF   1                43,2266  3 4223 0           CAF     PINSUPBT
0271                           43,2267  0 0006 1           EXTEND
0272   REF   2  LAST  198      43,2270  01 007 1           WRITE   SUPERBNK        TURN ON FE7
0273   REF  10  LAST  251      43,2271  0 4655 0           TC      POSTJUMP
0274   REF   1                40,2000                     SBANK=  PINSUPER
0275   REF   1                43,2272   63001 0           CADR    LOADLV1
R0276                V60     VERB 60

0277                           43,2273  0 0006 1  V60      EXTEND                  SET ASTRONAUT TOTAL ATTITUDE (N17) EQUAL
0278   REF   5  LAST  246      43,2274  3 0033 1           DCA     CDUX            TO PRESENT ATTITUDE
0279   REF   1                43,2275  53'014 1           DXCH    CPHIX
0280   REF   5  LAST  243      43,2276  3 0034 0           CA      CDUZ
0281   REF   2  LAST  257      43,2277  55'015 0           TS      CPHIX +2
0282   REF   2  LAST  252      43,2300  0 2117 1           TC      GOPIN

R0283                V61     VERB 61

0284   REF   1                43,2301  0 3065 1  V61      TC      DOWNX           CLEAR NEEDLFLG, PHASE
0285   REF   1                43,2302   00006 1           ADRES   NEEDLFLG        PLANE A/P FOLLOWING ERROR DISPLAYED
0286   REF   1                43,2303  0 3071 1  SETNEEDL TC      UPX             SET NEEDLFLG, TOTAL ATT ERR DISPLAYED

R0287                V62     VERB 62

0290   REF  17  LAST  247      43,2304  0 5547 1  V62      TC      UPFLAG
02902  REF   1                43,2305   00220 1           ADRES   N22ORN17        COMPUTE TOTAL ATTITUDE ERROR WRT N22
02904  REF   1                43,2306  0 2303 0           TC      SETNEEDL

R02905               V63     VERB 63

02908  REF  17  LAST  247      43,2307  0 5561 0  V63      TC      DOWNFLAG
02909  REF   2  LAST  257      43,2310   00220 1           ADRES   N22ORN17        COMPUTE TOTAL ASTRONAUT ATTITUDE ERROR
029093 REF   2  LAST  257      43,2311  0 2303 0           TC      SETNEEDL
```

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P0291           ALINTIME    VERB 55          DESCRIPTION
R0292               1. SET EXT VERB DISPLAY BUSY FLAG.
R0293               2. DISPLAY FLASHING V25,N24 (LOAD DELTA TIME FOR AGC CLOCK.
R0294               3. REQUIRE EXECUTION OF VERB 23.
R0295               4. ADD DELTA TIME, RECEIVED FROM INPUT REGISTER, TO THE COMPUTER TIME.
R0297               5. RELEASE EXT VERB DISPLAY SYSTEM

 0298  REF   1                                                  COUNT* $$/R33
 0299  REF   4  LAST  256   43,2312  0 2076 1  ALINTIME TC     TESTXACT

 0300  REF   1               43,2313  3 2341 0            CAF    VNLODDT
 0301  REF  24  LAST  256    43,2314  0 4636 0            TC     BANKCALL
 0302  REF   1               43,2315   20576 1            CADR   GOMARKF
 0303  REF   5  LAST  255    43,2316  0 5524 1            TC     ENDEXT          TERMINATE
 0304  REF   6  LAST  258    43,2317  0 5524 1            TC     ENDEXT          PROCEED
 0305  REF   1               43,2320  4 4615 0            CS     DEC23           DATA IN OR RESEQUENCE(UNLIKELY)
 0306  REF  28  LAST  250    43,2321  6 0154 1            AD     MPAC            RECALL LEFT VERB IN MPAC
 0307                        43,2322  0 0006 1            EXTEND
 0308  REF   1               43,2323  1 2325 0            BZF    UPDATIME        GO AHEAD WITH UPDATE ONLY IF RECALL
 0309  REF   7  LAST  258    43,2324  0 5524 1            TC     ENDEXT            WITH V23 (DATA IN).
 0310                        43,2325  0 0004 0  UPDATIME INHINT                   DELTA TIME IS IN DSPTEM1, +1.
 0311  REF  29  LAST  246    43,2326  3 4772 1            CAF    ZERO
 0313  REF  23  LAST  238    43,2327  54 001 1            TS     L               ZERO T1 & 2 WHILE ALIGNING.
 0314  REF   8  LAST  243    43,2330  52 025 1            DXCH   TIME2
 0315  REF  29  LAST  258    43,2331  52 155 1            DXCH   MPAC
 0316  REF   2  LAST   82    43,2332  53'255 0            DXCH   DSPTEM2 +1      INCREMENT
 0317  REF  30  LAST  258    43,2333  20 155 1            DAS    MPAC

 0318  REF   1               43,2334  0 7224 1            TC     DPAGREE         FORCE SIGN AGREEMENT
 0319  REF  31  LAST  258    43,2335  52 155 1            DXCH   MPAC            NEW CLOCK.
 0320  REF   9  LAST  258    43,2336  20 025 1            DAS    TIME2
 0321                        43,2337  0 0003 1            RELINT
 0322  REF   8  LAST  258    43,2340  0 5524 1  UPDTMEND  TC     ENDEXT
 0324                        43,2341   06230 0  VNLODDT   VN     2524            V25N24 FOR LOAD DELTA TIME


R0347   REDO AND TSELECT ARE NOW IN SYSTEM TEST.

 0348  REF   2 LAST  249 TO  258:   202   202*                 COUNT* $$/EXTVB
R0349           CKOPTVB     VERB 65          DESCRIPTION
R0350               OPTICAL VERIFICATION FOR PRELAUNCH.
R0351               1. SCHEDULE GCOMPVER, OPTICAL VERIFICATION SUBPROGRAM, WITH PRIORITY 17.

 0353  REF   9  LAST  248    43,2342  0 5354 0  CKOPTVB   TC     CHECKMM
 0354                        43,2343   00002 0             MM     02              I WONDER IF PRELAUNCH IS RUNNING
 0355  REF  13  LAST  253    43,2344  0 2116 0            TC     ALM/END         NOT RUNNING OPERATOR ERROR
 0357  REF   3  LAST  205    43,2345  3 5055 1            CAF    PRIO16           PRELAUNCH OPTICAL VERIFICATION
 0358  REF   6  LAST  248    43,2346  0 5135 0            TC     FINDVAC
 0359  REF   1               E5,1425                      EBANK= QPLACE
 0360  REF   2  LAST  233    43,2347   02000 0            2CADR  COMPVER         STANDARD LEADIN TO GCOMPVER.
 0360                        43,2350   66065 1
```

```
 0361   REF   3  LAST  257   43,2351  0 2117 1            TC      GOPIN

RC362   V 78....          TO CHANGE GYROCOMPASS AZIMUTH

 0363   REF  10  LAST  258   43,2352  0 5354 0  CHAZFOGC  TC      CHECKMM         IS IT PRELAUNCH
 0363I                      43,2353   00002 0             MM      02
 0363J  REF  14  LAST  258   43,2354  0 2116 0            TC      ALM/END         NO - OPERA TOR ERROR

 0364   REF   4  LAST  258   43,2355  3 5055 1            CAF     PRIO16          PRELAUNCH AZIMUTH CHANGE
 0365   REF   7  LAST  258   43,2356  0 5135 0            TC      FINDVAC
 0366   REF  12  LAST  236   E5,1671                      EBANK=  XSM
 0367   REF   2  LAST  233   43,2357   03132 1            2CADR   AZMTHCG1
 0367                       43,2360   66105 0
 0368   REF   7  LAST  220   43,2361  0 5402 1            TC      PHASCHNG
 0369                       43,2362   00174 0            OCT     00174
 0369S  REF   1             01,2146                4P17SPT1 =      4,17SPOT
 0370   REF   4  LAST  259   43,2363  0 2117 1            TC      GOPIN
```

```
P0371                IMUATTCK    VERB 43          DESCRIPTION
R0372                    LOAD IMU ATTITUDE ERROR METERS
R0373                    1. REQUIRE PROGRAM 00 ACTIVE, COARSE ALIGN ENABLE BIT OFF  AND ZERO ICDU BIT OFF.
R0375                    2. IF GUID REF RELEASE OR LIFTOFF HAS OCCURRED  REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY
R0377                       FLAG, OTHERWISE ALLOW CURRENT EXT VERB DISPLAY TO BE OVER-RIDDEN.
R0379                    3.  REMOVE COARSE ALIGN ENABLE AND IMU ERROR COUNTER ENABLE
R0380                    4. DISPLAY FLASHING V25,N22 (LOAD NEW ICDU ANGLES).
R0381                    5. UPON PROCEED OR ENTER RESPONSE, INITIALIZE CURRENT DAC AND COMMAND VALUES, ENABLE ERROR COUNTERS
R0383                       TRANSFER LOADED VALUES TO REGISTERS, AND SEND COMMANDS.
R0384                    6. IF BUSY FLAG SET, RESET IT TO RELEASE EXT VERB DISPLAY.

 0385   REF   2  LAST  255   43,2364  0 2714 1  IMUATTCK TC      CHKPOOH

 0386   REF   5  LAST  205   43,2365  3 5001 0            CAF     BITS4&5        CHECK IF IMU ZERO AND IMU COARSE ARE ON
 0387                        43,2366  0 0006 1            EXTEND
 0388   REF  24  LAST  195   43,2367  02 012 0            RAND    CHAN12
 0389   REF  71  LAST  250   43,2370  10 000 0            CCS     A
 0390   REF  15  LAST  259   43,2371  1 2116 1            TCF     ALM/END        NOT ALLOWED IF IMU COARSE OR IMU ZERO ON

 0391   REF   1              43,2372  0 2427 1            TC      CKLFTBTS       IS IT BEFORE OR AFTER LIFTOFF
 0392   REF   5  LAST  258   43,2373  0 2076 1            TC      TESTXACT       AFTER
 0393   REF   2  LAST  214   43,2374  4 5004 1            CS      OCT50          REMOVE COARSE AND ECTR ENABLE.
 0394                        43,2375  0 0006 1            EXTEND
 0395   REF  25  LAST  260   43,2376  03 012 1            WAND    CHAN12

 0396   REF   2  LAST  254   43,2377  3 2163 1            CAF     VNLODCDU
 0397   REF  25  LAST  258   43,2400  0 4636 0            TC      BANKCALL
 0398   REF   4  LAST  256   43,2401   20576 1            CADR    GOXDSPF
 0399   REF   1              43,2402  1 2414 0            TCF     TRMATTCK
 0400                        43,2403  0 2404 0            TC      +1
 0401   REF   4  LAST  222   43,2404  0 4611 0            TC      E6SETTER       FOR NEEDLES.

 0403   REF   6  LAST  236   E6,1476                      EBANK=  AK

 0404   REF  26  LAST  260   43,2405  0 4636 0            TC      BANKCALL       INITIALIZE CURRENT DAC AND
 0405   REF   1              43,2406   42450 0            CADR    NEEDLE11       COMMAND VALUES

 0406   REF  27  LAST  260   43,2407  0 4636 0            TC      BANKCALL       ENABLE ERROR COUNTERS.
 0407   REF   1              43,2410   42467 1            CADR    NEEDLER2

 0408   REF   3  LAST  250   43,2411  3 4767 0            CAF     TWO            4 MS MIN.
 0410   REF   4  LAST  171   43,2412  0 5223 1            TC      TWIDDLE
 0411   REF   1              43,2413   02417 1            ADRES   ATTCK1
 0413   REF   2  LAST  260   43,2414  0 2427 1  TRMATTCK  TC      CKLFTBTS       IS IT BEFORE OR AFRER LIFTOFF
 0414   REF   9  LAST  258   43,2415  1 5524 0            TCF     ENDEXT         AFTER
 0415   REF   5  LAST  259   43,2416  0 2117 1            TC      GOPIN

 0416                        43,2417  0 0006 1  ATTCK1    EXTEND                 TRANSFER LOADED VALUES TO DESIRED REGS.
 0417   REF  11  LAST  182   43,2420  3 1310 1            DCA     THETAD
```

```
0418  REF   7  LAST  260   43,2421  53'477 0          DXCH   AK
0419  REF  12  LAST  260   43,2422  31'311 0          CAE    THETAD +2
0420  REF   8  LAST  261   43,2423  55'500 1          TS     AK +2

0421  REF  13  LAST  212   43,2424  0 4714 1          TC     IBNKCALL      SENDS COMMANDS LIMITED TO +,- 384 PULSES
0422  REF   1              43,2425   42503 1          CADR   NEEDLES       AND LEAVES ERROR COUNTERS ENABLED.

0423  REF  10  LAST  247   43,2426  0 5314 1          TC     TASKOVER

0424  REF   1              43,2427  3 4764 0  CKLFTBTS CAF    GRRBKBIT      HAS LIFTOFF OCCURRED
0425  REF   8  LAST  245   43,2430  7 0101 0          MASK   FLAGWRD5
0426  REF  72  LAST  260   43,2431  10 000 0          CCS    A
0427  REF  28  LAST  250   43,2432  0 0002 0  XACTOQ  TC     Q             YES
0428  REF  15  LAST  152   43,2433  3 4764 0          CAF    BIT5
0429                       43,2434  0 0006 1          EXTEND
0430  REF   4  LAST  173   43,2435  02 030 0          RAND   CHAN30
0431  REF   3  LAST  170   43,2436  1 5651 1          TCF    INCRQCK
0436  REF   6  LAST  260   43,2437  0 2076 1  VB64    TC     TESTXACT
0438  REF   1              43,2440  3 4755 1          CAF    PRIO4
0439  REF   8  LAST  259   43,2441  0 5135 0          TC     FINDVAC
0440  REF   2  LAST   94   E4,1711                    EBANK= RHOSB
0441  REF   1              43,2442   03504 0          2CADR  SBANDANT      CALC.,DISPLAY S-BAND ANTENNA ANGLES.
0441  REF   1              43,2443   64104 0
0442  REF   5  LAST  221   43,2444  0 5205 0          TC     ENDOFJOB
```

```
R0443          ENATMA    VERB 58            DESCRIPTION
R0444              ENABLE AUTOMATIC ATTITUDE MANEUVER

R0445      VERB58 RESETS STIKFLAG TO ENABLE R61 TO PERFORM AUTOMATIC TRACKING MANEUVERS, AFTER INTERUPTIONS BY RHC ACT-
R0447      IVITY.

0448  REF  18  LAST  257   43,2445  0 5547 1  ENATMA  TC     UPFLAG        SET FLAG TO ENABLE R60 MANEUVER
0449  REF   2  LAST  210   43,2446   00055 1          ADRES  V50N18FL
04491 REF   2  LAST  257   43,2447  0 3065 1          TC     DOWNX         RESET STIKFLAG
0450  REF   2  LAST  211   43,2450   00020 0          ADRES  STIKFLAG
```

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R0467          STABLISH    VERB 46            DESCRIPTION
R0468              ESTABLISH G & N AUTOPILOT CONTROL
R0469              1. SETS UP EITHER RCS, ENTRY, OR SATURN
R0470              2. IF TVC IS ON, SETS UP CSM/LM SWITCH-OVER
R0471                      FROM HIGH BW TO LOW BW

0473  REF   5  LAST  260   43,2451  0 4611 0  STABLISH TC     E6SETTER

0475  REF   5  LAST  209   43,2452  4 0102 0          CS     FLAGWRD6            TEST FOR TVC
0476  REF   5  LAST  209   43,2453  7 4076 0          MASK   DPCONFIG
0477                       43,2454  0 0006 1          EXTEND
0478  REF   1              43,2455  6 2465 1          BZMF   DAPFIG
```

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04781  REF  10  LAST  233  43,2456  31'465 1                CAE     DAPDATR1        TEST FOR CSM/LM
04782  REF  20  LAST  198  43,2457  7 4753 0                MASK    BIT14
04783                       43,2460  0 0006 1                EXTEND
04784  REF  16  LAST  260  43,2461  6 2116 0                BZMF    ALM/END         CSM, SO ALARM AND EXIT

0479   REF  28  LAST  260  43,2462  0 4636 0                TC      BANKCALL        CSM/LM, SO PERFORM HB TO LB SWITCH-OVER
04795  REF   1             43,2463   36344 1                CADR    SWICHOVR

0480   REF   6  LAST  260  43,2464  0 2117 1                TC      GOPIN

0487   REF  15  LAST  145  43,2465  4 4760 0  DAPFIG        CS      BIT9            TURN OFF SIVB TAKEOVER
0488                       43,2466  0 0006 1                EXTEND
0489   REF  26  LAST  260  43,2467  03 012 1                WAND    CHAN12
0490   REF  11  LAST  262  43,2470  31'465 1                CAE     DAPDATR1        DETERMINE VEHICLE CONFIGURATION
0491                       43,2471  0 0006 1                EXTEND
0491   REF  15  LAST  199  43,2472  7 4766 0                MP      BIT3            RIGHT SHIFT 4 OCTAL DIGITS
0492   REF   4  LAST  223  43,2473  7 6214 1                MASK    THREE           (IN CASE BIT 15 IS USED)
0493                       43,2474  0 0004 0                INHINT
0494   REF  73  LAST  261  43,2475  50 000 1                INDEX   A
0495                       43,2476  1 2477 0                TCF     +1              BRANCH BASED ON CONFIG
0496   REF   1             43,2477  1 2522 1                TCF     NODAPUP         CM.. ACTIVATE NODAP
0497   REF   1             43,2500  1 2517 1                TCF     RCSDAPUP        CSM..ACTIVATE RCSDAP
0498   REF   2  LAST  262  43,2501  1 2517 1                TCF     RCSDAPUP        CSM/LM ACTIVATE RCSDAP
0499                       43,2502  0 0006 1  SATSTKON       EXTEND
0500   REF   1             43,2503  3 2516 1                DCA     2REDOSAT
0501   REF   4  LAST  199  43,2504  52 113 0                DXCH    T5LOC
0502   REF   6  LAST  202  43,2505  3 4750 1                CAF     POSMAX
0503   REF   3  LAST  202  43,2506  54 030 0                TS      TIME5
0504   REF   6  LAST  261  43,2507  4 0102 0                CS      FLAGWRD6        TURN ON BITS 15,14 OF FLAGWRD6
0505   REF   6  LAST  261  43,2510  7 4076 0                MASK    DPCONFIG
0506   REF   7  LAST  262  43,2511  26 102 0                ADS     FLAGWRD6        SATSTICK CONTROL OF T5
0507   REF  14  LAST  261  43,2512  0 4714 1                TC      IBNKCALL        ZERO JET CHANNELS IN 14MS AND THEN
0508   REF   1             43,2513   42642 1                CADR    ZEROJET         LEAVE THE T6 CLOCK DISABLED
0509   REF   7  LAST  262  43,2514  0 2117 1                TC      GOPIN           EXIT THUS BECAUSE WE CAME VIA V46

0510   REF   3  LAST  234  E6,1704                           EBANK=  SPOLYARG
0511   REF   2  LAST  205  43,2515   02000 0  2REDOSAT      2CADR   REDOSAT
0511                       43,2516   54106 1

0512   REF  15  LAST  262  43,2517  0 4714 1  RCSDAPUP      TC      IBNKCALL
0513   REF   2  LAST  209  43,2520   42042 1                CADR    RCSDAPON
0514   REF   8  LAST  262  43,2521  1 2117 0                TCF     GOPIN

0515   REF  16  LAST  262  43,2522  0 4714 1  NODAPUP       TC      IBNKCALL        ZERO JET CHANNELS IN 14 MS. AND THEN
0516   REF   2  LAST  262  43,2523   42642 1                CADR    ZEROJET         LEAVE THE T6 CLOCK DISABLED.
0517   REF  20  LAST  244  43,2524  3 4770 0                CAF     BIT1
0518   REF   3  LAST  188  43,2525  55'340 0                TS      HOLDFLAG        KILL KALCMANU JOB

0519                       43,2526  0 0006 1  EXDAPOFF      EXTEND
0520   REF   1             43,2527  3 2721 1                DCA     IDLECADR        SET T5 TO IDLE
```

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0521	REF	5	LAST	262	43,2530	52 113 0	DXCH	T5LOC
0522	REF	7	LAST	262	43,2531	4 4076 0	CS	DPCONFIG
0523	REF	8	LAST	262	43,2532	7 0102 0	MASK	FLAGWRD6
0524	REF	9	LAST	263	43,2533	54 102 0	TS	FLAGWRD6
0525	REF	9	LAST	262	43,2534	0 2117 1	TC	GOPIN

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P0526              CREWMANU    VERB 49            DESCRIPTION
R0527                  START AUTOMATIC ATTITUDE MANEUVER
R0528                  1. REQUIRE PROGRAM 00 ACTIVE.
R0529                  2. SET EXT VERB DISPLAY BUSY FLAG.
R0530                  3. SCHEDULE R62DISP WITH PRIORITY 10.
R0531                  4. RELEASE EXT VERB DISPLAY.

R0532              R62DISP
R0533                  1. DISPLAY FLASHING V06,N22 (DECIMAL DISPLAY NEW ICDU ANGLES). UPON IMMEDIATE RETURN, SET-UP GROUP
R0535                     4 FOR RESTART OF DISPLAY SEQUENCE.
R0536                     RESPONSES
R0537                     A. TERMINATE
R0538                        1. GO TO GOTOPOOH.
R0539                     B. PROCEED
R0540                        1. SET 3AXISFLG TO INDICATE MANEUVER IS SPECIFIED BY 3 AXIS.
R0542                        2. EXECUTE R60CSM (ATTITUDE MANEUVER).
R0543                        3. ZERO GROUP 4 (END R62).
R0544                     C. ENTER
R0545                        1. REPEAT FLASHING V06,N22.

 0546  REF   3 LAST  260   43,2535  0 2714 1  CREWMANU TC     CHKPOOH         DEMAND POO

 0547  REF   7 LAST  261   43,2536  0 2076 1           TC     TESTXACT

 0548  REF   1            43,2537  3 4754 0           CAF    PRIO10
 0549  REF   9 LAST  261   43,2540  0 5135 0           TC     FINDVAC
 0550  REF   5 LAST  230   E6,1774                     EBANK= R61CNTR
 0551  REF   1            43,2541    02427 1          2CADR  R62DISP
 0551  REF   1            43,2542    56106 0
 0552  REF   6 LAST  261   43,2543  0 5205 0           TC     ENDOFJOB
```

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P0553                DAPDISP     VERB 48              DESCRIPTION
R0554                    LOAD AUTOPILOT DATA (ROUTINE R03)
R0555                    0. CHECKFAIL AND RETURN IF TVC.
R0556                    1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG.
R0557                    2. LOWER PRIORITY TO 10.
R0558                    3. DISPLAY FLASHING V04,N46 (DISPLAY AUTOPILOT CONFIGURATION)
R0560                    4. UPON PROCEED RESPONSE, EXECUTE S41.2.
R0561                    5. DISPLAY FLASHING V06,N47 (DISPLAY CSM WGT., LEM WGT.)
R0562                    6. UPON PROCEED RESPONSE EXECUTE S40.14.
R0563                    7. DISPLAY FLASHING V06,N48 (DISPLAY PITCH TRIM, YAW TRIM)
R0564                    8. UPON PROCEED RESPONSE, RELEASE EXTENDED VERB DESPLAY SYSTEM
 0566   REF   3 LAST  258 TO  265:    130   332*          COUNT* $$/EXTVB
 0567   REF  10 LAST  263    43,2544  4 0102 0  DAPDISP  CS     FLAGWRD6
 0568   REF   8 LAST  263    43,2545  7 4076 0           MASK   DPCONFIG
 0569                        43,2546  0 0006 1           EXTEND
 0570                        43,2547  6 2551 1           BZMF   +2              TVC = 10, CS YIELDS 01, BZMF TO CONTINUE
 0571   REF  17 LAST  262    43,2550  0 2116 0           TC     ALM/END         RETURN IF TVC

 0572   REF   8 LAST  264    43,2551  0 2076 1           TC     TESTXACT
 0573   REF   2 LAST  264    43,2552  3 4754 0           CAF    PRIO10
 0574   REF   3 LAST  246    43,2553  0 5121 0           TC     NOVAC
 0575   REF  12 LAST  262    E6,1465                     EBANK= DAPDATR1
 0576   REF   1              43,2554    02000 0         2CADR  DONOUN46
 0576   REF   1              43,2555    64106 1

 0577   REF   7 LAST  264    43,2556  0 5205 0           TC     ENDOFJOB

 0579   REF   1              42,2000                     SETLOC EXTVBS
 0580                        42,2000                     BANK
 0581   REF   1                                          COUNT* $$/R03
 0582   REF   1              42,2000  3 2055 0  DONOUN46 CAF    V04N46          R1          R2
 0583   REF  29 LAST  262    42,2001  0 4636 0           TC     BANKCALL        DAPDATR1    DAPDATR2
 0584   REF   5 LAST  260    42,2002    20576 1          CADR   GOXDSPF         GOXDSP ROUTINES USED FOR EXTENDED VERBS.

 0585   REF  10 LAST  260    42,2003  0 5524 1           TC     ENDEXT          EXT. VBS GO TO ENDEXT, NOT ENDOFJOB.
 0586                        42,2004  0 2006 0           TC     +2
 0587   REF   2 LAST  265    42,2005  0 2000 0           TC     DONOUN46

 0588   REF  13 LAST  265    42,2006  3 1465 1           CA     DAPDATR1
 0589   REF  19 LAST  221    42,2007  7 4765 0           MASK   BIT4
 0590   REF  74 LAST  262    42,2010  10 000 0           CCS    A
 0591   REF   1              42,2011  1 2050 1           TCF    MAXIN
 0592   REF  18 LAST  257    42,2012  0 5561 0           TC     DOWNFLAG
 0593   REF   1              42,2013    00212 0         ADRES  MAXDBFLG
 0594   REF  30 LAST  265    42,2014  0 4636 0  MAXOUT   TC     BANKCALL
 0595   REF   1              42,2015    40463 1          CADR   S41.2

 0596   REF   1              42,2016  3 2054 1  DONOUN47 CAF    V06N47          R1          R2          R3
 0597   REF  31 LAST  265    42,2017  0 4636 0           TC     BANKCALL        CSM WGT.    LEM WGT.    BLANK
 0598   REF   6 LAST  265    42,2020    20576 1          CADR   GOXDSPF
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0599  REF  11  LAST  265   42,2021  0 5524 1            TC      ENDEXT
0600                       42,2022  0 2024 0            TC      +2
0601  REF   1              42,2023  0 2016 1            TC      DONOUN47
0602  REF  14  LAST  265   42,2024  31'465 1            CAE     DAPDATR1      DO MASS PROPERTIES CALCULATION ONLY IF
0603  REF   5  LAST  209   42,2025  7 4346 0            MASK    PRIO30        CONFIG = 1(CSM), 2(CSM/LM), 6(CSM/LMA)
0604                       42,2026  0 0006 1            EXTEND
0605  REF   1              42,2027  1 2042 1            BZF     DONOUN48      SKIP IF 0, 4
0606                       42,2030  4 0000 0            COM
0607  REF   6  LAST  266   42,2031  7 4346 0            MASK    PRIO30
0608                       42,2032  0 0006 1            EXTEND
0609  REF   2  LAST  266   42,2033  1 2042 1            BZF     DONOUN48      SKIP IF 3, 7
0610                       42,2034  0 0004 0            INHINT
0611  REF  17  LAST  262   42,2035  0 4714 1            TC      IBNKCALL
0612  REF   2  LAST  209   42,2036   13313 1            CADR    MASSPROP      UPDATE IXX, IAVG, IAVG/TLX

0613                       42,2037  0 0003 1            RELINT
0614  REF  32  LAST  265   42,2040  0 4636 0            TC      BANKCALL
0615  REF   1              42,2041   40614 0            CADR    S40.14        COMPUTE RCS DAP STUFF

0616  REF   1              42,2042  3 2053 0  DONOUN48  CAF     V0648         R1          R2          R3
0617  REF  33  LAST  266   42,2043  0 4636 0            TC      BANKCALL      PTRIM       YTRIM       BLANK
0618  REF   7  LAST  265   42,2044   20576 1            CADR    GOXDSPF

0619  REF  12  LAST  266   42,2045  0 5524 1            TC      ENDEXT
0620  REF  13  LAST  266   42,2046  0 5524 1            TC      ENDEXT
0621  REF   3  LAST  266   42,2047  0 2042 0            TC      DONOUN48

0622  REF  19  LAST  261   42,2050  0 5547 1  MAXIN     TC      UPFLAG
0623  REF   2  LAST  265   42,2051   00212 0            ADRES   MAXDBFLG
0624  REF   1              42,2052  0 2014 0            TC      MAXOUT

0625                       42,2053   01460 1  V0648     VN      0648
0626                       42,2054   01457 0  V06N47    VN      0647
0627                       42,2055   01056 0  V04N46    VN      0446
0629  REF   2  LAST  249   43,2000                      SETLOC  EXTVERBS
0630                       43,2557                      BANK

0631  REF   4 LAST  265 TO  265:    11   343*           COUNT*  $$/EXTVB
R0632          V82PERF     VERB 82              DESCRIPTION
R0633               REQUEST ORBIT PARAMETERS DISPLAY (R30)
R0634  1. IF AVERAGE G IS OFF:
R0635          FLASH DISPLAY V04N06. R2 INDICATES WHICH SHIP'S STATE VECTOR IS
R0636           TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1). ASTRONAUT
R0637           CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R0638          SELECTED STATE VECTOR UPDATED BY THISPREC (OTHPREC).
R0639          CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R0640           RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R0641           HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R0642           HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R0643           INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
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R0644              FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R0645               NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R0646               ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R0647               DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R0648               ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R0649    2. IF AVERAGE G IS ON:
R0650              CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R0651               FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R0652               OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R0653              FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R0654              IF MODE IS P11, THEN CALL DELRSPL SO ASTRONAUT CAN MONITOR
R0655               RESULTS BY N50E. SPLASH COMPUTATION DONE ONCE PER TWO SECS.


R0656    ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R0657                ABOVE REMARKS.
 0658    REF    9  LAST  265   43,2557  0 2076 1  V82PERF  TC     TESTXACT
 0659    REF    2  LAST  219   43,2560  3 5051 0            CAF    PRIO7
 0660    REF    2  LAST  242   43,2561  0 5176 1            TC     PRIOCHNG
 0661    REF   11  LAST  257   43,2562  0 4655 0            TC     POSTJUMP
 0662    REF    1             43,2563   46330 0            CADR   V82CALL        ***** V82CALL MUST NOT BE A FINDVAC JOB.

R0663              V83PERF     VERB 83              DESCRIPTION
R0664                  REQUEST RENDEZVOUS PARAMETER DISPLAY (R31)
R0665                  1. SET EXT VERB DISPLAY BUSY FLAG.
R0666                  2. SCHEDULE V83CALL WITH PRIORITY 10.
R0667                     A. DISPLAY
R0668                           R1  RANGE
R0669                           R2  RANGE RATE
R0670                           R3  THETA

 0671    REF   10  LAST  267   43,2564  0 2076 1  V83PERF  TC     TESTXACT
 0672    REF   20  LAST  266   43,2565  0 5547 1            TC     UPFLAG
 0673    REF    1             43,2566   00222 0            ADRES  R31FLAG
 0674    REF    4  LAST  246   43,2567  3 5047 1    +3      CAF    PRIO5
 0675    REF    4  LAST  265   43,2570  0 5121 0            TC     NOVAC
 0676    REF    3  LAST  219   E4,1760                      EBANK= SUBEXIT
 0677    REF    1             43,2571   02000 0            2CADR  R31CALL
 0677    REF    1             43,2572   62064 1
 0678    REF    8  LAST  265   43,2573  0 5205 0            TC     ENDOFJOB


 0679    REF   11  LAST  267   43,2574  0 2076 1  V85PERF  TC     TESTXACT
 0680    REF   19  LAST  265   43,2575  0 5561 0            TC     DOWNFLAG       RESET R31 FLAG TO INDICATE R34
 0681    REF    2  LAST  267   43,2576   00222 0            ADRES  R31FLAG
 0682    REF    3  LAST  250   43,2577  0 2567 1            TC     V83PERF +3
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PC683                GOTOR23 VERB 54 DESCRIPTION

RC684           SET UP MARKING FOR R22(REND TRACK DATA PROC)
RC685           1. SET EXT VERB DISPLAY BUSY FLAG
RC686           2. IF REND (P20 RUNNING) + TRACK (TRACKING ALLOWED) FLAGS ARE SET,
RC687                SCHEDULE R23 WITH PRIORITY 16, OTHERWISE TURN ON ALARM 406


RC688           3. RELEASE EXT VERB DISPLAY SYSTEM
 0691   REF  12  LAST  267   43,2600  0 2076 1  GOTOR23  TC      TESTXACT
 0692   REF  16  LAST  222   43,2601  3 0074 1           CA      FLAGWRD0        V54 UNACCEPTABLE UNLESS BOTH
 0693   REF   7  LAST  215   43,2602  7 4762 1           MASK    RNDVZBIT              RENDEZVOUS AND TRACK FLAGS ON
 0694                        43,2603  0 0006 1           EXTEND
 0695   REF   1              43,2604  1 2616 0           BZF     R22ALARM

 0696   REF  19  LAST  247   43,2605  3 0075 0           CA      FLAGWRD1
 0697   REF   5  LAST  222   43,2606  7 4764 1           MASK    TRACKBIT
 0698                        43,2607  0 0006 1           EXTEND
 0699   REF   2  LAST  268   43,2610  1 2616 0           BZF     R22ALARM

 0704   REF   5  LAST  259   43,2611  3 5055 1           CAF     PRIO16          LOWER THAN R22
 0705   REF   5  LAST  267   43,2612  0 5121 0           TC      NOVAC
 0706   REF  15  LAST  248   E7,1722                     EBANK=  MRKBUF1
 0707   REF   1              43,2613   02263 1           2CADR   R23CSM
 0707   REF   1              43,2614   76067 1
 0708   REF   9  LAST  267   43,2615  0 5205 0                   TC      ENDOFJOB
 0709   REF  18  LAST  255   43,2616  0 5671 1  R22ALARM TC      ALARM           VERB 57 WAS SELECTED AND NEITHER REND
 0710                        43,2617   00406 0           OCT     00406             NOR TRACK FLAG WERE ON.
 0711   REF  14  LAST  266   43,2620  0 5524 1           TC      ENDEXT
```

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P0712                VERB 86    DESCRIPTION
R0713                  V86 IS TO R23 AS MARK REJECT IS TO R21
R0714                  V86 IS THE MARK REJECT FOR R23(THE BACKUP MARKING ROUTINE)
 0715  REF  16  LAST  268   E7,1722                          EBANK=  MRKBUF1
 0716  REF   2  LAST  208   43,2621  0 4606 0  V86PERF     TC      E7SETTER        BACKUP MARK REJ.
 0717  REF  17  LAST  269   43,2622  3 1722 1               CA      MRKBUF1
 0718                       43,2623  0 0006 1               EXTEND
 0719                       43,2624  1 2627 1               BZF     +3
 0720                       43,2625  0 0006 1               EXTEND
 0721  REF   1              43,2626  6 2632 1               BZMF    BKRJCT

 0722  REF   7  LAST  247   43,2627  3 7702 0               CA      NEGONE
 0723  REF  18  LAST  269   43,2630  55'722 0               TS      MRKBUF1
 0724  REF  10  LAST  263   43,2631  0 2117 1               TC      GOPIN
 0725  REF   2  LAST  247   43,2632  3 4762 0  BKRJCT       CAF     R22CABIT
 0726  REF   4  LAST  247   43,2633  7 0105 1               MASK    FLAGWRD9
 0727                       43,2634  0 0006 1               EXTEND
 0728  REF  11  LAST  269   43,2635  1 2117 0               BZF     GOPIN

 0729  REF  21  LAST  267   43,2636  0 5547 1               TC      UPFLAG
 0730  REF   2  LAST  247   43,2637   00231 1               ADRES   REJCTFLG
 0731  REF  12  LAST  269   43,2640  1 2117 0               TCF     GOPIN
```

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R0732            TRACKTRM     VERB 56              DESCRIPTION
R0733                 TERMINATE TRACKING (P20)
R0734                 1. KNOCK DOWN RENDEZVOUS, TRACK, AND UPDATE FLAGS.
R0735                 2. REQUIRE P20 NOT RUNNING ALONE OR GO TO GOTOPOOH (REQUEST PROGRAM 00).
R0737                 3. REQUIRE R22 RUNNING OR GO TO PINBRNCH.
R0738                 4. IF INTEGRATION RUNNING, STALL UNTIL IT IS COMPLETED, THEN ZERO GROUPS 2 AND 3 TO KILL R21 + R22.
R0740                 3. KNOCK DOWN RENDEZVOUS, R22, R21, TRACK, UPDATE, AND TARGI FLAGS.
R0742                 4. GO TO ENEMA (SOFTWARE RESTART).
R0743                 REFERENCE
R0744                    P20 RENDEZVOUS  NAVIGATION.
R0745                    R21 RENDEZVOUS  TRACKING SIGHTING MARK.
R0746                    R22 RENDEZVOUS  TRACKING DATA PROCESSING.

 0747  REF   7  LAST  220   43,2641  0 6006 1  TRACKTRM TC      INTPRET
 0748                       43,2642   43014 0            CLEAR   BON
 0749  REF   1             43,2643   04275 0                    R67FLAG
 0750  REF   2  LAST  215   43,2644   04306 0                    UTFLAG
 0751  REF   1             43,2645   66655 1                    TRACKCHK
 0752                       43,2646   43014 0            BOFF    CLEAR
 0753  REF   1             43,2647   00350 1                    RNDVZFLG
 0754  REF   1             43,2650   66701 1                    EXPIN1
 0755  REF   6  LAST  216   43,2651   05270 1                    AUTOSEQ
 0756                       43,2652   43014 0            CLEAR   CLEAR
 0757  REF   2  LAST  211   43,2653   01261 0                    R21MARK
 0758  REF   1             43,2654   00670 0                    UPDATFLG
 0759                       43,2655   43014 0  TRACKCHK  BOFCLR  CLEAR
 0760  REF   3  LAST  219   43,2656   00652 0                    TRACKFLG
 0761  REF   1             43,2657   66676 0                    EXPIN
 0762  REF   2  LAST  214   43,2660   00267 1                    IMUSE
 0763                       43,2661   43014 0            CLEAR   CLEAR
 0764  REF   2  LAST  270   43,2662   00270 1                    RNDVZFLG
 0765  REF   3  LAST  270   43,2663   04266 1                    UTFLAG
 0766                       43,2664   45034 1            RTB     CALL
 0767  REF   1             43,2665   11030 1                    INITSUBB      DO STOPRATE AND RESTORDB
 0768  REF   3  LAST  228   43,2666   27516 0                    INTSTALL      DONT INTERRUPT INTEGRATION
 0769                       43,2667   77776 1            EXIT

 0770  REF   1             43,2670   0 5362 0           TC      2PHSCHNG
 0771                       43,2671    00002 0           OCT     2             KILL GROUP 2 TO HALT P20 ACTIVITY
 0772                       43,2672    00001 0           OCT     1             ALSO KILL GROUP 1

 0773                       43,2673   0 0004 0  CLEANOUT INHINT
 0774  REF  12  LAST  267   43,2674   0 4655 0           TC      POSTJUMP
 0775  REF   1             43,2675    12712 0           CADR    ENEMA         CAUSE RESTART

 0776                       43,2676   43014 0  EXPIN    CLEAR   CLEAR
 0777  REF   3  LAST  270   43,2677   00270 1                    RNDVZFLG
 0778  REF   4  LAST  270   43,2700   04266 1                    UTFLAG
 0779                       43,2701   77776 1  EXPIN1   EXIT
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 0780   REF  13  LAST  269   43,2702  0 2117 1            TC      GOPIN

R0781           LEMVEC     VERB 80              DESCRIPTION
R0782               UPDATE LEM STATE VECTOR
R0783                 RESET VEHUPFLG TO 0

 0784   REF   3  LAST  261   43,2703  0 3065 1  LEMVEC    TC      DOWNX
 0785   REF   1               43,2704   00026 0            ADRES   VEHUPFLG       VEHUPFLG DOWN INDICATES LEM

 0786   REF   2  LAST  257   43,2705  0 3071 1  CSMVEC    TC      UPX             VEHUPFLG UP INDICATES CM.

R0787           CSMVEC     VERB 81              DESCRIPTION
R0788               UPDATE CSM STATE VECTOR
R0789                 SET   VEHUPFLG TO 1

R0790           DNEDUMP    VERB 74              DESCRIPTION
R0791               INITIALIZE DOWN-TELEMETRY PROGRAM FOR ERASABLE MEMORY DUMP.
R0792               2. REPLACE CURRENT DOWNLIST WITH ERASABLE MEMORY.
R0793               3. RELEASE EXT VERB DISPLAY.

 0794   REF   1               43,2706  3 2711 1  DNEDUMP   CAF     LDNDUMPI
 0795   REF   2  LAST  202   43,2707  54 334 1            TS      DNTMGOTO
 0796   REF  14  LAST  271   43,2710  0 2117 1            TC      GOPIN

 0797   REF   2  LAST  249   43,2706              V74      EQUALS  DNEDUMP
 0798   REF   1               43,2711   03643 0  LDNDUMPI REMADR  DNDUMPI

R0799           LFTFLGON   VERB 75              DESCRIPTION
R0800               SET LIFT-OFF FLAG
R0801               1. SETUP GGRBKFLG, GUIDANCE REFERENCE RELEASE BACK-UP FLAG.
R0802               2. RETURN VIA PINBRNCH

 0803   REF   1               43,2712   00125 1            ADRES   GRRBKFLG       MUST PRECEDE LFTFLGON
 0804   REF   3  LAST  271   43,2713  0 3071 1  LFTFLGON  TC      UPX

 0805   REF   5  LAST  213   43,2714  3 1214 1  CHKPOOH   CA      MODREG
 0806                         43,2715  0 0006 1            EXTEND
 0807   REF   4  LAST  257   43,2716  1 6711 1            BZF     TCQ
 0808   REF  18  LAST  265   43,2717  1 2116 1            TCF     ALM/END

 0809   REF   9  LAST  233   E6,1423                      EBANK=  PACTOFF
 0810   REF   2  LAST  205   43,2720   03226 1  IDLECADR  2CADR   T5IDLOC
 0810                         43,2721   12106 0
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R0811   VERB 89 DESCRIPTION     RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)

R0812   CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED. CALCULATES AND
R0813   DISPLAYS FINAL GIMBAL ANGLES TO POINT CSM +X AXIS OR PREFERRED AXIS
R0814   (UNIT(Z)COS55 DEG + UNIT(X)SIN55 DEG) AT LM.

R0815   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R0816   EXIT R63, OTHERWISE CONTINUE.

R0817   2. IF IN P00, DO IMU STATUS CHECK (R02BOTH). IF IMU ON AND ITS
R0818   ORIENTATION KNOWN TO CGC, CONTINUE.

R0819   3. FLASH DISPLAY V 04 N 06. R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R0820   BE POINTED AT LM.  INITIAL CHOICE IS PREFERRED AXIS. (R2=1).
R0821   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT= 1) BY V 22 E 2 E. CONTINUE
R0822   AFTER KEYING IN PROCEED.

R0823   4. SET PREFERRED ATTITUDE FLAG ACCORDING TO OPTION DESIRED. SET FLAG
R0824   FOR PREFERRED AXIS. RESET FLAG FOR X AXIS.

R0825   5. CURRENT TIME IS STORED AND R63COMP IS CALLED

R0826        R63COMP JOB:

R0827        UPDATES CSM AND LM STATE VECTORS USING CONIC EQUATIONS

R0828        CALCULATES BOTH PREFERRED AND X AXIS TRACKING ATT FROM CSM TO LM.

R0829        DESIRED GIMBAL ANGLES AS INDICATED BY PREFERRED ATTITUDE FLAG
R0830        ARE STORED FOR LATER R60CSM CALL.

R0831   6. FLASH DISPLAY V 06 N18 AND AWAIT RESPONSE.

R0832   7. RECYCLE- RETURN TO STEP 5.
R0833      TERMINATE- EXIT R63 ROUTINE
R0834      PROCEED- RESET 3AXISFLG AND CALL R60CSM FOR ATTITUDE MANEUVER.

 0835   REF   4  LAST  264   43,2722  0 2714 1  V89PERF  TC      CHKPOOH        DEMAND P00
 0836   REF  13  LAST  268   43,2723  0 2076 1           TC      TESTXACT
 0837   REF   3  LAST  265   43,2724  3 4754 0           CAF     PRIO10
 0838   REF  10  LAST  264   43,2725  0 5135 0           TC      FINDVAC
 0839   REF   6  LAST  264   E6,1774                     EBANK=  R61CNTR
 0840   REF   1               43,2726   02377 0          2CADR   V89CALL
 0840   REF   1               43,2727   62066 0
 0841   REF  10  LAST  268   43,2730  1 5205 1           TCF     ENDOFJOB

 0842   REF  20  LAST  267   43,2731  0 5561 0  WMATRXNG TC      DOWNFLAG       RESET RENDWFLG
 0843   REF   2  LAST  228   43,2732   00131 1           ADRES   RENDWFLG
 0844   REF   4  LAST  271   43,2733  0 3065 1           TC      DOWNX
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 0845   REF   2  LAST  227   43,2734   00066 1          ADRES  CR&WFLAG
RC0846
 C0847   REF   1                43,2735                 GOSHOSUM EQUALS SHOWSUM

 C0848   REF   5  LAST  272   43,2735   0 2714 1  SHOWSUM  TC     CHKPOOH
 C0849   REF  14  LAST  272   43,2736   0 2076 1           TC     TESTXACT     *
 C0850   REF   1                43,2737   3 4770 0           CAF    S+1          *
 C0851   REF   2  LAST   87   43,2740   55'376 0           TS     SKEEP6       * SHOWSUM OPTION
 C0852   REF   1                43,2741   3 4772 1           CAF    S+ZERO       *
 C0853   REF   3  LAST  194   43,2742   55'362 0           TS     SMODE        * TURN OFF SELF-CHECK
 C0854   REF   1                43,2743   3 3177 0           CA     SELFADRS     *
 C0855   REF   3  LAST  204   43,2744   55'361 0           TS     SELFRET      *
 C0856   REF   1                43,2745   0 3454 1           TC     STSHOSUM     * ENTER ROPECHK

 C0857   REF   2  LAST   87   43,2746   23'372 0  SDISPLAY LXCH   SKEEP2       * BNK NO FOR DSP
 C0858   REF   2  LAST   87   43,2747   23'373 1           LXCH   SKEEP3       * BUGGER WORD FOR DSP
 C0859   REF   1                43,2750   3 3176 1  NOKILL   CA     ADRS1        *
 C0860   REF  32  LAST  258   43,2751   54 156 1           TS     MPAC +2      *
 C0861   REF   1                43,2752   3 2763 1           CA     VNCON        * 0501
 C0862   REF  34  LAST  266   43,2753   0 4636 0           TC     BANKCALL     *
 C0863   REF   8  LAST  266   43,2754    20576 1           CADR   GOXDSPF      *
 C0864                          43,2755   0 2760 1           TC     +3           *
 C0865   REF   1                43,2756   0 3565 1           TC     NXTBNK       *
 C0866   REF   1                43,2757   0 2750 1           TC     NOKILL       *
 C0867   REF   2  LAST  273   43,2760   3 3177 0           CA     SELFADRS
 C0868   REF   2  LAST   87   43,2761   55'371 1           TS     SKEEP1

 C0869   REF  15  LAST  268   43,2762   0 5524 1           TC     ENDEXT       *

 C0870                          43,2763    01201 0  VNCON    VN     501          *

 C0871   REF   3  LAST  273   43,2764   3 1376 1  ENDSUMS  CA     SKEEP6       *
 C0872                          43,2765   0 0006 1           EXTEND              *
 C0873   REF   2  LAST  205   43,2766   1 3270 0           BZF    SELFCHK      * ROPECHK, START SELFCHK AGAIN.
 C0874   REF   2  LAST  273   43,2767   0 3454 1           TC     STSHOSUM     * START SHOWSUM AGAIN.

RC0875           VB 87  SET VHF RANGE FLAG - ALLOWS R22 TO ACCEPT RANGE DATA.

RC0876           VB 88  RESET VHF RANGE FLAG - STOPS ACCEPTANCE OF RANGE DATA.

 C0877   REF   1                43,2770   0 5632 0  RESETVHF TC     TRFAILOF     TRACKER FAIL LIGHT
 C0878   REF   5  LAST  272   43,2771   0 3065 1           TC     DOWNX
 C0879   REF   3  LAST  216   43,2772    00215 1           ADRES  VHFRFLAG
 C0880   REF   4  LAST  271   43,2773   0 3071 1  SETVHFLG TC     UPX          V87 SET VHF RANGE FLAG

RC0881   VERB 66.  VEHICLES ARE ATTACHED.- MOVE THIS VEHICLE STATE VECTOR TO
RC0882           OTHER VEHICLE STATE VECTOR.
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R0883        USE SUBROUTINE GENTRAN.

 0884   REF   1                  E3,1554                    EBANK=  RRECTHIS
 0885   REF   4  LAST  272       43,2774   3 4754 0 ATTACHED CAF     PRIO1
 0886   REF  11  LAST  272       43,2775   0 5135 0         TC      FINDVAC
 0887   REF   2  LAST  274       E3,1554                    EBANK=  RRECTHIS
 0888   REF   1                  43,2776     02000 0        2CADR   ATTACHIT
 0888   REF   1                  43,2777     36103 0
 0889   REF  11  LAST  272       43,3000   0 5205 0         TC      ENDOFJOB

 0890   REF   1                  17,2000                    SETLOC  EXTVRBS1
 0891                            17,2000                    BANK
 08915  REF   1                                             COUNT*  $$/EXTVB
 0892   REF   8  LAST  270       17,2000   0 6006 1 ATTACHIT TC      INTPRET
 0893                            17,2001    77624 1         CALL
 0894   REF   4  LAST  270       17,2002    27516 0                 INTSTALL
 0895                            17,2003    43014 0         SET     BON
 0896   REF   1                  17,2004    04064 1                 MOONOTH
 0897   REF   1                  17,2005    04303 0                 MOONTHIS
 0898   REF   1                  17,2006    36011 1                 CMMOVE
 0899                            17,2007    77614 1         CLEAR
 0900   REF   2  LAST  274       17,2010    04264 0                 MOONOTH
 0901                            17,2011    77776 1 CMMOVE  EXIT
 0902   REF   1                  17,2012   3 2032 1         CAF     OCT51
 0903   REF   4  LAST  246       17,2013   0 5607 0         TC      GENTRAN
 0904   REF   3  LAST  274       17,2014    01554 1         ADRES   RRECTHIS        OUR STATE VECTOR INTO OTHER VIA GENTRAN
 0905   REF   1                  17,2015    01626 1         ADRES   RRECTOTH

 0906   REF   9  LAST  274       17,2016   0 6006 1 TACHEXIT TC      INTPRET
 0907                            17,2017    77624 1         CALL                    UPDATE RN, VN, R-OTHER, V-OTHER
 0908   REF   1                  17,2020    27005 1                 PTOACSM
 0909                            17,2021    45154 0         LXA,2   CALL
 0910   REF   2  LAST   93       17,2022    02150 1                 PBODY
 0911   REF   1                  17,2023    20240 0                 SVDWN1
 0912                            17,2024    77624 1         CALL
 0913   REF   1                  17,2025    20264 0                 SVDWN2
 0914                            17,2026    77624 1         CALL
 0915   REF   1                  17,2027    27525 0                 INTWAKEO
 0916                            17,2030    77634 0 TCPIN   RTB
 0917   REF   3  LAST  251       17,2031    21275 1                 PINBRNCH

 0918                            17,2032    00051 0 OCT51   OCT     51
R0919
 0920   REF   3  LAST  266       43,2000                    SETLOC  EXTVERBS
 0921                            43,3001                    BANK
 09215  REF   5 LAST  266 TO  274:   146   489*             COUNT*  $$/EXTVB
R0922   VERB 47  MOVE LM STATE VECTOR INTO CM STATE VECTOR.

 0923   REF   5  LAST  274       43,3001   3 4754 0 LMTOCMSV CAF     PRIO1
 0924   REF  12  LAST  274       43,3002   0 5135 0         TC      FINDVAC
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0925  REF   4  LAST  274   E3,1554                        EBANK=  RRECTHIS
0926  REF   1            43,3003   02033 0               2CADR   LMTOCM
0926  REF   1            43,3004   36103 0
0927  REF  12  LAST  274   43,3005  0 5205 0              TC      ENDOFJOB

0928  REF   2  LAST  274   17,2000                        SETLOC  EXTVRBS1
0929                       17,2033                        BANK

09295 REF   2 LAST  274 TO  274:     27     27*           COUNT*  $$/EXTVB
0930  REF  10  LAST  274   17,2033  0 6006 1  LMTOCM      TC      INTPRET
0931                       17,2034   77624 1              CALL
0932  REF   5  LAST  274   17,2035   27516 0              INTSTALL
0933                       17,2036   43014 0              SET     BON
0934  REF   2  LAST  274   17,2037   04063 0              MOONTHIS
0935  REF   3  LAST  274   17,2040   04304 1              MOONOTH
0936  REF   1            17,2041   36044 1              LMMOVE
0937                       17,2042   77614 1              CLEAR
0938  REF   3  LAST  275   17,2043   04263 1              MOONTHIS
0939                       17,2044   77776 1  LMMOVE      EXIT
0940  REF   2  LAST  274   17,2045  3 2032 1              CAF     OCT51
0941  REF   5  LAST  274   17,2046  0 5607 0              TC      GENTRAN
0942  REF   2  LAST  274   17,2047   01626 1              ADRES   RRECTOTH     LM STATE VECTOR INTO CM VIA GENTRAN
0943  REF   5  LAST  275   17,2050   01554 1              ADRES   RRECTHIS
0944  REF   1            17,2051  1 2016 0              TCF     TACHEXIT

R0945 VERB 94  DO R64 VIA ENEMA TO PICK UP IN P23.

0946  REF   4  LAST  274   43,2000                        SETLOC  EXTVERBS
0947                       43,3006                        BANK
09475 REF   6 LAST  274 TO  275:     5    494*           COUNT*  $$/EXTVB
0948  REF   1            43,3006  3 4756 1  VERB94      CAF     V94FLBIT
0949  REF   5  LAST  269   43,3007  7 0105 1              MASK    FLAGWRD9    IS V94FLAG SET
0950                       43,3010  0 0006 1              EXTEND
0951  REF  19  LAST  271   43,3011  1 2116 1              BZF     ALM/END     NO - OPERATOR ERROR

0952  REF  21  LAST  272   43,3012  0 5561 0              TC      DOWNFLAG
0953  REF   1            43,3013   00213 1              ADRES   V94FLAG

0954  REF  11  LAST  259   43,3014  0 5354 0              TC      CHECKMM     IS IT P23
0955                       43,3015   00027 1              MM      23
0956  REF  20  LAST  275   43,3016  0 2116 0              TC      ALM/END     NO - OPERATOR ERROR
0957  REF   8  LAST  259   43,3017  0 5402 1              TC      PHASCHNG
0958                       43,3020   00112 0              OCT     112         SET GROUP 2 TO DO R64

09585 REF   1            01,2044                2P11SPT1 =       2.11SPOT
0959  REF   1            43,3021  0 2673 1              TC      CLEANOUT    CAUSE RESTART

R0960          V90PERF    VERB 90              DESCRIPTION
R0961               REQUEST RENDEZVOUS OUT-OF-PLANE DISPLAY (R36)
```

L EXTENDED VERBS

```
R0962                1. SET EXT VERB DISPLAY BUSY FLAG.
R0963                2. SCHEDULE R36 CALL WITH PRIORITY 10
R0964                   A. DISPLAY
R0965                        TIME OF EVENT - HOURS , MINUTES , SECONDS
R0966                        Y  OUT-OF-PLANE POSITION - NAUTICAL MILES
R0967                        YDOT  OUT-OF-PLANE VELOCITY - FEET/SECOND
R0968                        PSI  ANGLE BTW LINE OF SIGHT AND FORWARD
R0969                            DIRECTION VECTOR IN HORIZONTAL PLANE - DEGREES
 0970  REF  15 LAST 273  43,3022  0 2076 1  V90PERF  TC      TESTXACT
 0971  REF   3 LAST 267  43,3023  3 5051 0          CAF     PRIO7          R36.V90
 0972  REF  13 LAST 274  43,3024  0 5135 0          TC      FINDVAC
 0973  REF   2 LAST 257  40,2000                    SBANK=  PINSUPER
 0974  REF  15 LAST 236  E7,1412                    EBANK=  TIG
 0975  REF   1           43,3025    02000 0        2CADR   R36
 0975  REF   1           43,3026    50107 1
 0976  REF  13 LAST 275  43,3027  1 5205 1         TCF     ENDOFJOB
R0977  VERB 96 SET QUITFLAG TO STOP INTEGRATION.

 0978  REF  22 LAST 269  43,3030  0 5547 1  VERB96  TC      UPFLAG         QUITFLAG WILL CAUSE INTEGRATION TO EXIT
 0979  REF   1           43,3031    00221 0        ADRES   QUITFLAG           AT NEXT TIMESTEP

 0980  REF  23 LAST 276  43,3032  0 5547 1          TC      UPFLAG
 0981  REF   1           43,3033    00204 1        ADRES   V96DNFLG
 0982  REF  30 LAST 258  43,3034  3 4772 1          CAF     ZERO
 0983  REF  13 LAST 270  43,3035  0 4655 0          TC      POSTJUMP
 0984  REF   1           43,3036   10007 1         CADR    V37            GO TO P00

 0985  REF   4 LAST 231  E7,1751                    EBANK=  LANDMARK
 0986  REF  12 LAST 275  43,3037  0 5354 0  V52     TC      CHECKMM        IS P22 OPERATING
 0987                    43,3040    00026 0        MM      22
 0988  REF  21 LAST 275  43,3041  0 2116 0          TC      ALM/END        NO
 0989  REF   3 LAST 269  43,3042  0 4606 0          TC      E7SETTER
 0990  REF   4 LAST 276  43,3043  4 5051 1          CS      PRIO7          YES  SET BITS 12,11,10 OF LANDMARK =
 0991  REF   5 LAST 276  43,3044  7 1751 1          MASK    LANDMARK       NO. OF MARKS TO GET OFFSET MARK NO.
 0992  REF   6 LAST 276  43,3045  55'751 1          TS      LANDMARK

 0993  REF   6 LAST 248  43,3046  3 1747 1          CA      8NN            NO. OF MARKS
 0994                    43,3047  0 0006 1          EXTEND
 0995  REF  15 LAST 166  43,3050  7 4757 1          MP      BIT10
 0996  REF  24 LAST 258  43,3051  3 0001 0          CA      L
 0997  REF   7 LAST 276  43,3052  27'751 1          ADS     LANDMARK
 0998  REF  15 LAST 271  43,3053  0 2117 1          TC      GOPIN
R0999
R1000

R1001  VERB 67 ASTRONAUT DISPLAY OF W MATRIX

 1002  REF  16 LAST 276  43,3054  0 2076 1  V67     TC      TESTXACT
 1003  REF   5 LAST 267  43,3055  3 5047 1          CAF     PRIO5
 1004  REF  14 LAST 276  43,3056  0 5135 0          TC      FINDVAC
```

```
 1005   REF   5  LAST   97   E5,1400                          EBANK=  W
 1006   REF   1              43,3057   03636 1               2CADR   V67CALL
 1006   REF   1              43,3060   60105 0
 1007   REF  14  LAST  276   43,3061   0 5205 0              TC      ENDOFJOB
R1008
R1009   VB 45.     RESET SURFACE FLAG.

 1010   REF   6  LAST  273   43,3062   0 3065 1  RESTSRF     TC      DOWNX
 1011   REF   2  LAST  227   43,3063     00177 0             ADRES   SURFFLAG
 1012   REF   5  LAST  273   43,3064   0 3071 1  SETSURF     TC      UPX             VB 44. SET SURFACE FLAG
```

L EXTENDED VERBS USER'S PAGE NO. 30 E7 S4

```
P1013           DOWNX, UPX    FLAG SETTING AND RESETTING FOR EXTENDED VERBS.
R1014                         RETURN IS TO GOPIN.

R1015                         CALLING SEQUENCES:
R1016                             FOR DOWNX
R1017                                 TC      DOWNX
R1018                                 ADRES   (FLAG NAME)

R1019                             FOR UPX
R1020                                 ADRES   (FLAG NAME)
R1021                                 TC      UPX
```

```
 10215  REF   1                                                    COUNT* $$/FLAG
  1022  REF  29  LAST  261   43,3065  3 0002 0  DOWNX    CA      Q
  1023  REF   1             43,3066  0 5565 1            TC      DEBIT
  1024  REF  25  LAST  276   43,3067  7 0001 1            MASK    L
  1025  REF   1             43,3070  1 3077 0            TCF     COMXFLG

  1026  REF  30  LAST  278   43,3071  3 0002 0  UPX       CA      Q
  1027  REF   5  LAST  247   43,3072  6 7701 0            AD      NEG2
  1028  REF   2  LAST  278   43,3073  0 5565 1            TC      DEBIT
  1029                       43,3074  4 0000 0            COM
  1030                       43,3075  0 0006 1            EXTEND
  1031  REF  10  LAST  200   43,3076  04 001 1            ROR     LCHAN

  1032  REF  14  LAST  224   43,3077  50 061 0  COMXFLG   INDEX   ITEMP1
  1033  REF  17  LAST  268   43,3100  54 074 0            TS      FLAGWRD0
  1034  REF  16  LAST  276   43,3101  1 2117 0            TCF     GOPIN
```

L EXTENDED VERBS

P1035 VERB 57 SET FULL TRACK OPTION

```
10355  REF   7 LAST  275 TO  278:     47   541*          COUNT* $$/EXTVB
1036   REF  17  LAST  276    43,3102  0 2076 1  V57CALL  TC     TESTXACT

1037   REF  16  LAST  262    43,3103  3 4766 1  PARTRACK CAF    BIT3          OPTION 4 SPECIFY CONDITION OF FULTKFLG
1038   REF   1               43,3104  55'255 0          TS     OPTIONX

1039   REF   1               43,3105  3 4767 0  PRTRCK   CAF    FULTKBIT
1040   REF  12  LAST  218    43,3106  7 0106 1           MASK   FLGWRD10
1041                         43,3107  0 0006 1           EXTEND
1042                         43,3110  1 3112 1           BZF    +2            FULTKFLG NOT SET

1043   REF  21  LAST  262    43,3111  3 4770 0           CAF    BIT1          FULTKFLG SET
1044   REF   2  LAST  279    43,3112  55'256 0           TS     OPTIONX +1
1045   REF   1               43,3113  3 3131 1           CAF    V04N12
1046   REF  35  LAST  273    43,3114  0 4636 0           TC     BANKCALL
1047   REF   9  LAST  273    43,3115    20576 1          CADR   GOXDSPF
1048   REF  16  LAST  273    43,3116  0 5524 1           TC     ENDEXT
1049   REF  17  LAST  279    43,3117  0 5524 1           TC     ENDEXT
1050   REF   3  LAST  279    43,3120  3 1256 1           CA     OPTIONX +1
1051                         43,3121  0 0006 1           EXTEND
1052                         43,3122  1 3126 0           BZF    +4
1053   REF  24  LAST  276    43,3123  0 5547 1           TC     UPFLAG
1054   REF   1               43,3124    00243 1          ADRES  FULTKFLG
1055   REF   1               43,3125  1 3105 1           TCF    PRTRCK

1056   REF  22  LAST  275    43,3126  0 5561 0           TC     DOWNFLAG
1057   REF   2  LAST  279    43,3127    00243 1          ADRES  FULTKFLG
1058   REF   2  LAST  279    43,3130  1 3105 1           TCF    PRTRCK

1059                         43,3131   01014 0  V04N12   VN     0412
```

L PINBALL NOUN TABLES

P1000 THE FOLLOWING REFERS TO THE NOUN TABLES

R1001	COMPONENT CODE NUMBER	INTERPRETATION
R1002	00000	1 COMPONENT
R1003	00001	2 COMPONENT
R1004	00010	3 COMPONENT
R1005	X1XXX	BIT4 = 1. DECIMAL ONLY
R1006	1XXXX	BIT5 = 1. NO LOAD
R1007	END OF COMPONENT CODE NUMBERS	

R1008	SF ROUTINE CODE NUMBER	INTERPRETATION
R1009	00000	OCTAL ONLY
R1010	00001	STRAIGHT FRACTIONAL
R1011	00010	CDU DEGREES (XXX.XX)
R1012	00011	ARITHMETIC SF
R1013	00100	ARITH DP1 OUT(MULT BY 2EXP14 AT END) IN(STRAIGHT)
R1014	00101	ARITH DP2 OUT(STRAIGHT) IN(SL 7 AT END)
R1015	00110	Y OPTICS DEGREES (XX.XXX MAX 89.999)
R1016	00111	ARITH DP3 OUT (SL 7 AT END) IN (STRAIGHT)
R1017	01000	WHOLE HOURS IN R1, WHOLE MINUTES (MOD 60) IN R2,
R1018		SECONDS (MOD 60) 0XX.XX IN R3. *** ALARMS IF USED WITH OCTAL
R1019	01001	MINUTES (MOD 60) IN D1D2, D3 BLANK, SECONDS (MOD 60) IN D4D5
R1020		LIMITS TO 59B59 IF MAG EXCEEDS THIS VALUE.
R1021		ALARMS IF USED WITH OCTAL ******** IN (ALARM)
R1022	01010	ARITH DP4 OUT (STRAIGHT) IN (SL 3 AT END)
R10221	01011	ARITH1 SF OUT(MULT BY 2EXP14 AT END) IN(STRAIGHT)
R10222	01100	2 INTEGERS IN D1D2, D4D5, D3 BLANK.
R10223		ALARMS IF USED WITH OCTAL ******** IN (ALARM)
R10224	01101	DP STRAIGHT FRACTIONAL
R1023	END OF SF ROUTINE CODE NUMBERS	

R1024	SF CONSTANT CODE NUMBER	INTERPRETATION
R1025	00000	WHOLE USE ARITH
R1026	00000	DP TIME SEC (XXX.XX SEC) USE ARITHDP1
R1027	00001	SPARE
R1028	00010	CDU DEGREES USE CDU DEGREES
R1029	00010	Y OPTICS DEGREES USE Y OPTICS DEGREES
R1030	00011	DP DEGREES (90) XX.XXX DEG USE ARITHDP3
R1031	00100	DP DEGREES (360) XXX.XX DEG USE ARITHDP4
R1032	00101	DEGREES (180) XXX.XX DEG USE ARITH
R1034	00110	WEIGHT2 (XXXXX. LBS) USE ARITH1
R1035	00111	POSITION5 (XXX.XX NAUTICAL MILES)
R10351		USE ARITHDP1
R1037	01000	POSITION4 (XXXX.X NAUTICAL MILES)

```
R10371                                                  USE ARITHDP3
R1038   01001   VELOCITY2 (XXXXX. FT/SEC)              USE ARITHDP4
R1039   01010   VELOCITY3 (XXXX.X FT/SEC)              USE ARITHDP3
R1040   01011   ELEVATION DEGREES(89.999MAX)           USE ARITH
R10401  01100   TRIM DEGREES (XXX.XX DEG)              USE ARITH
R10402  01101   INERTIA (XXXXXBB. SLUG FT FT)          USE ARITH
R104025 01101   THRUST MOMENT (XXXXXBB.FT LBS)        USE ARITH
R10403  01110   VELOCITY/2VS (XXXXX. FT/SEC)           USE ARITHDP4
R10404  01111   POSITION6 (XXXX.X NAUT MI)             USE ARITHDP3
R10405  10000   DRAG ACCELERATION (XXX.XX G)           USE ARITHDP2
R10406  10001   POSITION8 (XXXX.X NAUT MI)             USE ARITHDP3
R10407  10010   POSITION9 (XXXXX. FT)                  USE ARITHDP3
R10408  10011   VELOCITY4 (XXXX.X FT/SEC)              USE ARITHDP2
R1041   END OF SF CONSTANT CODE NUMBERS


R1042   FOR GREATER THAN SINGLE PRECISION SCALES, PUT ADDRESS OF MAJOR PART INTO
R1043   NOUN TABLES.
R1044   OCTAL LOADS PLACE +0 INTO MAJOR PART, DATA INTO MINOR PART.
R1045   OCTAL DISPLAYS SHOW MINOR PART ONLY.
R1046   TO GET AT BOTH MAJOR AND MINOR PARTS(IN OCTAL), USE NOUN 01.


R1047   A NOUN MAY BE DECLARED :DECIMAL ONLY: BY MAKING BIT4=1 OF ITS COMPONENT
R1048   CODE NUMBER. IF THIS NOUN IS USED WITH ANY OCTAL DISPLAY VERB, OR IF
R1049   DATA IS LOADED IN OCTAL, IT ALARMS.

R1050   IN LOADING AN :HOURS, MINUTES, SECONDS: NOUN, ALL 3 WORDS MUST BE
R1051   LOADED, OR ALARM.
R1052   ALARM IF AN ATTEMPT IS MADE TO LOAD :SPLIT MINUTES/SECONDS: (MMBSS).
R1053   THIS IS USED FOR DISPLAY ONLY.
```

L PINBALL NOUN TABLES USER'S PAGE NO. 3 ED 54

P1054 THE FOLLOWING ROUTINES ARE FOR READING THE NOUN TABLES AND THE SF TABLES
R1055 (WHICH ARE IN A SEPARATE BANK FROM THE REST OF PINBALL). THESE READING
R1056 RCUTINES ARE IN THE SAME BANK AS THE TABLES. THEY ARE CALLED BY DXCH Z.

R1057 LODNNTAB LOADS NNADTEM WITH THE NNADTAB ENTRY, NNTYPTEM WITH THE
R1058 NNTYPTAB ENTRY. IF THE NOUN IS MIXED, IDAD1TEM IS LOADED WITH THE FIRST
R1059 IDADDTAB ENTRY, IDAD2TEM THE SECOND IDADDTAB ENTRY, IDAD3TEM THE THIRD
R1060 IDADDTAB ENTRY, RUTMXTEM WITH THE RUTMXTAB ENTRY. MIXBR IS SET FOR
R1061 MIXED OR NORMAL NOUN.

```
120001 REF  1                 42,2000                    SETLOC  PINBALL3
120002                        42,2056                    BANK

12001  REF  1                                           COUNT*  $$/NOUNS
1201   REF  1                 42,2056  52 152 0  LODNNTAB DXCH   IDAD2TEM      SAVE RETURN INFO IN IDAD2TEM, IDAD3TEM.
1202   REF  3  LAST  253      42,2057  51'205 1           INDEX  NOUNREG
1203   REF  1                 42,2060  3 2127 1           CAF    NNADTAB
1204   REF  1                 42,2061  54 146 0           TS     NNADTEM
1205   REF  4  LAST  282      42,2062  51'205 1           INDEX  NOUNREG
1206   REF  1                 42,2063  3 2273 0           CAF    NNTYPTAB
1207   REF  1                 42,2064  54 147 1           TS     NNTYPTEM
1208   REF  5  LAST  282      42,2065  4 1205 0           CS     NOUNREG
1209   REF  1                 42,2066  6 5004 0           AD     MIXCON
1210                          42,2067  0 0006 1           EXTEND
1211   REF  1                 42,2070  6 2074 0           BZMF   LODMIXNN       NOUN NUMBER G/E FIRST MIXED NOUN
1212   REF  12 LAST  255      42,2071  3 4770 0           CAF    ONE            NOUN NUMBER L/ FIRST MIXED NOUN
1213   REF  1                 42,2072  54 140 0           TS     MIXBR          NORMAL. +1 INTO MIXBR.
1214   REF  1                 42,2073  0 2112 1           TC     LODNLV
1215   REF  4  LAST  260      42,2074  3 4767 0  LODMIXNN  CAF    TWO            MIXED. +2 INTO MIXBR.
1216   REF  2  LAST  282      42,2075  54 140 0           TS     MIXBR
1217   REF  6  LAST  282      42,2076  51'205 1           INDEX  NOUNREG
1218   REF  1                 42,2077  3 2773 0           CAF    RUTMXTAB -40D  FIRST MIXED NOUN = 40.
1219   REF  1                 42,2100  54 153 1           TS     RUTMXTEM
1220   REF  3  LAST  221      42,2101  3 5041 1           CAF    LOW10
1221   REF  2  LAST  282      42,2102  7 0146 0           MASK   NNADTEM
1222   REF  31 LAST  278      42,2103  54 002 1           TS     Q              TEMP
1223   REF  75 LAST  265      42,2104  50 000 1           INDEX  A
1224   REF  1                 42,2105  3 2557 1           CAF    IDADDTAB
1225   REF  1                 42,2106  54 150 1           TS     IDAD1TEM       LOAD IDAD1TEM WITH FIRST IDADDTAB ENTRY
1226                          42,2107  0 0006 1           EXTEND
1227   REF  32 LAST  282      42,2110  5 0002 0           INDEX  Q              LOAD IDAD2TEM WITH 2ND IDADDTAB ENTRY
1228   REF  2  LAST  282      42,2111  3 2561 1           DCA    IDADDTAB +1    LOAD IDAD3TEM WITH 3RD IDADDTAB ENTRY.
1229   REF  2  LAST  282      42,2112  52 152 0  LODNLV   DXCH   IDAD2TEM       PUT RETURN INFO INTO A, L.
1230   REF  1                 42,2113  52 006 0           DXCH   Z

1231   REF  3  LAST  260        5004                MIXCON  =      OCT50          FIRST MIXED NOUN =40.  (DEC 40)
R1232  GTSFOUT LOADS SFTEMP1, SFTEMP2 WITH THE DP SFOUTAB ENTRIES.

1233   REF  1                 42,2114  52 124 1  GTSFOUT  DXCH   SFTEMP1       2X(SFCONUM) ARRIVES IN SFTEMP1.
```

L PINBALL NOUN TABLES

```
1234                                42,2115  0 0006 1                EXTEND
1235   REF  76  LAST  282           42,2116  5 0000 1                INDEX  A
1236   REF   1                     42,2117  3 2510 1                DCA    SFOUTAB
1237   REF   2  LAST  282          42,2120 52 124  1  SFCOM        DXCH   SFTEMP1
1238   REF   2  LAST  282          42,2121 52 006  0                DXCH   Z
```

R1239 GTSFIN LOADS SFTEMP1, SFTEMP2 WITH THE DP SFINTAB ENTRIES.

```
1240   REF   3  LAST  283          42,2122 52 124  1  GTSFIN       DXCH   SFTEMP1      2X(SFCONUM) ARRIVES IN SFTEMP1.
1241                               42,2123  0 0006 1                EXTEND
1242   REF  77  LAST  283          42,2124  5 0000 1                INDEX  A
1243   REF   1                     42,2125  3 2440 0                DCA    SFINTAB
1244   REF   1                     42,2126  1 2120 1                TCF    SFCOM
```

```
A1400                                                                NN  NORMAL NOUNS
1401                               42,2127  00000 1  NNADTAB        OCT    0000         00 NOT IN USE
1402                               42,2130  40000 0                 OCT    40000        01 SPECIFY MACHINE ADDRESS (FRACTIONAL)
1403                               42,2131  40000 0                 OCT    40000        02 SPECIFY MACHINE ADDRESS (WHOLE)
1404                               42,2132  40000 0                 OCT    40000        03 SPECIFY MACHINE ADDRESS (DEGREES)
1405                               42,2133  00000 1                 OCT    0            04 SPARE
1406   REF   3  LAST  242          42,2134  01250 1                 ECADR  DSPTEM1      05 ANGULAR ERROR/DIFFERENCE
1407   REF   4  LAST  187          42,2135  00775 1                 ECADR  OPTION1      06 OPTION CODE
1408   REF   1                     42,2136  01206 1                 ECADR  XREG         07 ECADR OF WORD TO BE MODIFIED
A14081                                                                                      ONES FOR BITS TO BE MODIFIED
A14082                                                                                      1 TO SET OR 0 TO RESET SELECTED BITS
1409   REF   2  LAST   87          42,2137  01363 0                 ECADR  ALMCADR      08 ALARM DATA
1410   REF   6  LAST  194          42,2140  00375 0                 ECADR  FAILREG      09 ALARM CODES
1411                               42,2141  77776 1                 OCT    77776        10 CHANNEL TO BE SPECIFIED
1412   REF   4  LAST  217          42,2142  02462 0                 ECADR  TCSI         11 TIG OF CSI (HRS,MIN,SEC)
1413   REF   4  LAST  279          42,2143  01255 1                 ECADR  OPTIONX      12 OPTION CODE
A14131                                                                                      (USED BY EXTENDED VERBS ONLY)
1414   REF   4  LAST  185          42,2144  02460 1                 ECADR  TCDH         13 TIG OF CDH (HRS,MIN,SEC)
1415   REF   1                     42,2145  02355 0                 ECADR  VC/0         14 INERTIAL VEL MAG AT TLI CUTOFF
1416                               42,2146  77777 0                 OCT    77777        15 INCREMENT MACHINE ADDRESS
1417   REF   2  LAST   82          42,2147  01254 0                 ECADR  DSPTEMX      16 TIME OF EVENT (HRS,MIN,SEC)
1418   REF   3  LAST  257          42,2150  01013 1                 ECADR  CPHIX        17 ASTRONAUT TOTAL ATTITUDE
1419   REF  13  LAST  261          42,2151  01307 1                 ECADR  THETAD       18 AUTO MANEUVER BALL ANGLES
1420                               42,2152  00000 1                 OCT    0            19 SPARE
1421   REF   6  LAST  257          42,2153  00032 0                 ECADR  CDUX         20 ICDU ANGLES
1422   REF   3  LAST  182          42,2154  00037 0                 ECADR  PIPAX        21 PIPAS
1423   REF  14  LAST  283          42,2155  01307 1                 ECADR  THETAD       22 NEW ICDU ANGLES
1424                               42,2156  00000 1                 OCT    0000         23 SPARE
1425   REF   3  LAST  258          42,2157  01254 0                 ECADR  DSPTEM2 +1   24 DELTA TIME FOR AGC CLOCK(HRS,MIN,SEC)
1426   REF   4  LAST  283          42,2160  01250 1                 ECADR  DSPTEM1      25 CHECKLIST
A14261                                                                                      (USED WITH PLEASE PERFORM ONLY)
1427   REF   1                     42,2161  01016 1                 ECADR  N26/PRI      26 PRIO/DELAY, ADRES, BBCON
1428   REF   4  LAST  273          42,2162  01362 1                 ECADR  SMODE        27 SELF TEST ON/OFF SWITCH
1429                               42,2163  00000 1                 OCT    0            28 SPARE
```

```
1430   REF   5  LAST  283   42,2164  01250 1   ECADR  DSPTEM1   29 XSM LAUNCH AZIMUTH
1431   REF   6  LAST  284   42,2165  01250 1   ECADR  DSPTEM1   30 TARGET CODES
1432   REF   1              42,2166  03735 0   ECADR  AGEOFW    31 TIME OF W-MATRIX INIT (P20)
1433   REF   2  LAST   95   42,2167  02336 0   ECADR  -TPER     32 TIME TO PERIGEE (HRS,MIN,SEC)
1434   REF  16  LAST  276   42,2170  03412 0   ECADR  TIG       33 TIME OF IGNITION (HRS,MIN(SEC)
1435   REF   7  LAST  284   42,2171  01250 1   ECADR  DSPTEM1   34 TIME OF EVENT (HRS,MIN,SEC)
1436   REF   3  LAST  236   42,2172  03660 1   ECADR  TTOGO     35 TIME TO GO TO EVENT (HRS,MIN,SEC)
1437   REF  10  LAST  258   42,2173  00024 1   ECADR  TIME2     36 TIME OF AGC CLOCK (HRS,MIN,SEC)
1438   REF   3  LAST  185   42,2174  03662 0   ECADR  TTPI      37 TIG OF TPI (HRS,MIN,SEC)
1439   REF   4  LAST  187   42,2175  01516 1   ECADR  TET       38 TIME OF STATE VECTOR
1440   REF   1              42,2176  02640 1   ECADR  T3TOT4    39 DELTA TIME TO TRANSFER (HRS,MIN,SEC)
R14401 END OF NNADTAB FOR NORMAL NOUNS


A14402                                                          NN  MIXED NOUNS
1441                        42,2177  64000 0   OCT    64000     40 TIME TO IGNITION/CUTOFF
A14411                                                              VG
A14412                                                              DELTA V (ACCUMULATED)
1442                        42,2200  02003 0   OCT    02003     41 TARGET  AZIMUTH
A14421                                                                     ELEVATION
1443                        42,2201  24006 1   OCT    24006     42 APOGEE
A14431                                                              PERIGEE
A14432                                                              DELTA V (REQUIRED)
1444                        42,2202  24011 1   OCT    24011     43 LATITUDE
A14441                                                              LONGITUDE
A14442                                                              ALTITUDE
1445                        42,2203  64014 0   OCT    64014     44 APOGEE
A14451                                                              PERIGEE
A14452                                                              TFF
1446                        42,2204  64017 0   OCT    64017     45 MARKS (VHF - OPTICS)
A14461                                                              TTI OF NEXT BURN
A14462                                                              MGA
1447                        42,2205  02022 0   OCT    02022     46 AUTOPILOT CONFIGURATION
1448                        42,2206  22025 0   OCT    22025     47 THIS VEHICLE WEIGHT
A14481                                                              OTHER VEHICLE WEIGHT
1449                        42,2207  22030 1   OCT    22030     48 PITCH TRIM
A14491                                                              YAW TRIM
1450                        42,2210  24033 1   OCT    24033     49 DELTA R
A14501                                                              DELTA V
A14502                                                              VHF OR OPTICS CODE
1451                        42,2211  64036 0   OCT    64036     50 SPLASH ERROR
A14511                                                              PERIGEE
A14512                                                              TFF
1452                        42,2212  22041 1   OCT    22041     51 S-BAND ANTENNA PITCH
A14521                                                                     YAW
1453                        42,2213  00044 1   OCT    00044     52 CENTRAL ANGLE OF ACTIVE VEHICLE
1454                        42,2214  24047 1   OCT    24047     53 RANGE
A14541                                                              RANGE RATE
A14542                                                              PHI
1455                        42,2215  24052 0   OCT    24052     54 RANGE
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L PINBALL NOUN TABLES

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A14551                                          RANGE RATE
A14552                                          THETA
 1458          42,2216  24055 1      OCT  24055  55 PERIGEE CODE
A14581                                          ELEVATION ANGLE
A14582                                          CENTRAL ANGLE
 1459          42,2217  22060 1      OCT  22060  56 REENTRY ANGLE,
A14591                                          DELTA V
 1460          42,2220  00000 1      OCT  0      57 SPARE
 1461          42,2221  24066 1      OCT  24066  58 PERIGEE ALT
A14611                                          DELTA V TPI
A14612                                          DELTA V TPF
 1462          42,2222  24071 1      OCT  24071  59 DELTA VELOCITY LOS
 1463          42,2223  24074 1      OCT  24074  60 GMAX
A14631                                          VPRED
A14632                                          GAMMA EI
 1464          42,2224  24077 1      OCT  24077  61 IMPACT LATITUDE
A14641                                          IMPACT LONGITUDE
A14642                                          HEADS UP/DOWN
 1465          42,2225  24102 1      OCT  24102  62 INERTIAL VEL MAG (VI)
A14651                                          ALT RATE CHANGE (HDOT)
A14652                                          ALT ABOVE PAD RADIUS (H)
 1466          42,2226  64105 1      OCT  64105  63 RANGE  297,431 TO SPLASH (RTGO)
A14661                                          PREDICTED INERT VEL (VIO)
A14662                                          TIME TO GO TO 297,431 (TTE)
 1467          42,2227  24110 1      OCT  24110  64 DRAG ACCELERATION
A14671                                          INERTIAL VELOCITY (VI)
A14672                                          RANGE TO SPLASH
 1468          42,2230  24113 1      OCT  24113  65 SAMPLED AGC TIME (HRS,MIN,SEC)
A14681                                          (FETCHED IN INTERRUPT)
 1470          42,2231  24116 1      OCT  24116  66 COMMAND BANK ANGLE (BETA)
A14701                                          CROSS RANGE ERROR
A14702                                          DOWN RANGE ERROR
 1471          42,2232  24121 0      OCT  24121  67 RANGE TO TARGET
A14711                                          PRESENT LATITUDE
A14712                                          PRESENT LONGITUDE
 1472          42,2233  24124 0      OCT  24124  68 COMMAND BANK ANGLE (BETA)
A14721                                          INERTIAL VELOCITY (VI)
A14722                                          ALT RATE CHANGE (RDOT)
 1473          42,2234  24127 0      OCT  24127  69 BETA
A14731                                          DL
A14732                                          VL
 1474          42,2235  04132 0      OCT  04132  70 STAR CODE
A14741                                          LANDMARK DATA
A14742                                          HORIZON DATA
 1475          42,2236  04135 1      OCT  04135  71 STAR CODE
A14751                                          LANDMARK
A14752                                          HORIZON
 1476          42,2237  00000 1      OCT  0      72 SPARE
 1477          42,2240  04143 0      OCT  04143  73 ALTITUDE
A14771                                          VELOCITY
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L PINBALL NOUN TABLES USER'S PAGE NO. 7 EQ S4

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A14772                                          FLIGHT PATH ANGLE
 1478          42,2241   04146 0     OCT   04146   74 COMMAND BANK ANGLE (BETA)
A14781                                          INERTIAL VELOCITY (VI)
A14782                                          DRAG ACCELERATION
 1479          42,2242   64151 0     OCT   64151   75 DELTA ALTITUDE CDH
A14791                                          DELTA TIME (CDH-CSI OR TPI-CDH)
A14792                                          DELTA TIME (TPI-CDH OR TPI-NOMTPI)
 1480          42,2243   00000 1     OCT   0       76 SPARE
 1481          42,2244   00000 1     OCT   0       77 SPARE
 1482          42,2245   24162 1     OCT   24162   78 YAW ANGLE FOR P20
A14821                                          78 PITCH ANGLE FOR P20
A14822                                          78 AZIMUTH CONSTRAINT FOR P20
 1483          42,2246   22165 0     OCT   22165   79 ORBRATE OR PTC RATE
A14831                                          P20 ROTATION DEADBAND
 1484          42,2247   64170 0     OCT   64170   80 TIME TO IGNITION/CUTOFF
A14841                                          VG
A14842                                          DELTA V (ACCUMULATED)
 1485          42,2250   24173 1     OCT   24173   81 DELTA V (LV)
 1486          42,2251   24176 1     OCT   24176   82 DELTA V (LV)
 1487          42,2252   24201 1     OCT   24201   83 DELTA V (BODY)
 1488          42,2253   24204 1     OCT   24204   84 DELTA V (OTHER VEHICLE)
 1489          42,2254   24207 1     OCT   24207   85 VG (BODY)
 1490          42,2255   24212 0     OCT   24212   86 DELTA V (LV)
 1491          42,2256   02215 0     OCT   02215   87 MARK DATA  SHAFT
A14911                                                TRUNION
 1492          42,2257   24220 1     OCT   24220   88 HALF UNIT SUN OR PLANET VECTOR
 1493          42,2260   24223 1     OCT   24223   89 LANDMARK  LATITUDE
A14931                                                LONGITUDE/2
A14932                                                ALTITUDE
 1494          42,2261   24226 1     OCT   24226   90 Y    (ACT VEH)
A14941                                          YDOT (ACT VEH)
A14942                                          YDOT (PAS VEH)
 1495          42,2262   02231 0     OCT   02231   91 OCDU ANGLES  SHAFT
A14951                                                TRUNION
 1496          42,2263   02234 0     OCT   02234   92 NEW OPTICS ANGLES  SHAFT
A14961                                                TRUNION
 1497          42,2264   04237 0     OCT   04237   93 DELTA GYRO ANGLES
 1498          42,2265   02242 1     OCT   02242   94 NEW OPTICS ANGLES  SHAFT
A14981                                                TRUNNION
 1499          42,2266   04245 0     OCT   04245   95 TIME FROM IGNITION/CUTOFF
A14991                                          VG
A14992                                          INERTIAL VEL MAG
 1500          42,2267   24250 0     OCT   24250   96 Y    (CM)
A15001                                          YDOT (CM)
A15002                                          YDOT (LM)
 1501          42,2270   04253 1     OCT   04253   97 SYSTEM TEST INPUTS
 1502          42,2271   04256 1     OCT   04256   98 SYSTEM TEST RESULTS
 1503          42,2272   24261 1     OCT   24261   99 RMS IN POSITION
A15031                                          RMS IN VELOCITY
A15032                                          RMS OPTION
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R1504 END OF NNADTAB FOR MIXED NOUNS

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A1800                                                          NN        NORMAL NOUNS
 1801                  42,2273  00000 1  NNTYPTAB OCT  00000   00 NOT IN USE
 1802                  42,2274  04040 1           OCT  04040   01 3COMP  FRACTIONAL
 1803                  42,2275  04140 0           OCT  04140   02 3COMP  WHOLE
 1804                  42,2276  04102 0           OCT  04102   03 3COMP  CDU DEGREES
 1805                  42,2277  00000 1           OCT  0       04 SPARE
 1806                  42,2300  00504 0           OCT  00504   05 1COMP  DPDEG(360)
 1807                  42,2301  02000 0           OCT  02000   06 2COMP  OCTAL ONLY
 1808                  42,2302  04000 0           OCT  04000   07 3COMP  OCTAL ONLY
 1809                  42,2303  04000 0           OCT  04000   08 3COMP  OCTAL ONLY
 1810                  42,2304  04000 0           OCT  04000   09 3COMP  OCTAL ONLY
 1811                  42,2305  00000 1           OCT  00000   10 1COMP  OCTAL ONLY
 1812                  42,2306  24400 0           OCT  24400   11 3COMP  HMS (DEC ONLY)
 1813                  42,2307  02000 0           OCT  02000   12 2COMP  OCTAL ONLY
 1814                  42,2310  24400 0           OCT  24400   13 3COMP  HMS (DEC ONLY)
 1815                  42,2311  00511 1           OCT  00511   14 1COMP  VEL2
 1816                  42,2312  00000 1           OCT  00000   15 1COMP  OCTAL ONLY
 1817                  42,2313  24400 0           OCT  24400   16 3COMP  HMS (DEC ONLY)
 1818                  42,2314  04102 0           OCT  04102   17 3COMP  CDU DEG
 1819                  42,2315  04102 0           OCT  04102   18 3COMP  CDU DEG
 1820                  42,2316  00000 1           OCT  0       19        SPARE
 1821                  42,2317  04102 0           OCT  04102   20 3COMP  CDU DEGREES
 1822                  42,2320  04140 0           OCT  04140   21 3COMP  WHOLE
 1823                  42,2321  04102 0           OCT  04102   22 3COMP  CDU DEGREES
 1824                  42,2322  00000 1           OCT  00000   23        SPARE
 1825                  42,2323  24400 0           OCT  24400   24 3COMP  HMS (DEC ONLY)
 1826                  42,2324  04140 0           OCT  04140   25 3COMP  WHOLE
 1827                  42,2325  04000 0           OCT  04000   26 3COMP  OCTAL ONLY
 1828                  42,2326  00140 1           OCT  00140   27 1COMP  WHOLE
 1829                  42,2327  00000 1           OCT  0       28        SPARE
 1830                  42,2330  20102 0           OCT  20102   29 1COMP  CDU DEG (DEC ONLY)
 1831                  42,2331  04140 0           OCT  04140   30 3COMP  WHOLE
 1832                  42,2332  24400 0           OCT  24400   31 3COMP  HMS (DEC ONLY)
 1833                  42,2333  24400 0           OCT  24400   32 3COMP  HMS (DEC ONLY)
 1834                  42,2334  24400 0           OCT  24400   33 3COMP  HMS (DEC ONLY)
 1835                  42,2335  24400 0           OCT  24400   34 3COMP  HMS (DEC ONLY)
 1836                  42,2336  24400 0           OCT  24400   35 3COMP  HMS (DEC ONLY)
 1837                  42,2337  24400 0           OCT  24400   36 3COMP  HMS (DEC ONLY)
 1838                  42,2340  24400 0           OCT  24400   37 3COMP  HMS (DEC ONLY)
 1839                  42,2341  24400 0           OCT  24400   38 3COMP  HMS (DEC ONLY)
 1840                  42,2342  24400 0           OCT  24400   39 3COMP  HMS (DEC ONLY)
R18401  END OF NNTYPTAB FOR NORMAL NOUNS

A18402                                                         NN   MIXED NOUNS
 1841                  42,2343  24500 1           OCT  24500   40 3COMP  MIN/SEC, VEL3, VEL3
A18411                                                                   (NO LOAD, DEC ONLY)
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1842	42,2344	00542 1	OCT	00542	41 2COMP	CDU DEG, ELEV DEG
1843	42,2345	24410 1	OCT	24410	42 3COMP	POS4, POS4, VEL3
A18431						(DEC ONLY)
1844	42,2346	20204 0	OCT	20204	43 3COMP	DPDEG(360), DPDEG(360), POS4
A18441						(DEC ONLY)
1845	42,2347	00410 1	OCT	00410	44 3COMP	POS4, POS4, MIN/SEC
A18451						(NO LOAD, DEC ONLY)
1846	42,2350	10000 0	OCT	10000	45 3COMP	2INT, MIN/SEC, DPDEG(360)
A18461						(NO LOAD, DEC ONLY)
1847	42,2351	00000 1	OCT	00000	46 2COMP	OCTAL ONLY FOR EACH
1848	42,2352	00306 1	OCT	00306	47 2COMP	WEIGHT2 FOR EACH
A18481						(DEC ONLY)
1849	42,2353	00614 1	OCT	00614	48 2COMP	TRIM DEG, TRIM DEG
A18491						(DEC ONLY)
1850	42,2354	00507 0	OCT	00507	49 3 COMP	POS5, VEL3, WHOLE
A18501						(DEC ONLY)
1851	42,2355	00417 0	OCT	00417	50 3COMP	POS6, POS4, MIN/SEC
A18511						(NO LOAD, DEC ONLY)
1852	42,2356	00204 1	OCT	00204	51 2COMP	DPDEG(360), DPDEG(360)
A18521						(DEC ONLY)
1853	42,2357	00004 0	OCT	00004	52 1COMP	DPDEG(360)
1854	42,2360	10507 1	OCT	10507	53 3COMP	POS5, VEL3, DPDEG(360)
A18541						(DEC ONLY)
1855	42,2361	10507 1	OCT	10507	54 3COMP	POS5, VEL3, DPDEG(360)
A18551						(DEC ONLY)
1858	42,2362	10200 1	OCT	10200	55 3COMP	WHOLE, DPDEG(360), DPDEG(360)
A18581						(DEC ONLY)
1859	42,2363	00444 0	OCT	00444	56 2COMP	DPDEG(360), VEL2
A18591						(DEC ONLY)
1860	42,2364	00000 1	OCT	0	57	SPARE
1861	42,2365	24510 0	OCT	24510	58 3COMP	POS4, VEL3, VEL3
A18611						(DEC ONLY)
1862	42,2366	24512 1	OCT	24512	59 3COMP	VEL3 FOR EACH
A18621						(DEC ONLY)
1863	42,2367	10440 0	OCT	10440	60 3COMP	WHOLE, VEL2, DPDEG(360)
A18631						(DEC ONLY)
1864	42,2370	00204 1	OCT	00204	61 3COMP	DPDEG(360), DPDEG(360), WHOLE
A18641						(DEC ONLY)
1865	42,2371	20451 0	OCT	20451	62 3COMP	VEL2, VEL2, POS4
A18651						(DEC ONLY)
1866	42,2372	00457 1	OCT	00457	63 3COMP	POS6, VEL2, MIN/SEC
A18661						(NO LOAD, DEC ONLY)
1867	42,2373	36460 0	OCT	36460	64 3COMP	DRAG ACCEL, VEL2, POS6
A18671						(DEC ONLY)
1868	42,2374	00000 1	OCT	00000	65 3COMP	HMS (DEC ONLY)
1869	42,2375	37044 0	OCT	37044	66 3COMP	DPDEG(360), POS8, POS6
A18691						(DEC ONLY)
1870	42,2376	10217 1	OCT	10217	67 3COMP	POS6, DPDEG(360), DPDEG(360)
A18701						(DEC ONLY)
1871	42,2377	34444 1	OCT	34444	68 3COMP	DPDEG(360), VEL2, VEL/2VS

						(DEC ONLY)
A18711						
1872	42,2400	35004 0	OCT	35004	69 3COMP	DPDEG(360), DRAG ACCEL,VEL/2VS
						(DEC ONLY)
A18721						
1873	42,2401	00000 1	OCT	00000	70 3COMP	OCTAL ONLY FOR EACH
1874	42,2402	00000 1	OCT	0	71 3COMP	OCTAL ONLY FOR EACH
1875	42,2403	00000 1	OCT	0	72	SPARE
1876	42,2404	10450 1	OCT	10450	73 3COMP	POS4, VEL2, DPDEG(360)
1877	42,2405	40444 1	OCT	40444	74 3COMP	DPDEG(360), VEL2, DRAG ACCEL
1878	42,2406	00010 0	OCT	00010	75 3COMP	POS4, MIN/SEC, MIN/SEC
						(NO LOAD, DEC ONLY)
A18781						
1879	42,2407	00000 1	OCT	0	76	SPARE
1880	42,2410	00000 1	OCT	0	77	SPARE
1881	42,2411	10204 0	OCT	10204	78 3COMP	DPDEG(360) FOR EACH
1882	42,2412	00113 1	OCT	00113	79 2COMP	ELEVDEG, CDUDEG
1883	42,2413	22440 1	OCT	22440	80 3COMP	MIN/SEC, VEL2, VEL2
						(NO LOAD, DEC ONLY)
A18831						
1884	42,2414	24512 1	OCT	24512	81 3COMP	VEL3 FOR EACH
						(DEC ONLY)
A18841						
1885	42,2415	24512 1	OCT	24512	82 3COMP	VEL3 FOR EACH
						(DEC ONLY)
A18851						
1886	42,2416	24512 1	OCT	24512	83 3COMP	VEL3 FOR EACH
						(DEC ONLY)
A18861						
1887	42,2417	24512 1	OCT	24512	84 3COMP	VEL3 FOR EACH
						(DEC ONLY)
A18871						
1888	42,2420	24512 1	OCT	24512	85 3COMP	VEL3 FOR EACH
						(DEC ONLY)
A18881						
1889	42,2421	22451 1	OCT	22451	86 3COMP	VEL2 FOR EACH
						(DEC ONLY)
A18891						
1890	42,2422	00102 1	OCT	00102	87 2COMP	CDU DEG, Y OPTICS DEG
1891	42,2423	00000 1	OCT	0	88 3COMP	FRAC FOR EACH
						(DEC ONLY)
A18912						
1892	42,2424	16143 0	OCT	16143	89 3COMP	DPDEG(90), DPDEG(90), POS5
						(DEC ONLY)
A18921						
1893	42,2425	24507 0	OCT	24507	90 3COMP	POS5,VEL3,VEL3
						(DEC ONLY)
A18931						
1894	42,2426	00102 1	OCT	00102	91 2COMP	CDU DEG, Y OPTICS DEG
1895	42,2427	00102 1	OCT	00102	92 2COMP	CDU DEG, Y OPTICS DEG
1896	42,2430	06143 1	OCT	06143	93 3COMP	DPDEG(90) FOR EACH
1897	42,2431	00102 1	OCT	00102	94 2COMP	CDU DEG, Y OPTICS DEG
1898	42,2432	22440 1	OCT	22440	95 3COMP	MIN/SEC, VEL2, VEL2
1899	42,2433	24507 0	OCT	24507	96	POS5,VEL3,VEL3
						(DEC ONLY)
A18991						
1900	42,2434	00000 1	OCT	00000	97 3COMP	WHOLE FOR EACH
1901	42,2435	00000 1	OCT	00000	98 3COMP	WHOLE, FRAC, WHOLE
1902	42,2436	01162 0	OCT	01162	99 3COMP	POS9, VEL4, WHOLE
						(DEC ONLY)
A19021						
R1903	END OF NNTYPTAB FOR MIXED NOUNS					
2200	42,2437	00006 1	SFINTAB	OCT	00006	WHOLE, DP TIME (SEC)

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2201                42,2440  03240 1        OCT     03240
2202                42,2441  00000 1        OCT     00000          SPARE
2203                42,2442  00000 1        OCT     00000
2204                42,2443  00000 1        OCT     00000          CDU DEGREES, Y OPTICS DEGREES
2205                42,2444  00000 1        OCT     00000            (SFCONS IN DEGINSF, OPTDEGIN)
2206                42,2445  10707 0        OCT     10707          DP DEGREES (90)
2207                42,2446  03435 0        OCT     03435                UPPED BY 1
2208                42,2447  13070 1        OCT     13070          DP DEGREES (360)(POINT BETWN BITS 11-12)
2209                42,2450  34345 1        OCT     34345                UPPED BY 1
2210                42,2451  00005 1        OCT     00005          DEGREES (180)
2211                42,2452  21616 0        OCT     21616
2212                42,2453  26113 0        OCT     26113          WEIGHT2
2213                42,2454  31713 0        OCT     31713
2214                42,2455  00070 0        OCT     00070          POSITION5
2215                42,2456  20460 1        OCT     20460
2216                42,2457  01065 0        OCT     01065          POSITION4
2217                42,2460  05740 1        OCT     05740
2218                42,2461  11414 0        OCT     11414          VELOCITY2       (POINT BETWN BITS 11-12)
2219                42,2462  31463 1        OCT     31463
2220                42,2463  07475 0        OCT     07475          VELOCITY3
2221                42,2464  16051 1        OCT     16051
2222                42,2465  00001 0        OCT     00001          ELEVATION DEGREES
2223                42,2466  03434 1        OCT     03434
2224                42,2467  00002 0        OCT     00002          TRIM DEGREES
2225                42,2470  22245 1        OCT     22245
2226                42,2471  00014 1        OCT     00014          INERTIA, THRUST MOMENT
2227                42,2472  35607 0        OCT     35607
2228                42,2473  07606 0        OCT     07606          VELOCITY/2VS
2229                42,2474  06300 1        OCT     06300
2230                42,2475  16631 1        OCT     16631          POSITION 6
2231                42,2476  11307 0        OCT     11307
2232                42,2477  12000 1        OCT     12000          DRAG ACCELERATION (POINT BETWN BITS 7-8)
2233                42,2500  00000 1        OCT     00000
2234                42,2501  27176 1        OCT     27176          POSITION 8
2235                42,2502  14235 0        OCT     14235
2236                42,2503  01670 1        2DEC    30480 B-19     POSITION 9
2236                42,2504  20000 0
2237                42,2505  07475 0        2DEC    30.48 B-7      VELOCITY4
2237                42,2506  16051 1
A2290                                                              END OF SFINTAB


2300                42,2507  05174 0  SFDUTAB OCT     05174          WHOLE, DP TIME (SEC)
2301                42,2510  13261 0          OCT     13261
2302                42,2511  00000 1          OCT     00000          SPARE
2303                42,2512  00000 1          OCT     00000
2304                42,2513  00000 1          OCT     00000          CDU DEGREES, Y OPTICS DEGREES
2305                42,2514  00000 1          OCT     00000            (SFCONS IN DEGOUTSF, OPTDEGOUT)
2306                42,2515  00714 0          OCT     00714          DP DEGREES (90) (POINT BETWN BITS 7-8)
2307                42,2516  31463 1          OCT     31463
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2308                    42,2517  13412 1        OCT     13412          DP DEGREES (360)
2309                    42,2520  07534 1        OCT     07534
2310                    42,2521  05605 1        OCT     05605          DEGREES (180)
2311                    42,2522  03656 1        OCT     03656
2312                    42,2523  00001 0        OCT     00001          WEIGHT2
2313                    42,2524  16170 0        OCT     16170
2314                    42,2525  00441 0        OCT     00441          POSITION5
2315                    42,2526  34306 0        OCT     34306
2316                    42,2527  07176 0        OCT     07176          POSITION4
2317                    42,2530  21603 1        OCT     21603
2318                    42,2531  15340 1        OCT     15340          VELOCITY2
2319                    42,2532  15340 1        OCT     15340
2320                    42,2533  01031 1        OCT     01031          VELOCITY3       (POINT BETWN BITS 7-8)
2321                    42,2534  21032 0        OCT     21032
2322                    42,2535  34631 1        OCT     34631          ELEVATION DEGREES
2323                    42,2536  23146 0        OCT     23146
2324                    42,2537  14340 0        OCT     14340          TRIM DEGREES
2325                    42,2540  24145 1        OCT     24145
2326                    42,2541  02363 0        OCT     02363          INERTIA, THRUST MOMENT
2327                    42,2542  03721 0        OCT     03721
2328                    42,2543  20373 1        OCT     20373          VELOCITY/2VS
2329                    42,2544  02122 1        OCT     02122
2330                    42,2545  00424 0        OCT     00424          POSITION 6      (POINT BETWN BITS 7-8)
2331                    42,2546  30446 1        OCT     30446
2332                    42,2547  00631 0        OCT     00631          DRAG ACCELERATION
2333                    42,2550  23146 0        OCT     23146
2334                    42,2551  00260 0        OCT     00260          POSITION 8
2335                    42,2552  06213 1        OCT     06213
2336                    42,2553  04231 0        2DEC    17.2010499 B-7 POSITION 9
2336                    42,2554  27400 0
2337                    42,2555  01031 1        2DEC    .032808399     VELOCITY4
2337                    42,2556  21032 0
A2390                                                                  END OF SFOUTAB


A2400                                                                  NN  SF CONSTANT                SF ROUTINE

2401  REF  4  LAST  284 42,2557  03660 1  IDADDTAB ECADR  TTOGO          40 MIN/SEC                   M/S
2402  REF  1           42,2560  03762 1            ECADR  VGDISP        40 VEL3                      DP3
2403  REF  5  LAST  235 42,2561  03425 1            ECADR  DVTOTAL       40 VEL3                      DP3
2404  REF  8  LAST  284 42,2562  01250 1            ECADR  DSPTEM1       41 CDU DEG                   CDU
2405  REF  9  LAST  291 42,2563  01251 0            ECADR  DSPTEM1 +1    41 ELEV DEG                  ARTH
2406                    42,2564  00000 1            OCT    0             41 SPARE COMPONENT
2407  REF  2  LAST   96 42,2565  02354 1            ECADR  HAPO          42 POS4                      DP3
2408  REF  1           42,2566  02356 0            ECADR  HPER          42 POS4                      DP3
2409  REF  2  LAST  291 42,2567  03762 1            ECADR  VGDISP        42 VEL3                      DP3
2410  REF  5  LAST  190 42,2570  00746 1            ECADR  LAT           43 DPDEG(360)                DP4
2411  REF  3  LAST  190 42,2571  00750 0            ECADR  LONG          43 DPDEG(360)                DP4
2412  REF  3  LAST  190 42,2572  00752 1            ECADR  ALT           43 POS4                      DP3
2413  REF  4  LAST  183 42,2573  02342 0            ECADR  HAPOX         44 POS4                      DP3
```

2414	REF	3	LAST	184	42,2574	02344 0	ECADR	HPERX	44	POS4		DP3
2415	REF	2	LAST	95	42,2575	02334 1	ECADR	TFF	44	MIN/SEC		M/S
2416	REF	5	LAST	195	42,2576	00771 0	ECADR	VHFCNT	45	2INT		2INT
2417	REF	5	LAST	291	42,2577	03660 1	ECADR	TTOGO	45	MIN/SEC		M/S
2418	REF	2	LAST	126	42,2600	03625 0	ECADR	+MGA	45	DPDEG(360)		DP4
2419	REF	15	LAST	266	42,2601	03065 1	ECADR	DAPDATR1	46	OCTAL ONLY		OCT
2420	REF	3	LAST	188	42,2602	03066 1	ECADR	DAPDATR2	46	OCTAL ONLY		OCT
2421					42,2603	00000 1	OCT	0	46	SPARE COMPONENT		
2422	REF	6	LAST	236	42,2604	03073 0	ECADR	CSMMASS	47	WEIGHT2		ARTH1
2423	REF	4	LAST	187	42,2605	03072 1	ECADR	LEMMASS	47	WEIGHT2		ARTH1
2424					42,2606	00000 1	OCT	00000	47	SPARE COMPONENT		
2425	REF	10	LAST	271	42,2607	03023 0	ECADR	PACTOFF	48	TRIM DEG		ARTH
2426	REF	3	LAST	184	42,2610	03024 1	ECADR	YACTOFF	48	TRIM DEG		ARTH
2427					42,2611	00000 1	OCT	00000	48	SPARE COMPONENT		
2428	REF	1			42,2612	03501 0	ECADR	N49DISP	49	POS5		DP1
2429	REF	2	LAST	292	42,2613	03503 1	ECADR	N49DISP +2	49	VEL3		DP3
2430	REF	3	LAST	292	42,2614	03505 1	ECADR	N49DISP +4	49	WHOLE		ARTH
2431	REF	2	LAST	95	42,2615	02346 1	ECADR	RSP-RREC	50	POS6		DP3
2432	REF	4	LAST	292	42,2616	02344 0	ECADR	HPERX	50	POS4		DP3
2433	REF	3	LAST	292	42,2617	02334 1	ECADR	TFF	50	MIN/SEC		M/S
2434	REF	3	LAST	261	42,2620	02311 0	ECADR	RHOSB	51	DPDEG(360)		
2435	REF	1			42,2621	02313 1	ECADR	GAMMASB	51	DPDEG(360)		DP4
2436					42,2622	00000 1	OCT	0	51	SPARE COMPONENT		
2437	REF	2	LAST	98	42,2623	02632 1	ECADR	ACTCENT	52	DPDEG(360)		DP4
2438					42,2624	00000 1	OCT	00000	52	SPARE COMPONENT		
2439					42,2625	00000 1	OCT	00000	52	SPARE COMPONENT		
2440	REF	7	LAST	185	42,2626	02311 0	ECADR	RANGE	53	POS5		DP1
2441	REF	4	LAST	186	42,2627	02313 1	ECADR	RRATE	53	VEL3		DP3
2442	REF	6	LAST	185	42,2630	02315 1	ECADR	RTHETA	53	DPDEG(360)		DP4
2443	REF	8	LAST	292	42,2631	02311 0	ECADR	RANGE	54	POS5		DP1
2444	REF	5	LAST	292	42,2632	02313 1	ECADR	RRATE	54	VEL3		DP3
2445	REF	7	LAST	292	42,2633	02315 1	ECADR	RTHETA	54	DPDEG(360)		DP4
2446	REF	1			42,2634	03765 0	ECADR	NN1	55	WHOLE		ARTH
2447	REF	4	LAST	180	42,2635	03743 1	ECADR	ELEV	55	DPDEG(360)		DP4
2448	REF	4	LAST	185	42,2636	03753 0	ECADR	CENTANG	55	DPDEG(360)		DP4
2449	REF	2	LAST	131	42,2637	03633 1	ECADR	RTEGAM2D	56	DPDEG(360)		DP4
2450	REF	2	LAST	131	42,2640	03631 0	ECADR	RTEDVD	56	VEL2		DP4
2451					42,2641	00000 1	OCT	0	56	SPARE COMPONENT		
2452					42,2642	00000 1	OCT	0	57	SPARE		
2453					42,2643	00000 1	OCT	0	57	SPARE COMPONENT		
2454					42,2644	00000 1	OCT	0	57	SPARE COMPONENT		
2455	REF	2	LAST	98	42,2645	02640 1	ECADR	POSTTPI	58	POS4		DP3
2456	REF	3	LAST	98	42,2646	02634 1	ECADR	DELVTPI	58	VEL3		DP3
2457	REF	3	LAST	185	42,2647	02636 0	ECADR	DELVTPF	58	VEL3		DP3
2458	REF	4	LAST	105	42,2650	02610 1	ECADR	DVLOS	59	VEL3		DP3
2459	REF	5	LAST	292	42,2651	02612 0	ECADR	DVLOS +2	59	VEL3		DP3
2460	REF	6	LAST	292	42,2652	02614 0	ECADR	DVLOS +4	59	VEL3		DP3
2461	REF	2	LAST	123	42,2653	03721 0	ECADR	GMAX	60	WHOLE		ARTH
2462	REF	7	LAST	188	42,2654	03756 0	ECADR	VPRED	60	VEL2		DP4
2463	REF	9	LAST	187	42,2655	03760 0	ECADR	GAMMAEI	60	DPDEG(360)		DP4

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2464	REF	6	LAST	187	42,2656	03400 0	ECADR	LAT(SPL)	61	DPDEG(360)	DP4
2465	REF	4	LAST	188	42,2657	03402 1	ECADR	LNG(SPL)	61	DPDEG(360)	DP4
2466	REF	2	LAST	116	42,2660	03326 0	ECADR	HEADSUP	61	WHOLE	ARTH
2467	REF	6	LAST	182	42,2661	03722 0	ECADR	VMAGI	62	VEL2	DP4
2468	REF	1			42,2662	03740 1	ECADR	HDOT	62	VEL2	DP4
2469	REF	2	LAST	124	42,2663	03736 0	ECADR	ALTI	62	POS4	DP3
2470	REF	4	LAST	124	42,2664	03713 1	ECADR	RTGO	63	POS6	DP3
2471	REF	5	LAST	188	42,2665	03724 0	ECADR	VIO	63	VEL2	DP4
2472	REF	5	LAST	188	42,2666	03726 1	ECADR	TTE	63	MIN/SEC	M/S
2473	REF	2	LAST	122	42,2667	03637 0	ECADR	D	64	DRAG ACCEL	DP2
2474	REF	7	LAST	293	42,2670	03722 0	ECADR	VMAGI	64	VEL2	DP4
2475	REF	1			42,2671	03713 1	ECADR	RTGON64	64	POS6	DP3
2476	REF	2	LAST	243	42,2672	00013 0	ECADR	SAMPTIME	65	HMS (MIXED ONLY TO KEEP CODE 65)	HMS
2477	REF	3	LAST	293	42,2673	00013 0	ECADR	SAMPTIME	65	HMS	HMS
2478	REF	4	LAST	293	42,2674	00013 0	ECADR	SAMPTIME	65	HMS	HMS
2479	REF	3	LAST	188	42,2675	03315 0	ECADR	ROLLC	66	DPDEG(360)	DP4
2480	REF	1			42,2676	03675 0	ECADR	XRNGERR	66	POS8	DP3
2481	REF	2	LAST	123	42,2677	03715 1	ECADR	DNRNGERR	66	POS6	DP3
2482	REF	1			42,2700	03713 1	ECADR	RTGON67	67	POS6	DP3
2483	REF	6	LAST	291	42,2701	00746 1	ECADR	LAT	67	DPDEG(360)	DP4
2484	REF	4	LAST	291	42,2702	00750 0	ECADR	LONG	67	DPDEG(360)	DP4
2485	REF	4	LAST	293	42,2703	03315 0	ECADR	ROLLC	68	DPDEG(360)	DP4
2486	REF	8	LAST	293	42,2704	03722 0	ECADR	VMAGI	68	VEL2	DP4
2487	REF	4	LAST	188	42,2705	03677 1	ECADR	RDOT	68	VEL/2VS	DP4
2488	REF	5	LAST	293	42,2706	03315 0	ECADR	ROLLC	69	DPDEG(360)	DP4
2489	REF	1			42,2707	03174 0	ECADR	Q7	69	DRAG ACCEL	DP2
2490	REF	1			42,2710	03756 0	ECADR	VL	69	VEL/2VS	DP4
2491	REF	1			42,2711	01140 0	ECADR	STARCODE	70	OCTAL ONLY	OCT
2492	REF	8	LAST	276	42,2712	03751 1	ECADR	LANDMARK	70	OCTAL ONLY	OCT
2493	REF	2	LAST	134	42,2713	03752 1	ECADR	HORIZON	70	OCTAL ONLY	OCT
2494	REF	2	LAST	293	42,2714	01140 0	ECADR	STARCODE	71	OCTAL ONLY	OCT
2495	REF	9	LAST	293	42,2715	03751 1	ECADR	LANDMARK	71	OCTAL ONLY	OCT
2496	REF	3	LAST	293	42,2716	03752 1	ECADR	HORIZON	71	OCTAL ONLY	OCT
2497					42,2717	00000 1	OCT	0	72	SPARE	
2498					42,2720	00000 1	OCT	0	72	SPARE	
2499					42,2721	00000 1	OCT	0	72	SPARE	
2500	REF	2	LAST	133	42,2722	03620 0	ECADR	P21ALT	73	POS4	DP3
2501	REF	2	LAST	133	42,2723	03622 1	ECADR	P21VEL	73	VEL2	DP4
2502	REF	1			42,2724	03624 1	ECADR	P21GAM	73	DPDEG(360)	DP4
2503	REF	6	LAST	293	42,2725	03315 0	ECADR	ROLLC	74	DPDEG(360)	DP4
2504	REF	9	LAST	293	42,2726	03722 0	ECADR	VMAGI	74	VEL2	DP4
2505	REF	3	LAST	293	42,2727	03637 0	ECADR	D	74	DRAG ACCEL	DP2
2506	REF	2	LAST	185	42,2730	02632 1	ECADR	DIFFALT	75	POS4	DP3
2507	REF	2	LAST	105	42,2731	02546 1	ECADR	T1TOT2	75	MIN/SEC	M/S
2508	REF	1			42,2732	03655 1	ECADR	T2TOT3	75	MIN/SEC	M/S
2509					42,2733	00000 1	OCT	0	76	SPARE	
2510					42,2734	00000 1	OCT	0	76	SPARE	
2511					42,2735	00000 1	OCT	0	76	SPARE	
2512					42,2736	00000 1	OCT	0	77	SPARE	
2513					42,2737	00000 1	OCT	0	77	SPARE	

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2514					42,2740	00000 1	OCT	0	77	SPARE	
2515	REF	3	LAST	131	42,2741	03741 0	ECADR	UTYAW	78	DPDEG(360)	
2516	REF	3	LAST	219	42,2742	03737 1	ECADR	UTPIT	78	DPDEG(360)	
2517	REF	2	LAST	216	42,2743	01352 1	ECADR	AZIMANGL	78	DPDEG(360)	
2518	REF	2	LAST	119	42,2744	03372 1	ECADR	RATEPTC	79	ELEV DEG	ARTH
2519	REF	2	LAST	119	42,2745	03373 0	ECADR	DBPTC	79	CDU DEG	CDU
2520					42,2746	00000 1	OCT	0	79	SPARE COMPONENT	
2521	REF	6	LAST	292	42,2747	03660 1	ECADR	TTOGO	80	MIN/SEC	M/S
2522	REF	3	LAST	291	42,2750	03762 1	ECADR	VGDISP	80	VEL2	DP4
2523	REF	6	LAST	291	42,2751	03425 1	ECADR	DVTOTAL	80	VEL2	DP4
2524	REF	4	LAST	221	42,2752	03404 1	ECADR	DELVLVC	81	VEL3	DP3
2525	REF	5	LAST	294	42,2753	03406 0	ECADR	DELVLVC +2	81	VEL3	DP3
2526	REF	6	LAST	294	42,2754	03410 1	ECADR	DELVLVC +4	81	VEL3	DP3
2527	REF	7	LAST	221	42,2755	03537 0	ECADR	DELVOV	82	VEL3	DP3
2528	REF	8	LAST	294	42,2756	03541 1	ECADR	DELVOV +2	82	VEL3	DP3
2529	REF	9	LAST	294	42,2757	03543 0	ECADR	DELVOV +4	82	VEL3	DP3
2530	REF	3	LAST	232	42,2760	03674 1	ECADR	DELVIMU	83	VEL3	DP3
2531	REF	4	LAST	294	42,2761	03676 0	ECADR	DELVIMU +2	83	VEL3	DP3
2532	REF	5	LAST	294	42,2762	03700 0	ECADR	DELVIMU +4	83	VEL3	DP3
2533	REF	10	LAST	294	42,2763	03537 0	ECADR	DELVOV	84	VEL3	DP3
2534	REF	11	LAST	294	42,2764	03541 1	ECADR	DELVOV +2	84	VEL3	DP3
2535	REF	12	LAST	294	42,2765	03543 0	ECADR	DELVOV +4	84	VEL3	DP3
2536	REF	3	LAST	127	42,2766	03664 0	ECADR	VGBODY	85	VEL3	DP3
2537	REF	4	LAST	294	42,2767	03666 1	ECADR	VGBODY +2	85	VEL3	DP3
2538	REF	5	LAST	294	42,2770	03670 0	ECADR	VGBODY +4	85	VEL3	DP3
2539	REF	7	LAST	294	42,2771	03404 1	ECADR	DELVLVC	86	VEL2	DP4
2540	REF	8	LAST	294	42,2772	03406 0	ECADR	DELVLVC +2	86	VEL2	DP4
2541	REF	9	LAST	294	42,2773	03410 1	ECADR	DELVLVC +4	86	VEL2	DP4
2542	REF	19	LAST	269	42,2774	03725 1	ECADR	MRKBUF1 +3	87	CDU DEG	CDU
2543	REF	20	LAST	294	42,2775	03727 0	ECADR	MRKBUF1 +5	87	Y OPTICS DEG	YOPT
2544					42,2776	00000 1	OCT	0	87	SPARE COMPONENT	
2545	REF	1			42,2777	03704 1	ECADR	STARSAV3	88	DPFRAC	DPFRAC
2546	REF	2	LAST	294	42,3000	03706 0	ECADR	STARSAV3 +2	88	DPFRAC	DPFRAC
2547	REF	3	LAST	294	42,3001	03710 1	ECADR	STARSAV3 +4	88	DPFRAC	DPFRAC
2548	REF	1			42,3002	00746 1	ECADR	LANDLAT	89	DPDEG(90)	DP3
2549	REF	2	LAST	95	42,3003	02350 0	ECADR	LANDLONG	89	DPDEG(90)	DP3
2550	REF	2	LAST	95	42,3004	02352 1	ECADR	LANDALT	89	POS5	DP1
2551	REF	2	LAST	91	42,3005	01755 1	ECADR	YCSM	90	POS5	DP1
2552	REF	2	LAST	91	42,3006	01757 0	ECADR	YDOTC	90	VEL3	DP3
2553	REF	1			42,3007	01761 0	ECADR	YDOTL	90	VEL3	DP3
2554	REF	7	LAST	243	42,3010	00036 1	ECADR	CDUS	91	CDU DEG	CDU
2555	REF	6	LAST	243	42,3011	00035 1	ECADR	CDUT	91	Y OPTICS DEG	YOPT
2556					42,3012	00000 1	OCT	0	91	SPARE COMPONENT	
2557	REF	3	LAST	255	42,3013	02773 0	ECADR	SAC	92	CDU DEG	CDU
2558	REF	3	LAST	255	42,3014	02775 0	ECADR	PAC	92	Y OPTICS DEG	YOPT
2559					42,3015	00000 1	OCT	0	92	SPARE COMPONENT	
2560	REF	8	LAST	256	42,3016	02757 0	ECADR	OGC	93	DPDEG(90)	DP3
2561	REF	9	LAST	294	42,3017	02761 0	ECADR	OGC +2	93	DPDEG(90)	DP3
2562	REF	10	LAST	294	42,3020	02763 1	ECADR	OGC +4	93	DPDEG(90)	DP3
2563	REF	21	LAST	294	42,3021	03725 1	ECADR	MRKBUF1 +3	94	CDU DEG	CDU

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2564	REF	22	LAST	294	42,3022	03727 0	ECADR	MRKBUF1 +5	94	Y OPTICS DEG	YOPT
2565					42,3023	00000 1	OCT	0	94	SPARE	
2566	REF	7	LAST	294	42,3024	03660 1	ECADR	TTOGO	95	MIN/SEC	M/S
2567	REF	2	LAST	182	42,3025	03724 0	ECADR	VGTLI	95	VEL2	DP4
2568	REF	1			42,3026	03722 0	ECADR	VNOW	95	VEL2	DP4
2569	REF	9	LAST	292	42,3027	02311 0	ECADR	RANGE	96	POS5	DP1
2570	REF	6	LAST	292	42,3030	02313 1	ECADR	RRATE	96	VEL3	DP3
2571	REF	1			42,3031	02315 1	ECADR	RRATE2	96	VEL3	DP3
2572	REF	10	LAST	291	42,3032	01250 1	ECADR	DSPTEM1	97	WHOLE	ARTH
2573	REF	11	LAST	295	42,3033	01251 0	ECADR	DSPTEM1 +1	97	WHOLE	ARTH
2574	REF	12	LAST	295	42,3034	01252 0	ECADR	DSPTEM1 +2	97	WHOLE	ARTH
2575	REF	4	LAST	283	42,3035	01253 1	ECADR	DSPTEM2	98	WHOLE	ARTH
2576	REF	5	LAST	295	42,3036	01254 0	ECADR	DSPTEM2 +1	98	FRAC	FRAC
2577	REF	6	LAST	295	42,3037	01255 1	ECADR	DSPTEM2 +2	98	WHOLE	ARTH
2578	REF	1			42,3040	02311 0	ECADR	WWPOS	99	POS9	DP3
2579	REF	1			42,3041	02313 1	ECADR	WWVEL	99	VEL4	DP2
2580	REF	1			42,3042	02315 1	ECADR	WWOPT	99	WHOLE	ARTH
R2600	END OF IDADDTAB										

A2800 NN SF ROUTINES

2801	42,3043	16351 1	RUTMXTAB	OCT	16351	40 M/S, DP3, DP3
2802	42,3044	00142 0		OCT	00142	41 CDU, ARTH
2803	42,3045	16347 0		OCT	16347	42 DP3, DP3, DP3
2804	42,3046	16512 0		OCT	16512	43 DP4, DP4, DP3
2805	42,3047	22347 1		OCT	22347	44 DP3, DP3, M/S
2806	42,3050	24454 1		OCT	24454	45 2INT, M/S, DP4
2807	42,3051	00000 1		OCT	00000	46 OCT, OCT
2808	42,3052	00553 1		OCT	00553	47 ARITH1, ARITH1
2809	42,3053	00143 1		OCT	00143	48 ARTH, ARTH
2810	42,3054	06344 1		OCT	06344	49 DP1, DP3, ARTH
2811	42,3055	22347 1		OCT	22347	50 DP3, DP3, M/S
2812	42,3056	00512 1		OCT	00512	51 DP4, DP4
2813	42,3057	00012 1		OCT	00012	52 DP4
2814	42,3060	24344 1		OCT	24344	53 DP1, DP3, DP4
2815	42,3061	24344 1		OCT	24344	54 DP1, DP3, DP4
2816	42,3062	24503 1		OCT	24503	55 ARTH, DP4 , DP4
2817	42,3063	00512 1		OCT	00512	56 DP4, DP4
2818	42,3064	00007 0		OCT	00007	57 DP3
2819	42,3065	16347 0		OCT	16347	58 DP3, DP3, DP3
2820	42,3066	16347 0		OCT	16347	59 DP3, DP3, DP3
2821	42,3067	24503 1		OCT	24503	60 ARTH, DP4, DP4
2822	42,3070	06512 1		OCT	06512	61 DP4, DP4, ARTH
2823	42,3071	16512 0		OCT	16512	62 DP4, DP4, DP3
2824	42,3072	22507 0		OCT	22507	63 DP3, DP4, M/S
2825	42,3073	16505 0		OCT	16505	64 DP2, DP4, DP3
2826	42,3074	20410 0		OCT	20410	65 HMS, HMS, HMS
2827	42,3075	16352 1		OCT	16352	66 DP4, DP3, DP3
2828	42,3076	24507 0		OCT	24507	67 DP3, DP4, DP4

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2829                42,3077  24512 1   OCT   24512   68 DP4, DP4, DP4
2830                42,3100  24252 1   OCT   24252   69 DP4, DP2, DP4
2831                42,3101  00000 1   OCT   00000   70 OCT, OCT, OCT
2832                42,3102  00000 1   OCT   0       71 OCT, OCT, OCT
2833                42,3103  00000 1   OCT   0       72 SPARE
2834                42,3104  24507 0   OCT   24507   73 DP3, DP4, DP4
2835                42,3105  12512 1   OCT   12512   74 DP4, DP4, DP2
2836                42,3106  22447 0   OCT   22447   75 DP3, M/S, M/S
2837                42,3107  00000 1   OCT   0       76 SPARE
2838                42,3110  00000 1   OCT   0       77 SPARE
2839                42,3111  24512 1   OCT   24512   78 DP4,DP4,DP4
2840                42,3112  00103 0   OCT   103     79 ARTH,CDU
2841                42,3113  24511 1   OCT   24511   80 M/S, DP4, DP4
2842                42,3114  16347 0   OCT   16347   81 DP3, DP3, DP3
2843                42,3115  16347 0   OCT   16347   82 DP3, DP3, DP3
2844                42,3116  16347 0   OCT   16347   83 DP3, DP3, DP3
2845                42,3117  16347 0   OCT   16347   84 DP3, DP3, DP3
2846                42,3120  16347 0   OCT   16347   85 DP3, DP3, DP3
2847                42,3121  24512 1   OCT   24512   86 DP4, DP4, DP4
2848                42,3122  00302 0   OCT   00302   87 CDU, YOPT
2849                42,3123  32655 0   OCT   32655   88 DPFRAC FOR EACH
2850                42,3124  10347 0   OCT   10347   89 DP3, DP3, DP1
2851                42,3125  16344 0   OCT   16344   90 DP1, DP3, DP3
2852                42,3126  00302 0   OCT   00302   91 CDU, YOPT
2853                42,3127  00302 0   OCT   00302   92 CDU, YOPT
2854                42,3130  16347 0   OCT   16347   93 DP3, DP3, DP3
2855                42,3131  00302 0   OCT   00302   94 CDU, YOPT
2856                42,3132  24511 1   OCT   24511   95 M/S, DP4, DP4
2857                42,3133  16344 0   OCT   16344   96 DP1, DP3, DP3
2858                42,3134  06143 1   OCT   06143   97 ARTH, ARTH, ARTH
2859                42,3135  06043 0   OCT   06043   98 ARTH, FRAC, ARTH
2860                42,3136  06247 0   OCT   06247   99 DP3, DP2, ARTH
R2870  END OF RUTMXTAB

2871  REF  3 LAST 221  30,2000                SBANK= LOWSUPER
```

L CSM GEOMETRY USER'S PAGE NO. 1 EC S?

```
C002   REF   1                23,2000                    SETLOC COMGEOM1
C003                          23,2000                    BANK

R0004  THIS ROUTINE TAKES THE SHAFT AND TRUNNION ANGLES AS READ BY THE CM OPTICAL SYSTEM AND CONVERTS THEM INTO A UNIT
R0006  VECTOR REFERENCED TO THE NAVIGATION BASE COORDINATE SYSTEM AND COINCIDENT WITH THE SEXTANT LINE OF SIGHT.

R0008  THE INPUTS ARE 1) THE SEXTANT SHAFT AND TRUNNION ANGLES ARE STORED SP IN LOCATIONS 3 AND 5 RESPECTIVELY OF THE
R0010  MARK VAC AREA. 2) THE COMPLEMENT OF THE BASE ADDRESS OF THE MARK VAC AREA IS STORED SP AT LOCATION X1 OF YOUR
R0012  JOB VAC AREA.

R0013  THE OUTPUT IS A HALF-UNIT VECTOR IN NAVIGATION BASE COORDINATES AND STORED AT LOCATION 32D OF THE VAC AREA. THE
R0015  OUTPUT IS ALSO AVAILABLE AT MPAC.

C016   REF   1                                          COUNT* $$/GEOM
C017                          23,2000  47133 0  SXTNB   SLOAD*  RTB       PUSHDOWN 00,02,04,(17D-19D),32D-36D
C018                          23,2001  00006 1           5,1      TRUNNION = TA
C019   REF   1                23,2002  51754 0           CDULOGIC
C020                          23,2003  41434 1  RTB      PUSH
C021   REF   1                23,2004  46027 0           SXTLOGIC
C022                          23,2005  72556 1  SIN      SL1
C023                          23,2006  66606 1  PUSH     SLOAD*   PD2 = SIN(TA)
C024                          23,2007  00004 0           3,1      SHAFT = SA
C025                          23,2010  41434 1  RTB      PUSH     PD4 = SA
C026   REF   2  LAST  297     23,2011  51754 0           CDULOGIC
C027                          23,2012  41346 0  COS      DMP
C028                          23,2013  00003 1           2
C029   REF   1                23,2014  14041 1  STODL    STARM    COS(SA)SIN(TA)

C030                          23,2015  41356 1  SIN      DMP
C031                          23,2016  77626 0  STADR
C032   REF   2  LAST  297     23,2017  63734 1  STODL    STARM +2 SIN(SA)SIN(TA)

C033                          23,2020  77746 1  COS
C034   REF   3  LAST  297     23,2021  24045 0  STOVL    STARM +4
C035   REF   4  LAST  297     23,2022  00041 1           STARM    STARM = 32D
C036                          23,2023  76521 0  MXV      VSL1
C037   REF   1                23,2024  06300 1           NBINB2
C038                          23,2025  00041 1  STORE    32D
C039                          23,2026  77616 0  RVQ

C040   REF   1                23,2027  3 2321 0 SXTLOGIC CAF     1ODEGS-  CORRECT FOR 19.775 DEGREE OFFSET
C041   REF   33 LAST  273     23,2030  26 154 0          ADS      MPAC
C042   REF   1                23,2031  3 4754 0          CAF      QUARTER
C043   REF   1                23,2032  0 7256 1          TC       SHORTMP
C044   REF   2  LAST  222     23,2033  0 6030 1          TC       DANZIG
```

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R0045 CALCSXA COMPUTES THE SEXTANT SHAFT AND TRUNNION ANGLES REQUIRED TO POSITION THE OPTICS SUCH THAT A STAR LINE-
R0047 OF-SIGHT LIES ALONG THE STAR VECTOR. THE ROUTINE TAKES THE GIVEN STAR VECTOR AND EXPRESSES IT AS A VECTOR REF-
R0049 ERENCED TO THE OPTICS COORDINATE SYSTEM. IN ADDITION IT SETS UP THREE UNIT VECTORS DEFINING THE X,Y, AND Z AXES
R0051 REFERENCED TO THE OPTICS COORDINATE SYSTEM.

R0052 THE INPUTS ARE 1) THE STAR VECTOR REFERRED TO PRESENT STABLE MEMBER COORDINATES STORED AT STAR. 2) SAME ANGLE
R0054 INPUT AS *SMNB*, I.E. SINES AND COSINES OF THE CDU ANGLES, IN THE ORDER Y Z X, AT SINCDU AND COSCDU. A CALL
R0056 TO CDUTRIG WILL PROVIDE THIS INPUT.

R0057 THE OUTPUTS ARE THE SEXTANT SHAFT AND TRUNNION ANGLES STORED DP AT SAC AND PAC RESPECTIVELY. (LOW ORDER PART
R0059 EQUAL TO ZERO).

```
0060                          23,2034  77220 1  CALCSXA  ITA     VLOAD          PUSHDOWN  00-26D,28D,30D,32D-36D
0061                          23,2035  00034 0                   28D
0062  REF   3  LAST  233      23,2036  02766 1                   STAR
0063                          23,2037  77624 1           CALL
0064  REF   1                 23,2040  47633 1                   *SMNB*
0065                          23,2041  76521 0           MXV     VSL1
0066  REF   1                 23,2042  06256 0                   NB2NB1
0067  REF   4  LAST  298      23,2043  26766 1           STOVL   STAR
0068  REF   1                 23,2044  15334 1                   HIUNITX
0069  REF   2  LAST   97      23,2045  26555 0           STOVL   XNB1
0070  REF   1                 23,2046  15332 1                   HIUNITY
0071  REF   2  LAST   97      23,2047  26563 0           STOVL   YNB1
0072  REF   1                 23,2050  15330 0                   HIUNITZ
0073  REF   2  LAST   97      23,2051  36571 1           STCALL  ZNB1
0074  REF   1                 23,2052  46076 1                   SXTANG1
```

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R0075 SXTANG COMPUTES THE SEXTANT SHAFT AND TRUNNION ANGLES REQUIRED TO POSITION THE OPTICS SUCH THAT A STAR LINE-OF-
R0077 SIGHT LIES ALONG THE STAR VECTOR.

R0078 THE INPUTS ARE 1) THE STAR VECTOR REFERRED TO ANY COORDINATE SYSTEM STORED AT STAR. 2) THE NAVIGATION BASE
R0080 COORDINATES REFERRED TO THE SAME COORDINATE SYSTEM. THESE THREE HALF-UNIT VECTORS ARE STORED AT XNB, YNB, AND
R0082 ZNB.

R0083 THE OUTPUTS ARE THE SEXTANT SHAFT AND TRUNNION ANGLES STORED DP AT SAC AND PAC RESPECTIVELY. (LOW ORDER PART
R0085 EQUAL TO ZERO).

0086					23,2053	47020 0	SXTANG	ITA	RTB	PUSHDOWN 16D,18D,22D-26D,28D
0087					23,2054	00034 0			28D	
0088	REF	1			23,2055	45731 0			TRANSP1	EREF WRT NB2
0089					23,2056	64375 1		VLOAD	MXV	
0090	REF	1			23,2057	02714 1			XNB	
0091	REF	2	LAST	298	23,2060	06256 0			NB2NB1	
0092					23,2061	77772 0		VSL1		
0093	REF	3	LAST	298	23,2062	26555 0		STOVL	XNB1	
0094	REF	1			23,2063	02722 1			YNB	
0095					23,2064	76521 0		MXV	VSL1	
0096	REF	3	LAST	299	23,2065	06256 0			NB2NB1	
0097	REF	3	LAST	298	23,2066	26563 0		STOVL	YNB1	
0098	REF	1			23,2067	02730 1			ZNB	
0099					23,2070	76521 0		MXV	VSL1	
0100	REF	4	LAST	299	23,2071	06256 0			NB2NB1	
0101	REF	3	LAST	298	23,2072	02571 0		STORE	ZNB1	
0102					23,2073	47034 0		RTB	RTB	
0103	REF	2	LAST	299	23,2074	45731 0			TRANSP1	
0104	REF	1			23,2075	45745 0			TRANSP2	
0105					23,2076	47375 0	SXTANG1	VLOAD	VXV	
0106	REF	4	LAST	299	23,2077	02571 0			ZNB1	
0107	REF	5	LAST	298	23,2100	02766 1			STAR	
0108					23,2101	77600 1		BOV		
0109					23,2102	46103 1			+1	
0110					23,2103	40056 0		UNIT	BOV	
0111	REF	1			23,2104	46145 0			ZNB=S1	
0112	REF	1			23,2105	00027 1		STORE	PDA	PDA = UNIT(ZNB X S)
0113					23,2106	57441 1		DOT	DCOMP	
0114	REF	4	LAST	299	23,2107	02555 0			XNB1	
0115	REF	1			23,2110	24023 0		STOVL	SINTH	SIN(SA) = PDA . -XNB
0116	REF	2	LAST	299	23,2111	00027 1			PDA	
0117					23,2112	77641 1		DOT		
0118	REF	4	LAST	299	23,2113	02563 0			YNB1	
0119	REF	1			23,2114	34021 0		STCALL	COSTH	COS(SA) = PDA . YNB
0120	REF	1			23,2115	47311 1			ARCTRIG	

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```
0121                          23,2116  77634 0          RTB
0122  REF   1                 23,2117  45640 1                   1STO2S
0123  REF   4  LAST  294      23,2120  26774 1          STOVL    SAC
0124  REF   6  LAST  299      23,2121  02766 1                   STAR
0125                          23,2122  77600 1          BOV
0126                          23,2123  46124 1                   +1
0127                          23,2124  72441 0          DOT      SL1
0128  REF   5  LAST  299      23,2125  02571 0                   ZNB1
0129                          23,2126  77726 1          ACOS
0131                          23,2127  62440 0          BMN      SL2
0132  REF   1                 23,2130  46142 1                   SXTALARM     TRUNNION ANGLE NEGATIVE
0133                          23,2131  45200 1          BOV      DSU
0134  REF   2  LAST  300      23,2132  46142 1                   SXTALARM     TRUNNION ANGLE GREATER THAN 90 DEGREES
0135  REF   1                 23,2133  06327 1                   20DEG-
0136                          23,2134  77634 0          RTB
0137  REF   2  LAST  300      23,2135  45640 1                   1STO2S
0138  REF   4  LAST  294      23,2136  02776 0          STORE    PAC          FOR FLIGHT USE, CULTFLAG IS ON IF
0139                          23,2137  77614 1          CLRGO                 TRUNION IS GREATER THAN 90 DEG
0140  REF   1                 23,2140  01630 0                   CULTFLAG
0141                          23,2141  00034 0                   28D
0142                          23,2142  77614 1  SXTALARM SETGO                ALARM HAS BEEN REMOVED FROM THIS
0143  REF   2  LAST  300      23,2143  01430 1                   CULTFLAG
0144                          23,2144  00034 0                   28D          SUBROUTINE,ALARM WILL BE SET BY MPI
0145                          23,2145  77745 1  ZNB=S1   DLOAD
0146  REF   1                 23,2146  06323 0                   270DEG
0147  REF   5  LAST  300      23,2147  16774 1          STODL    SAC
0148  REF   1                 23,2150  06325 0                   20DEGS-
0149  REF   5  LAST  300      23,2151  02776 0          STORE    PAC
0150                          23,2152  77614 1          CLRGO
0151  REF   3  LAST  300      23,2153  01630 0                   CULTFLAG
0152                          23,2154  00034 0                   28D
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L CSM GEOMETRY

```
R0153   THESE TWO ROUTINES COMPUTE THE ACTUAL STATE VECTOR FOR LM, CSM BY ADDING
R0154   THE CONIC R,V AND THE DEVIATIONSR,V. THE STATE VECTORS ARE CONVERTED TO
R0155   METERS B-29 AND METERS/CSEC B-7 AND STORED APPROPRIATELY IN RN,VN OR
R0156   R-OTHER , V-OTHER FOR DOWNLINK. THE ROUTINES NAMES ARE SWITCHED IN THE
R0157   OTHER VEHICLES COMPUTER.

R0158   INPUT
R0159     STATE VECTOR IN TEMPORARY STORAGE AREA
R0160     IF STATE VECTOR IS SCALED POS B27 AND VEL B5
R0161        SET X2 TO +2
R0162     IF STATE VECTOR IS SCALED POS B29 AND VEL B7
R0163        SET X2 TO 0

R0164   OUTPUT
R0165     R(T) IN RN, V(T) IN VN, T IN PIPTIME
R0166   OR
R0167     R(T) IN R-OTHER, V(T) IN V-OTHER   (T IS DEFINED BY T-OTHER)


 0169   REF   1              10,2000                        SETLOC  COMGEOM2
 0170                        10,2240                        BANK
 0171   REF   1                                            COUNT*  $$/GEOM
 0172                        10,2240   43414 1  SVDWN1     BOF     RVQ             SW=1=AVETOMID DOING W-MATRIX INTEG
01721   REF   1              10,2241   04756 1                    AVEMIDSW
01722                        10,2242   20243 0                    +1
01723                        10,2243   53775 1            VLOAD   VSL*
 0173   REF   2  LAST   89   10,2244   01521 0                    TDELTAV
 0174                        10,2245   57605 0                    0 -7,2
 0175                        10,2246   53655 1            VAD     VSL*
 0176   REF   2  LAST   89   10,2247   01535 0                    RCV
 0177                        10,2250   57576 1                    0,2
 0178   REF   4  LAST  180   10,2251   25030 0            STODVL  RN
 0179   REF   2  LAST   89   10,2252   01527 0                    TNUV
 0180                        10,2253   53257 1            VSL*    VAD
 0181                        10,2254   57602 1                    0 -4,2
 0182   REF   2  LAST   89   10,2255   01543 1                    VCV
 0183                        10,2256   77657 0            VSL*
 0184                        10,2257   57576 1                    0,2
 0185   REF   4  LAST  180   10,2260   15036 0            STODL   VN
 0186   REF   5  LAST  284   10,2261   01517 0                    TET
 0187   REF   3  LAST  180   10,2262   01044 0            STORE   PIPTIME
 0188                        10,2263   77616 0            RVQ


 0189                        10,2264   53775 1  SVDWN2    VLOAD   VSL*
 0190   REF   3  LAST  301   10,2265   01521 0                    TDELTAV
 0191                        10,2266   57605 0                    0 -7,2
 0192                        10,2267   53655 1            VAD     VSL*
 0193   REF   3  LAST  301   10,2270   01535 0                    RCV
 0194                        10,2271   57576 1                    0,2
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```
0195  REF  4 LAST 181   10,2272  25720 0        STOVL  R-OTHER
0196  REF  3 LAST 301   10,2273  01527 0               TNUV
0197                    10,2274  53257 1        VSL*   VAD
0198                    10,2275  57602 1               0 -4,2
0199  REF  3 LAST 301   10,2276  01543 1               VCV
0200                    10,2277  77657 0        VSL*
0201                    10,2300  57576 1               0,2
0202  REF  4 LAST 181   10,2301  01726 0        STORE  V-OTHER
0203                    10,2302  77616 0        RVQ
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L       CSM GEOMETRY

P0204   SUBROUTINE TO COMPUTE THE NATURAL LOG OF C(MPAC, MPAC +1).

R0205           ENTRY:      CALL
R0206                       LOG

R0207   SUBROUTINE RETURNS WITH  -LOG  IN DP MPAC.

R0208   EBANK IS ARBITRARY..


0210    REF   1             23,2000                 SETLOC  POWFLIT2
0211                        23,2155                 BANK
0212    REF   2 LAST  297 TO  301:   109   109*     COUNT*  $$/GEOM
0213                        23,2155   44301 0  LOG  NORM    BDSU        GENERATES LOG BY SHIFTING ARG
0214    REF  34 LAST  297   23,2156   00160 0              MPAC +3     UNTIL IT LIES BETWEEN .5 AND 1.
0215    REF   1             23,2157   15344 0              NEARLY1     THE LOG OF THIS PART IS FOUND AND THE
0216                        23,2160   77776 1  EXIT                    LOG OF THE SHIFTED PART IS COMPUTED

0217    REF   1             23,2161   0 7171 1  TC      POLY        AND ADDED IN. SHIFT COUNT STORED

0218                        23,2162   00002 0  DEC     2           (N-1, SUPPLIED BY SMERZH)
0219                        23,2163   00000 1  2DEC    0           IN MPAC +3.
0219                        23,2164   00000 1
0220                        23,2165   01001 1  2DEC    .031335467
0220                        23,2166   14636 1
0221                        23,2167   00325 0  2DEC    .0130145859
0221                        23,2170   07310 1
0222                        23,2171   00541 1  2DEC    .0215738898
0222                        23,2172   16735 1

0223    REF  31 LAST  276   23,2173   3 4772 1 CAF     ZERO
0224    REF  35 LAST  303   23,2174   54 156 1 TS      MPAC +2
0225                        23,2175   0 0006 1 EXTEND
0226    REF   1             23,2176   3 2212 1 DCA     CLOG2/32
0227    REF  36 LAST  303   23,2177   52 155 1 DXCH    MPAC
0228    REF  37 LAST  303   23,2200   52 160 1 DXCH    MPAC +3
0229                        23,2201   4 0000 0 COM                 LOAD POSITIVE SHIFT COUNT IN A.
0230    REF   2 LAST  297   23,2202   0 7256 1 TC      SHORTMP     MULTIPLY BY SHIFT COUNT.

0231    REF  38 LAST  303   23,2203   52 156 1 DXCH    MPAC +1
0232    REF  39 LAST  303   23,2204   52 155 1 DXCH    MPAC
0233    REF  40 LAST  303   23,2205   52 160 1 DXCH    MPAC +3
0234    REF  41 LAST  303   23,2206   20 155 1 DAS     MPAC
0235    REF  11 LAST  275   23,2207   0 6006 1 TC      INTPRET     RESULT IN MPAC, MPAC +1

0236                        23,2210   77616 0  RVQ

                            26,3343          NEARLY1  =       NEARONE
0237    REF   1             23,2211   00542 1 CLOG2/32 2DEC   .0216608494
0238                        23,2212   34414 1
0238
```

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```
PC239   SUBROUTINE NAME:       EARTH ROTATOR     (EARROT1 OR EARROT2)          DATE:          15 FEB 67
RC241   MOD NO:  N +1                                                          LOG SECTION:   POWERED FLIGHT SUBROS
RC243   MOD BY:  ENTRY GROUP  (BAIRNSFATHER)
RC244   FUNCTIONAL DESCRIPTION:       THIS ROUTINE PROJECTS THE INITIAL EARTH TARGET VECTOR   RTINIT   AHEAD THROUGH
RC246           THE ESTIMATED TIME OF FLIGHT. INITIAL CALL RESOLVES THE INITIAL TARGET VECTOR   RTINIT   INTO EASTERLY
RC248           AND NORMAL COMPONENTS   RTEAST   AND   RTNORM   . INITIAL AND  SUBSEQUENT CALLS ROTATE THIS VECTOR
RC250           ABOUT THE (FULL) UNIT POLAR AXIS   UNITW   THROUGH THE ANGLE    WIE DTEAROT   TO OBTAIN THE ROTATED
RC252           TARGET VECTOR   RT   . ALL VECTORS EXCEPT   UNITW   ARE HALF UNIT.
RC254           THE EQUATIONS ARE
RC255                  - -      -                  -
RC256                 RT = RTINIT + RTNORM (COS(WT) -1) + RTEAST SIN(WT)
RC257           WHERE  WT = WIE DTEAROT
RC258                  RTINIT = INITIAL TARGET VECTOR
RC259                  -      -    -
RC260                  RTEAST = UNITW*RTINIT
RC261                  -      -    -
RC262                  RTNORM = RTEAST*UNITW

RC263           FOR CONTINUOUS UPDATING, ONLY ONE ENTRY TO EARROT1 IS REQUIRED, WITH SUBSEQUENT ENTRIES AT EARROT2.
RC265   CALLING SEQUENCE:  FIRST CALL                    SUBSEQUENT CALL
RC266                      STCALL DTEAROT                STCALL DTEAROT
RC267                           EARROT1                       EARROT2
RC268                      C(MPAC) UNSPECIFIED           C(MPAC) = DTEAROT
RC269           PUSHLOC = PDL+0, ARBITRARY.  6 LOCATIONS USED.

RC270   SUBROUTINES USED:  NONE
RC271   NORMAL EXIT MODES:   RVQ
RC272   ALARMS:  NONE
RC273   OUTPUT:  RTEAST (-1)          .5 UNIT VECTOR EAST, COMPNT OF RTINIT   LEFT BY FIRST CALL
RC275           RTNORM (-1)          .5 UNIT VECTOR NORML, COMPNT OF RTINIT  LEFT BY FIRST CALL
RC277           RT     (-1)          .5 UNIT TARGET VECTOR, ROTATED          LEFT BY ALL CALLS
RC279           DTEAROT  (-28) CS    MAY BE CHANGED BY EARROT2, IF OVER 1 DAY
RC280   ERASABLE INITIALIZATION REQUIRED:
RC281           UNITW  (0)           UNIT POLAR VECTOR                       PAD LOADED
RC283           RTINIT (-1)          .5 UNIT INITIAL TARGET VECTOR           LEFT BY ENTRY
RC285           DTEAROT  (-28) CS    TIME OF FLIGHT                          LEFT BY CALLER
RC287   DEBRIS:  QPRET,     PDL+0 ... PDL+5
```

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```
PC288

 0289   REF  3 LAST 234   E7,1451                          EBANK= RTINIT

 0290                     23,2213  47375 0  EARROT1  VLOAD  VXV
 0291   REF  3 LAST  90   23,2214  01712 1           UNITW  FULL UNIT VECTOR
 0292   REF  4 LAST 305   23,2215  03452 1           RTINIT .5 UNIT
 0293   REF  2 LAST 122   23,2216  03460 0           STORE  RTEAST  .5 UNIT

 0294                     23,2217  77635 1           VXV
 0295   REF  4 LAST 305   23,2220  01712 1           UNITW  FULL UNIT
 0296   REF  2 LAST 122   23,2221  17466 0           STODL  RTNORM  .5 UNIT
 0297   REF  2 LAST 122   23,2222  03606 1                  DTEAROT (-28) CS

 0298                     23,2223  56204 1  EARROT2  BOVB   DDV
 0299   REF  1            23,2224  57544 0                  TCDANZIG RESET OVFIND, IF ON
 0300   REF  1            23,2225  06254 1                  1/WIE
 0301                     23,2226  41400 0           BOV    PUSH
 0302   REF  1            23,2227  46243 0                  OVERADAY
 0303                     23,2230  45346 1           COS    DSU
 0304   REF  1            23,2231  15334 1                  HIDPHALF
 0305                     23,2232  65361 0           VXSC   PDDL    XCH W PUSH LIST
 0306   REF  3 LAST 305   23,2233  03466 0                  RTNORM  .5 UNIT
 0307                     23,2234  74356 1           SIN    VXSC
 0308   REF  3 LAST 305   23,2235  03460 0                  RTEAST  .5 UNIT
 0309                     23,2236  76455 1           VAD    VSL1
 0310                     23,2237  53455 0           VAD    UNIT    INSURE THAT RT IS 'UNIT'.
 0311   REF  5 LAST 305   23,2240  03452 1                  RTINIT  .5 UNIT
 0312   REF  2 LAST 122   23,2241  03474 0           STORE  RT      .5 UNIT TARGET VECTOR

 0313                     23,2242  77616 0           RVQ

 0314                     23,2243  75345 1  OVERADAY DLOAD  SIGN
 0315   REF  2 LAST 305   23,2244  06254 1                  1/WIE
 0316   REF  3 LAST 305   23,2245  03606 1                  DTEAROT
 0317                     23,2246  77621 1           BDSU
 0318   REF  4 LAST 305   23,2247  03606 1                  DTEAROT
 0319   REF  5 LAST 305   23,2250  03606 1           STORE  DTEAROT

 0320                     23,2251  77650 1           GOTO
 0321   REF  1            23,2252  46223 0                  EARROT2

                                          WIE      2DEC   .1901487997
A0322
 0323                     23,2253  01015 1  1/WIE    2DEC   8616410
 0323                     23,2254  34732 0
 1036                     23,2255  15373 1  NB2NB1   2DEC   +.8431756920 B-1
 1036                     23,2256  11346 0
 1037                     23,2257  00000 1           2DEC   0
 1037                     23,2260  00000 1
 1038                     23,2261  67313 1           2DEC   -.5376381241 B-1
 1038                     23,2262  65307 0
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```
1039          23,2263   00000 1  ZERINFLT 2DEC    0
1039          23,2264   00000 1
1040          23,2265   20000 0  HALFNFLT 2DEC    .5
1040          23,2266   00000 1
1041          23,2267   00000 1           2DEC    0
1041          23,2270   00000 1

1042          23,2271   10464 0           2DEC    +.5376381241 B-1
1042          23,2272   12470 1
1043          23,2273   00000 1           2DEC    0
1043          23,2274   00000 1
1044          23,2275   15373 1           2DEC    +.8431756920 B-1
1044          23,2276   11346 0


1045          23,2277   15373 1  N81N82   2DEC    +.8431756920 B-1
1045          23,2300   11346 0
1046          23,2301   00000 1           2DEC    0
1046          23,2302   00000 1
1047          23,2303   10464 0           2DEC    +.5376381241 B-1
1047          23,2304   12470 1
1048          23,2305   00000 1           2DEC    0
1048          23,2306   00000 1
1049          23,2307   20000 0           2DEC    .5
1049          23,2310   00000 1
1050          23,2311   00000 1  2DEC     0
1050          23,2312   00000 1

1051          23,2313   67313 1           2DEC    -.5376381241 B-1
1051          23,2314   65307 0
1052          23,2315   00000 1           2DEC    0
1052          23,2316   00000 1
1053          23,2317   15373 1           2DEC    +.8431756920 B-1
1053          23,2320   11346 0
```

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```
1054                23,2321   07020 1  10DEGS-  DEC     3600

1055                23,2322   60000 1  270DEG   OCT     60000          SHAFT  270 DEGREES  2S COMP.
1056                23,2323   00000 1           OCT     00000

1057                23,2324   61740 0  20DEGS-  DEC     -07199
1058                23,2325   77777 0           DEC     -00000

1059                23,2326   07020 1  20DEG-   DEC     03600
1060                23,2327   00000 1           DEC     00000
```

L IMU COMPENSATION PACKAGE USER'S PAGE NO. 1 EQ S3

```
C00101 REF   1                06,2000                    SETLOC  IMUCOMP
C00102                        06,3276                    BANK
0002   REF   1                E3,1460                    EBANK=  NBDX

0100   REF   1                                           COUNT*  $$/ICOMP
0112   REF   1                06,3276  3 3535 1  1/PIPA CAF     LGCOMP     SAVE EBANK OF CALLING PROGRAM
0113   REF   8  LAST  255      06,3277  56 003 1          XCH     EBANK
0114   REF   1                06,3300  54 163 1          TS      MODE

0115   REF   1                06,3301  11'477 0          CCS     GCOMPSW    BYPASS IF GCOMPSW NEGATIVE
0116                           06,3302  1 3305 0          TCF     +3
0117                           06,3303  1 3305 0          TCF     +2
0118   REF   1                06,3304  1 3422 1          TCF     IRIG1      RETURN

01181                          06,3305  0 0004 0          INHINT               ASSURE COMPLETE COMPENSATION OF DELV'S
A01182                                                                       FOR DOWNLINK.
0119   REF   1                06,3306  3 4766 1  1/PIPA1 CAF     FOUR       PIPAZ, PIPAY, PIPAX
01191  REF   8  LAST  269      06,3307  7 7702 1  +1      MASK    NEGONE
0120   REF   4  LAST   70      06,3310  54 132 0          TS      BUF +2

0121   REF   5  LAST  308      06,3311  50 132 1          INDEX   BUF +2
0122   REF   1                06,3312  3 1453 1          CA      PIPASCF    (P.P.M.) X 2(-9)
0123                           06,3313  0 0006 1          EXTEND
0124   REF   6  LAST  308      06,3314  5 0132 1          INDEX   BUF +2
0125   REF   1                06,3315  7 1314 1          MP      DELVX      (PP) X 2(+14) NOW (PIPA PULSES) X 2(+5)
0126   REF  33  LAST  282      06,3316  54 002 1          TS      Q          SAVE MAJOR PART

0127   REF  26  LAST  278      06,3317  3 0001 0          CA      L          MINOR PART
0128                           06,3320  0 0006 1          EXTEND
0129   REF  21  LAST  243      06,3321  7 4763 0          MP      BIT6       SCALE 2(+9)   SHIFT RIGHT 9
0130   REF   7  LAST  308      06,3322  50 132 1          INDEX   BUF +2
0131   REF   2  LAST  308      06,3323  55'315 0          TS      DELVX +1   FRACTIONAL PIPA PULSES SCALED 2(+14)

0132   REF  34  LAST  308      06,3324  3 0002 0          CA      Q          MAJOR PART
0133                           06,3325  0 0006 1          EXTEND
0134   REF  22  LAST  308      06,3326  7 4763 0          MP      BIT6       SCALE 2(+9)   SHIFT RIGHT 9
0135   REF   8  LAST  308      06,3327  50 132 1          INDEX   BUF +2
0136   REF   3  LAST  308      06,3330  21'315 0          DAS     DELVX      (PIPAI) + (PIPAI)(SFE)

0137   REF   9  LAST  308      06,3331  50 132 1          INDEX   BUF +2
0138   REF   1                06,3332  4 1452 1          CS      PIPABIAS   (PIPA PULSES)/(CS) X 2(-6)
0139                           06,3333  0 0006 1          EXTEND
0140   REF   2  LAST   83      06,3334  7 1277 0          MP      1/PIPADT   (CS) X 2(+8) NOW (PIPA PULSES) X 2(+2)
0141                           06,3335  0 0006 1          EXTEND
0142   REF  17  LAST  279      06,3336  7 4766 0          MP      BIT3       SCALE 2(+12) SHIFT RIGHT 12
0143   REF  10  LAST  308      06,3337  50 132 1          INDEX   BUF +2
0144   REF   4  LAST  308      06,3340  21'315 0          DAS     DELVX      (PIPAI) + (PIPAI)(SFE) - (BIAS)(DELTAT)

0145   REF  11  LAST  308      06,3341  10 132 0          CCS     BUF +2     PIPAZ, PIPAY, PIPAX
0146   REF   1                06,3342  1 3307 1          TCF     1/PIPA1 +1
```

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C1481 06,3343 0 0003 1 RELINT

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P01482
 0149   REF   2  LAST  308   06,3344  55'477 0  IRIGCOMP TS      GCOMPSW        INDICATE COMMANDS 2 PULSES OR LESS
 0150   REF  12  LAST  308   06,3345  54 130 1           TS      BUF            INDEX COUNTER - IRIGX, IRIGY, IRIGZ

 0151                        06,3346  0 0006 1  IRIGX    EXTEND
 0152   REF   5  LAST  308   06,3347  4 1315 0           DCS     DELVX          (PIPA PULSES) X 2(+14)
 0153   REF  42  LAST  303   06,3350  52 155 1           DXCH    MPAC
 0154   REF   1              06,3351  3 1463 1           CA      ADIAX          (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0155   REF   1              06,3352  0 3425 1           TC      GCOMPSUB       -(ADIAX)(PIPAX)   (GYRO PULSES) X 2(+14)

 0156                        06,3353  0 0006 1           EXTEND
 0157   REF   1              06,3354  4 1317 1           DCS     DELVY          (PIPA PULSES) X 2(+14)
 0158   REF  43  LAST  310   06,3355  52 155 1           DXCH    MPAC
 0159   REF   1              06,3356  4 1466 0           CS      ADSRAX         (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0160   REF   2  LAST  310   06,3357  0 3425 1           TC      GCOMPSUB       +(ADSRAX)(PIPAY)  (GYRO PULSES) X 2(+14)

A01603                                                  EXTEND         ***
A01604                                                  DCS     DELVZ  ***     (PIPA PULSES) X 2(+14)
A01605                                                  DXCH    MPAC   ***
A01606                                                  CA      ADDAX  ***     (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
A01607                                                  TC      GCOMPSUB ***   -(ADDAX)(PIPAZ)   (GYRO PULSES) X 2(+14)

 0161   REF   2  LAST  308   06,3360  4 1460 0           CS      NBDX           (GYRO PULSES)/(CS) X 2(-5)
 0162   REF   1              06,3361  0 3454 1           TC      DRIFTSUB       -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

 0163                        06,3362  0 0006 1  IRIGY    EXTEND
 0164   REF   2  LAST  310   06,3363  4 1317 1           DCS     DELVY          (PIPA PULSES) X 2(+14)
 0165   REF  44  LAST  310   06,3364  52 155 1           DXCH    MPAC
 0166   REF   1              06,3365  3 1464 0           CA      ADIAY          (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0167   REF   3  LAST  310   06,3366  0 3425 1           TC      GCOMPSUB       -(ADIAY)(PIPAY)   (GYRO PULSES) X 2(+14)

 0168                        06,3367  0 0006 1           EXTEND
 0169   REF   1              06,3370  4 1321 1           DCS     DELVZ          (PIPA PULSES) X 2(+14)
 0170   REF  45  LAST  310   06,3371  52 155 1           DXCH    MPAC
 0171   REF   1              06,3372  4 1467 1           CS      ADSRAY         (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0172   REF   4  LAST  310   06,3373  0 3425 1           TC      GCOMPSUB       +(ADSRAY)(PIPAZ)  (GYRO PULSES) X 2(+14)

A01723                                                  EXTEND         ***
A01724                                                  DCS     DELVX  ***     (PIPA PULSES) X 2(+14)
A01725                                                  DXCH    MPAC   ***
A01726                                                  CA      ADDAY  ***     (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
A01727                                                  TC      GCOMPSUB ***   -(ADDAY)(PIPAX)   (GYRO PULSES) X 2(+14)

 0173   REF   1              06,3374  4 1461 1           CS      NBDY           (GYRO PULSES)/(CS) X 2(-5)
 0174   REF   2  LAST  310   06,3375  0 3454 1           TC      DRIFTSUB       -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

 0175                        06,3376  0 0006 1  IRIGZ    EXTEND
 0176   REF   3  LAST  310   06,3377  4 1317 1           DCS     DELVY          (PIPA PULSES) X 2(+14)
 0177   REF  46  LAST  310   06,3400  52 155 1           DXCH    MPAC
 0178   REF   1              06,3401  3 1470 0           CA      ADSRAZ         (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
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 0179   REF   5  LAST  310    06,3402  0 3425 1        TC     GCOMPSUB        -(ADSRAZ)(PIPAY)  (GYRO PULSES) X 2(+14)

 0180                         06,3403  0 0006 1        EXTEND
 0181   REF   2  LAST  310    06,3404  4 1321 1        DCS    DELVZ           (PIPA PULSES) X 2(+14)
 0182   REF  47  LAST  310    06,3405  52 155 1        DXCH   MPAC
 0183   REF   1               06,3406  3 1465 1        CA     ADIAZ           (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0184   REF   6  LAST  311    06,3407  0 3425 1        TC     GCOMPSUB        -(ADIAZ)(PIPAZ)   (GYRO PULSES) X 2(+14)

A01843                                                EXTEND          ***
A01844                                                DCS    DELVX    ***     (PIPA PULSE) X 2(+14)
A01845                                                DXCH   MPAC     ***
A01846                                                CS     ADOAZ    ***     (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
A01847                                                TC     GCOMPSUB ***     +(ADOAZ)(PIPAX)   (GYRO PULSES) X 2(+14)

 0185   REF   1               06,3410  3 1462 0        CA     NBDZ            (GYRO PULSES)/(CS) X 2(-5)
 0186   REF   3  LAST  310    06,3411  0 3454 1        TC     DRIFTSUB        +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)
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0187  REF   3  LAST  310   06,3412  11'477 0          CCS     GCOMPSW         ARE GYRO COMMANDS GREATER THAN 2 PULSES
0188                       06,3413  1 3415 0          TCF     +2              YES
0189  REF   2  LAST  308   06,3414  1 3422 1          TCF     IRIG1           NO

0191  REF   1              06,3415  3 5057 0          CAF     PRIO21          HIGHER THAN SERVICER-LESS THAN PRELAUNCH
0192  REF   6  LAST  268   06,3416  0 5121 0          TC      NOVAC
0193  REF   3  LAST  310   E3,1460                    EBANK=  NBDX
0194  REF   1              06,3417   03507 0          2CADR   1/CHECK
0194  REF   1              06,3420   14063 1

0195                       06,3421  0 0003 1          RELINT
0196  REF   2  LAST  308   06,3422  3 0163 0  IRIG1    CA      MODE            SET EBANK FOR RETURN
0197  REF   9  LAST  308   06,3423  54 003 0          TS      EBANK
0198  REF   2  LAST  224   06,3424  1 4651 0          TCF     SWRETURN

0199  REF  48  LAST  311   06,3425  56 154 1  GCOMPSUB XCH     MPAC            ADIA OR ADSRA COEFFICIENT ARRIVES IN A
0200                       06,3426  0 0006 1          EXTEND                  C(MPAC) = (PIPA PULSES) X 2(+14)
0201  REF  49  LAST  312   06,3427  7 0154 0          MP      MPAC            (GYRO PULSES)/(PIPA PULSE) X 2(-3)      *
0202  REF  13  LAST   70   06,3430  52 123 0          DXCH    VBUF            NOW = (GYRO PULSES) X 2(+11)            *

0203  REF  50  LAST  312   06,3431  3 0155 0          CA      MPAC +1         MINOR PART PIPA PULSES
0204                       06,3432  0 0006 1          EXTEND
0205  REF  51  LAST  312   06,3433  7 0154 0          MP      MPAC            ADIA OR ADSRA
0206  REF  27  LAST  308   06,3434  54 001 1          TS      L
0207  REF  32  LAST  303   06,3435  3 4772 1          CAF     ZERO
0208  REF  14  LAST  312   06,3436  20 123 0          DAS     VBUF            NOW = (GYRO PULSES) X 2(+11)            *

0209  REF  15  LAST  312   06,3437  3 0122 0          CA      VBUF            PARTIAL RESULT - MAJOR
0210                       06,3440  0 0006 1          EXTEND
0211  REF  16  LAST  204   06,3441  7 4755 0          MP      BIT12           SCALE 2(+3)     SHIFT RIGHT 3           *
0212  REF  13  LAST  310   06,3442  50 130 0          INDEX   BUF             RESULT = (GYRO PULSES) X 2(+14)
0213  REF   3  LAST   89   06,3443  21'472 0          DAS     GCOMP           HI(ADIA)(PIPAI)  OR  HI(ADSRA)(PIPAI)

0214  REF  16  LAST  312   06,3444  3 0123 1          CA      VBUF +1         PARTIAL RESULT - MINOR
0215                       06,3445  0 0006 1          EXTEND
0216  REF  17  LAST  312   06,3446  7 4755 0          MP      BIT12           SCALE 2(+3)     SHIFT RIGHT 3           *
0217  REF  28  LAST  312   06,3447  54 001 1          TS      L
0218  REF  33  LAST  312   06,3450  3 4772 1          CAF     ZERO
0219  REF  14  LAST  312   06,3451  50 130 0          INDEX   BUF             RESULT = (GYRO PULSES) X 2(+14)
0220  REF   4  LAST  312   06,3452  21'472 0          DAS     GCOMP           (ADIA)(PIPAI)  OR  (ADSRA)(PIPAI)

0221  REF  35  LAST  308   06,3453  0 0002 0          TC      Q
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```
0222                                  06,3454  0 0006 1  DRIFTSUB EXTEND
0223   REF  15  LAST  312             06,3455  22 131 1           QXCH    BUF +1

0224                                  06,3456  0 0006 1           EXTEND
0225   REF   3  LAST  308             06,3457  7 1277 0           MP      1/PIPADT   C(A) = NBD    (GYRO PULSES)/(CS) X 2(-5)
0226   REF  52  LAST  312             06,3460  22 155 0           LXCH    MPAC +1    (CS) X 2(+8)   NOW (GYRO PULSES) X 2(+3)
0227                                  06,3461  0 0006 1           EXTEND             SAVE FOR FRACTIONAL COMPENSATION
0228   REF  20  LAST  265             06,3462  7 4765 0           MP      BIT4       SCALE 2(+11)     SHIFT RIGHT 11
0229   REF  16  LAST  313             06,3463  50 130 0           INDEX   BUF
0230   REF   5  LAST  312             06,3464  21'472 0           DAS     GCOMP      HI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

0231   REF  53  LAST  313             06,3465  3 0155 0           CA      MPAC +1    NOW MINOR PART
0232                                  06,3466  0 0006 1           EXTEND
0233   REF  21  LAST  313             06,3467  7 4765 0           MP      BIT4       SCALE 2(+11)     SHIFT RIGHT 11
0234   REF  29  LAST  312             06,3470  54 001 1           TS      L
0235   REF  34  LAST  312             06,3471  3 4772 1           CAF     ZERO
0236   REF  17  LAST  313             06,3472  50 130 0           INDEX   BUF        ADD IN FRACTIONAL COMPENSATION
0237   REF   6  LAST  313             06,3473  21'472 0           DAS     GCOMP      (NBD)(DELTAT)     (GYRO PULSES) X 2(+14)

0238   REF   5  LAST  282             06,3474  3 4767 0  DRFTSUB2 CAF     TWO        PIPAX, PIPAY, PIPAZ
0239   REF  18  LAST  313             06,3475  6 0130 0           AD      BUF
0240   REF  19  LAST  313             06,3476  56 130 0           XCH     BUF
0241   REF  78  LAST  283             06,3477  50 000 1           INDEX   A
0242   REF   7  LAST  313             06,3500  11'471 0           CCS     GCOMP      ARE GYRO COMMANDS 1 PULSE OR GREATER
0243                                  06,3501  1 3503 0           TCF     +2         YES
0244   REF  20  LAST  313             06,3502  0 0131 1           TC      BUF +1     NO

0245   REF   9  LAST  308             06,3503  7 7702 1           MASK    NEGONE
0246   REF  79  LAST  313             06,3504  10 000 0           CCS     A          ARE GYRO COMMANDS GREATER THAN 2 PULSES
0247   REF   4  LAST  312             06,3505  55'477 0           TS      GCOMPSW    YES - SET GCOMPSW POSITIVE
0248   REF  21  LAST  313             06,3506  0 0131 1           TC      BUF +1     NO
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02481  REF   5  LAST  256   06,3507  3 1335 0  1/CHECK  CA      MODECADR
02482                       06,3510  0 0006 1           EXTEND
02483  REF   1              06,3511  1 3513 1           BZF     1/GYRO
02484  REF  15  LAST  277   06,3512  1 5205 1           TCF     ENDOFJOB

0249   REF   2  LAST  308   06,3513  3 4766 1  1/GYRO   CAF     FOUR      PIPAZ, PIPAY, PIPAX
0250   REF  22  LAST  313   06,3514  54 130 1  +1       TS      BUF

0251   REF  23  LAST  314   06,3515  50 130 0           INDEX   BUF       SCALE GYRO COMMANDS FOR IMUPULSE
0252   REF   8  LAST  313   06,3516  3 1472 1           CA      GCOMP +1  FRACTIONAL PULSES
0253                       06,3517  0 0006 1           EXTEND
0254   REF  23  LAST  221   06,3520  7 4761 1           MP      BIT8      SHIFT RIGHT 7
0255   REF  24  LAST  314   06,3521  50 130 0           INDEX   BUF
0256   REF   9  LAST  314   06,3522  55'472 0           TS      GCOMP +1  FRACTIONAL PULSES SCALED

0257   REF  35  LAST  313   06,3523  3 4772 1           CAF     ZERO      SET GCOMP = 0 FOR DAS INSTRUCTION
0258   REF  25  LAST  314   06,3524  50 130 0           INDEX   BUF
0259   REF  10  LAST  314   06,3525  57'471 1           XCH     GCOMP     GYRO PULSES
0260                       06,3526  0 0006 1           EXTEND
0261   REF  24  LAST  314   06,3527  7 4761 1           MP      BIT8      SHIFT RIGHT 7
0262   REF  26  LAST  314   06,3530  50 130 0           INDEX   BUF
0263   REF  11  LAST  314   06,3531  21'472 0           DAS     GCOMP     ADD THESE TO FRACTIONAL PULSES ABOVE

0264   REF  27  LAST  314   06,3532  10 130 1           CCS     BUF       PIPAZ, PIPAY, PIPAX
0265   REF   1              06,3533  6 7702 0           AD      NEG1
0266   REF   2  LAST  314   06,3534  1 3514 0           TCF     1/GYRO +1
0267   REF  12  LAST  314   06,3535   01471 1  LGCOMP   ECADR   GCOMP     LESS THAN ZERO IMPOSSIBLE

0268   REF   2  LAST  308   06,3536  3 3535 1           CAF     LGCOMP
0269   REF  36  LAST  279   06,3537  0 4636 0           TC      BANKCALL
0270   REF   2  LAST  256   06,3540   17244 0           CADR    IMUPULSE  CALL GYRO TORQUING ROUTINE
0271   REF  37  LAST  314   06,3541  0 4636 0           TC      BANKCALL
0272   REF   5  LAST  256   06,3542   17644 1           CADR    IMUSTALL  WAIT FOR PULSES TO GET OUT
0273                       06,3543  1 3544 0           TCF     +1

0274   REF   3  LAST  314   06,3544  3 4766 1  GCOMP1   CAF     FOUR      PIPAZ, PIPAY, PIPAX
0275   REF  28  LAST  314   06,3545  54 130 1  +1       TS      BUF

0276   REF  29  LAST  314   06,3546  50 130 0           INDEX   BUF       RESCALE
0277   REF  13  LAST  314   06,3547  3 1472 1           CA      GCOMP +1
0278                       06,3550  0 0006 1           EXTEND
0279   REF  25  LAST  314   06,3551  7 4761 1           MP      BIT8      SHIFT MINOR PART LEFT 7 - MAJOR PART = 0
0280   REF  30  LAST  314   06,3552  50 130 0           INDEX   BUF
0281   REF  14  LAST  314   06,3553  23'472 1           LXCH    GCOMP +1  BITS 8-14 OF MINOR PART WERE = 0

0282   REF  31  LAST  314   06,3554  10 130 1           CCS     BUF       PIPAZ, PIPAY, PIPAX
0283   REF   2  LAST  314   06,3555  6 7702 0           AD      NEG1
0284   REF   1              06,3556  1 3545 1           TCF     GCOMP1 +1
0285                       06,3557   75252 0  OCT75252 OCT     75252     -15 DEGREES USED BY T4RUPT
0286   REF  16  LAST  314   06,3560  1 5205 1           TCF     ENDOFJOB
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0287  REF   5  LAST  313   06,3561  11'477 0  NBDONLY  CCS    GCOMPSW     BYPASS IF GCOMPSW NEGATIVE
0288                       06,3562  1 3565 0           TCF    +3
0289                       06,3563  1 3565 0           TCF    +2
0290  REF  17  LAST  314   06,3564  1 5205 1           TCF    ENDOFJOB

029005                     06,3565  0 0004 0           INHINT
02901 REF   9  LAST  247   06,3566  3 0076 0           CA     FLAGWRD2
02902 REF   1              06,3567  7 4752 1           MASK   DRFTBIT
02903                      06,3570  0 0006 1           EXTEND
02904 REF  18  LAST  315   06,3571  1 5205 1           BZF    ENDOFJOB

0291  REF   8  LAST  238   06,3572  3 0025 0           CA     TIME1       (CS) X 2(+14)
0292  REF   4  LAST  313   06,3573  57'277 1           XCH    1/PIPADT    PREVIOUS TIME
02925                      06,3574  0 0003 1           RELINT
0293                       06,3575  4 0000 0           COM
0294  REF   5  LAST  315   06,3576  6 1277 1           AD     1/PIPADT
0295  REF  80  LAST  313   06,3577  10 000 0  NBD2     CCS    A           CALCULATE ELAPSED TIME
0296  REF  13  LAST  282   06,3600  6 4770 0           AD     ONE         NO TIME1 OVERFLOW
0297  REF   1              06,3601  1 3606 0           TCF    NBD3        RESTORE TIME DIFFERENCE AND JUMP
0298                       06,3602  1 3604 1           TCF    +2          TIME1 OVERFLOW
0299  REF  19  LAST  315   06,3603  1 5205 1           TCF    ENDOFJOB    IF ELAPSED TIME = 0  (DIFFERENCE = -0)

0300                       06,3604  4 0000 0           COM                CALCULATE ABSOLUTE DIFFERENCE
0301  REF   7  LAST  262   06,3605  6 4750 1           AD     POSMAX
0302                       06,3606  0 0006 1  NBD3     EXTEND             C(A) = DELTAT    (CS) X 2(+14)
0303  REF  16  LAST  276   06,3607  7 4757 1           MP     BIT10       SHIFT RIGHT 5
0304  REF  17  LAST  312   06,3610  52 123 0           DXCH   V3UF
0305                       06,3611  0 0006 1           EXTEND
0306  REF  18  LAST  315   06,3612  3 0123 1           DCA    VBUF
0307  REF  54  LAST  313   06,3613  52 155 1           DXCH   MPAC        DELTAT NOW SCALED (CS) X 2(+19)

0308  REF  36  LAST  314   06,3614  3 4772 1           CAF    ZERO
0309  REF   6  LAST  315   06,3615  55'477 0           TS     GCOMPSW     INDICATE COMMANDS 2 PULSES OR LESS
0310  REF  32  LAST  314   06,3616  54 130 1           TS     BUF         PIPAX, PIPAY, PIPAZ

0311  REF   4  LAST  312   06,3617  4 1460 0           CS     NBDX        (GYRO PULSES)/(CS) X 2(-5)
0312  REF   1              06,3620  0 3636 1           TC     FBIASSUB    -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

0313                       06,3621  0 0006 1           EXTEND
0314  REF  19  LAST  315   06,3622  4 0123 0           DCS    VBUF
0315  REF  55  LAST  315   06,3623  52 155 1           DXCH   MPAC        DELTAT SCALED (CS) X 2(+19)
0316  REF   2  LAST  310   06,3624  3 1461 0           CA     NBDY        (GYRO PULSES)/(CS) X 2(-5)
0317  REF   2  LAST  315   06,3625  0 3636 1           TC     FBIASSUB    -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

0318                       06,3626  0 0006 1           EXTEND
0319  REF  20  LAST  315   06,3627  4 0123 0           DCS    VBUF
0320  REF  56  LAST  315   06,3630  52 155 1           DXCH   MPAC        DELTAT SCALED (CS) X 2(+19)
0321  REF   2  LAST  311   06,3631  4 1462 1           CS     NBDZ        (GYRO PULSES)/(CS) X 2(-5)
0322  REF   3  LAST  315   06,3632  0 3636 1           TC     FBIASSUB    +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)
```

L IMU COMPENSATION PACKAGE USER'S PAGE NO. 9 E3 S3

```
0323  REF   7  LAST  315   06,3633  11'477 0        CCS   GCOMPSW    ARE GYRO COMMANDS GREATER THAN 2 PULSES
0324  REF   3  LAST  314   06,3634  1 3513 1        TCF   1/GYRO     YES
0325  REF  20  LAST  315   06,3635  1 5205 1        TCF   ENDOFJOB   NO
```

L IMU COMPENSATION PACKAGE

```
0326  REF  36  LAST  312   06,3636  56 002 0   FBIASSUB XCH    6
0327  REF  33  LAST  315   06,3637  54 131 0            TS     EUF +1

0328  REF  37  LAST  317   06,3640  3 0002 0            CA     6          NBD SCALED (GYRO PULSES)/(CS) X 2(-5)
0329                       06,3641  0 0006 1            EXTEND
0330  REF  57  LAST  315   06,3642  7 0154 0            MP     MPAC       DELTAT SCALED (CS) X 2(+19)
0331  REF  34  LAST  317   06,3643  50 130 0            INDEX  BUF
0332  REF  15  LAST  314   06,3644  21'472 0           DAS    GCOMP      HI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

0333  REF  38  LAST  317   06,3645  3 0002 0            CA     6          NOW FRACTIONAL PART
0334                       06,3646  0 0006 1            EXTEND
0335  REF  58  LAST  317   06,3647  7 0155 1            MP     MPAC +1
0336  REF  30  LAST  313   06,3650  54 001 1            TS     L
0337  REF  37  LAST  315   06,3651  3 4772 1            CAF    ZERO
0338  REF  35  LAST  317   06,3652  50 130 0            INDEX  BUF
0339  REF  16  LAST  317   06,3653  21'472 0           DAS    GCOMP      (NBD)(DELTAT)     (GYRO PULSES) X 2(+14)

0340  REF   1             06,3654  1 3474 1            TCF    DRFTSUB2   CHECK MAGNITUDE OF COMPENSATION

03401 REF  38  LAST  314   06,3655  0 4636 0  LASTBIAS TC     BANKCALL
03402 REF   1             06,3656  17214 0             CADR   PIPUSE

0341  REF   8  LAST  316   06,3657  11'477 0            CCS    GCOMPSW    BYPASS IF GCOMPSW NEGATIVE
0342                       06,3660  1 3663 0            TCF    +3
0343                       06,3661  1 3663 0            TCF    +2
0344  REF  21  LAST  316   06,3662  1 5205 1            TCF    ENDOFJOB

0345  REF   1             06,3663  3 7652 1            CAF    PRIO31     2 SECONDS SCALED (CS) X 2(+8)
0346  REF   6  LAST  315   06,3664  57'277 1            XCH    1/PIPADT
0347                       06,3665  4 0000 0            COM
0348  REF   4  LAST  188   06,3666  6 1105 1            AD     PIPTIME1 +1   TIME AT PIPA1 =0
0349  REF   1             06,3667  1 3577 0            TCF    N8D2

0350                       06,3670  21450 0   90SECS    DEC    900
0351                       06,3671  16037 1   20DEGS    DEC    7199
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S PAGE NO. 1 EQ 53

R0001 PROGRAM NAME - KEYBOARD AND DISPLAY PROGRAM
R0002 MOD BY - BARNERT DATE - 20 AUG 1969
R0004 LOG SECTION - PINBALL GAME BUTTONS AND LIGHTS

R0009 FUNCTIONAL DESCRIPTION-

R0010 THE KEYBOARD AND DISPLAY SYSTEM PROGRAM OPERATES UNDER EXECUTIVE
R0011 CONTROL AND PROCESSES INFORMATION EXCHANGED BETWEEN THE AGC AND THE
R0012 COMPUTER OPERATOR. THE INPUTS TO THE PROGRAM ARE FROM THE KEYBOARD,
R0013 FROM INTERNAL PROGRAMS, AND FROM THE UPLINK.
R0014 THE LANGUAGE OF COMMUNICATION WITH THE PROGRAM IS A PAIR OF WORDS
R0015 KNOWN AS VERB AND NOUN. EACH OF THESE IS REPRESENTED BY A 2 CHARACTER
R0016 DECIMAL NUMBER. THE VERB CODE INDICATES WHAT ACTION IS TO BE TAKEN, THE
R0017 NOUN CODE INDICATES TO WHAT THIS ACTION IS APPLIED. NOUNS USUALLY
R0018 REFER TO A GROUP OF ERASABLE REGISTERS.

R0020 VERBS ARE GROUPED INTO DISPLAYS, LOADS, MONITORS (DISPLAYS THAT ARE
R0021 UPDATED ONCE PER SECOND), SPECIAL FUNCTIONS, AND EXTENDED VERBS(THESE
R0022 ARE OUTSIDE OF THE DOMAIN OF PINBALL AND CAN BE FOUND UNDER LOG SECTION
R0023 :EXTENDED VERBS:).
R0024 A LIST OF VERBS AND NOUNS IS GIVEN IN LOG SECTION :ASSEMBLY AND
R0025 OPERATION INFORMATION:.

R0026 CALLING SEQUENCES-

R0027 KEYBOARD:
R0028 EACH DEPRESSION OF A MAIN (NAVIGATION) KEYBOARD BUTTON ACTIVATES
R0029 INTERRUPT KEYRUPT1 (KEYRUPT2) AND PLACES THE 5 BIT KEY CODE INTO
R00291 CHANNEL 15 (CHANNEL 16). KEYRUPT1 (KEYRUPT2) PLACES THE KEY
R0030 CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE KEYBOARD AND DISPLAY
R0031 PROGRAM (AT :CHARIN:), AND EXECUTES A RESUME.

R0032 UPLINK:
R0033 EACH WORD RECEIVED BY THE UPLINK ACTIVATES INTERRUPT UPRUPT WHICH
R0034 PLACES THE 5 BIT KEY CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE
R0035 KEYBOARD AND DISPLAY PROGRAM (AT:CHARIN:) AND EXECUTES A RESUME.

R0036 INTERNAL PROGRAMS:
R0037 INTERNAL PROGRAMS CALL PINBALL AT :NVSUB: WITH THE DESIRED VERB/NOUN
R0038 CODE IN A (LOW 7 BITS FOR NOUN, NEXT 7 BITS FOR VERB). DETAILS
R0039 DESCRIBED ON REMARKS CARDS JUST BEFORE :NVSUB: (SEE
R0040 SYMBOL TABLE FOR PAGE NUMBERS).

R0045 NORMAL EXIT MODES-

R0046 IF PINBALL WAS CALLED BY EXTERNAL ACTION, THERE ARE FOUR EXITS:
R00460 1) ALL BUT (2), (3), AND (4) EXIT DIRECTLY TO ENDOFJOB.
R00461 2) EXTENDED VERBS GO TO THE EXTENDED VERB FAN AS PART OF THE

```
R00461S             PINBALL EXECUTIVE JOB WITH PRIORITY 30000.  IT IS THE
R00462              RESPONSIBILITY OF THE EXTENDED VERB CALLED TO EVENTUALLY
R00463              CHANGE PRIORITY (IF NECESSARY) AND DO AN ENDOFJOB.
R00463S             ALSO PINBALL IS A NOVAC JOB. EBANK SET FOR COMMON.
R00464              3) VERB 37. CHANGE OF PROGRAM (MAJOR MODE) CALLS :V37: IN THE
R00465              SERVICE ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO
R00466              30000.  THE NEW PROGRAM CODE (MAJOR MODE) IS LEFT IN A.
R00467              4) KEY RELEASE BUTTON CALLS :PINBRNCH: IN THE DISPLAY INTERFACE
R00468              ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO 30000 IF
R00469              THE KEY RELEASE LIGHT IS OFF AND :CADRSTOR: IS NOT +0.

R0047       IF PINBALL WAS CALLED BY INTERNAL PROGRAMS, EXIT FROM PINBALL IS BACK
R0048    TO CALLING ROUTINE.  DETAILS DESCRIBED IN REMARKS CARDS JUST BEFORE
R0049    :NVSUB:
R0050    ALARM OR ABORT EXIT MODES-

R0051    EXTERNAL INITIATION:
R0052       IF SOME IMPROPER SEQUENCE OF KEY CODES IS DETECTED, THE OPERATOR
R0053    ERROR LIGHT IS TURNED ON AND EXIT IS TO :ENDOFJOB:.

R0054    INTERNAL PROGRAM INITIATION:
R0055       IF AN ILLEGAL V/N COMBINATION IS ATTEMPTED, AN ABORT IS CAUSED
R0056    (WITH OCTAL 21501)
R0056S      IF A SECOND ATTEMPT IS MADE TO GO TO SLEEP IN PINBALL, AN ABORT IS
R0057    CAUSED (WITH OCTAL 21206). THERE ARE TWO WAYS TO GO TO SLEEP IN PINBALL:
R0058            1) ENDIDLE
R0059            2) NVSUBUSY
R0059S   OUTPUT-

R0060       INFORMATION TO BE SENT TO THE DISPLAY PANEL IS LEFT IN THE :DSPTAB:
R0061    BUFFERS REGISTERS (UNDER EXEC CONTROL).  :DSPOUT: (A PART OF T4RUPT)
R0062    HANDLES THE PLACING OF THE :DSPTAB: INFORMATION INTO OUTPUT CHANNEL IO
R0063    IN INTERRUPT.


R0064    ERASABLE INITIALIZATION-

R0065       FRESH START AND RESTART INITIALIZE THE NECESSARY E REGISTERS FOR
R0066    PINBALL IN :STARTSUB:.  REGISTERS ARE:  DSPTAB BUFFER, CADRSTOR,
R0067    REQRET, CLPASS, DSPLOCK, MONSAVE, MONSAVE1, VERBREG, NOUNREG, DSPLIST,
R0068    DSPCOUNT, NOUT.

R0069    A COMPLETE LIST OF ALL THE ERASABLES (BOTH RESERVED AND TEMPORARIES) FOR
R0070    PINBALL IS GIVEN BELOW.

R0071    THE FOLLOWING ARE OF GENERAL INTEREST-

R0072       REMARKS CARDS PRECEDE THE REFERENCED SYMBOL DEFINITION.  SEE SYMBOL
R0073    TABLE TO FIND APPROPRIATE PAGE NUMBERS.
```

R0074 NVSUB CALLING POINT FOR INTERNAL USE OF PINBALL.
R0075 OF RELATED INTEREST - NVSUBUSY
R0083 ENDIDLE ROUTINE FOR INTERNAL PROGRAMS WISHING TO GO TO SLEEP WHILE
R0084 AWAITING OPERATORS RESPONSE.

R0085 DSPMMJOB ROUTINE CALL WITH PRIO 30000, USED TO DISPLAY A DECIMAL
R0086 PROGRAM CODE (MAJOR MODE) IN THE PROGRAM (MAJOR MODE) LIGHTS.
R0085 BLANKSUB ROUTINE BY WHICH AN INTERNAL PROGRAM MAY BLANK ANY
R0086 COMBINATION OF THE DISPLAY REGISTERS R1, R2, R3.

R0085 JAMTERM ROUTINES BY WHICH AN INTERNAL PROGRAM MAY PERFORM THE
R0086 TERNINATE (V 34) FUNCTION
R0086 MONITOR VERBS FOR PERIODIC (1 PER SEC) DISPLAY.

R0086 PLEASE PERFORM, PLEASE MARK SITUATIONS
R0086 REMARKS DESCRIBING HOW AN INTERNAL ROUTINE SHOULD HANDLE
R0086 THESE SITUATIONS CAN BE FOUND JUST BEFORE :NVSUB: (SEE
R0086 SYMBOL TABLE FOR PAGE NUMBER).

R0087 THE NOUN TABLE FORMAT IS DESCRIBED ON A PAGE OF REMARKS CARDS JUST
R0088 BEFORE :DSPABC: (SEE SYMBOL TABLE FOR PAGE NUMBER).

R0089 THE NOUN TABLES THEMSELVES ARE FOUND IN LOG SECTION :PINBALL NOUN
R0091 TABLES:.

R0090 FOR FURTHER DETAILS ABOUT OPERATION OF THE KEYBOARD AND DISPLAY SYSTEM
R0091 PROGRAM, SEE THE MISSION PLAN AND/OR MIT/IL E-2129
R0092 DESCRIBING KEYBOARD AND DISPLAY OPERATION FOR 278.

R0150 THE FOLLOWING QUOTATION IS PROVIDED THROUGH THE COURTESY OF THE AUTHORS.

R0151 ::IT WILL BE PROVED TO THY FACE THAT THOU HAST MEN ABOUT THEE THAT
R0152 USUALLY TALK OF A NOUN AND A VERB, AND SUCH ABOMINABLE WORDS AS NO
R0153 CHRISTIAN EAR CAN ENDURE TO HEAR.::

R0154 HENRY 6, ACT 2, SCENE 4

R0155 THE FOLLOWING ASSIGNMENTS FOR PINBALL ARE MADE ELSEWHERE

R0156 RESERVED FOR PINBALL EXECUTIVE ACTION

R0157	DSPCOUNT	ERASE	DISPLAY POSITION INDICATOR
R0158	DECBRNCH	ERASE	+DEC, - DEC, OCT INDICATOR
R0159	VERBREG	ERASE	VERB CODE
R0160	NOUNREG	ERASE	NOUN CODE
R0161	XREG	ERASE	R1 INPUT BUFFER

```
R0162   YREG      ERASE                  R2 INPUT BUFFER
R0163   ZREG      ERASE                  R3 INPUT BUFFER
R0164   XREGLP    ERASE                  LO PART OF XREG (FOR DEC CONV ONLY)
R0165   YREGLP    ERASE                  LO PART OF YREG (FOR DEC CONV ONLY)
R0166   HITEMOUT =       YREGLP         TEMP FOR DISPLAY OF HRS, MIN, SEC
R0167                                          MUST = LOTEMOUT-1.
R0168   ZREGLP    ERASE                  LO PART OF ZREG (FOR DEC CONV ONLY)
R0169   LOTEMOUT =       ZREGLP         TEMP FOR DISPLAY OF HRS, MIN, SEC
R0170                                          MUST = HITEMOUT+1.
R0171   MODREG    ERASE                  MODE CODE
R0172   DSPLOCK   ERASE                  KEYBOARD/SUBROUTINE CALL INTERLOCK
R0173   REQRET    ERASE                  RETURN REGISTER FOR LOAD
R0174   LOADSTAT  ERASE                  STATUS INDICATOR FOR LOADTST
R0175   CLPASS    ERASE                  PASS INDICATOR CLEAR
R0176   NOUT      ERASE                  ACTIVITY COUNTER FOR DSPTAB
R0177   NOUNCADR  ERASE                  MACHINE CADR FOR NOUN
R0178   MONSAVE   ERASE                  N/V CODE FOR MONITOR. (= MONSAVE1-1)
R0179   MONSAVE1  ERASE                  NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
R01795  MONSAVE2  ERASE                  NVMONOPT OPTIONS
R0180   DSPTAB    ERASE          +13D    0-10,DISPLAY PANEL BUFFER.11-13,C RELAYS
R0181   CADRSTOR  ERASE                  ENDIDLE STORAGE
R0182   NVQTEM    ERASE                  NVSUB STORAGE FOR CALLING ADDRESS
R0183                                    MUST = NVBNKTEM-1
R0184   NVBNKTEM  ERASE                  NVSUB STORAGE FOR CALLING BANK
R0185                                    MUST = NVQTEM+1
R0186   VERBSAVE  ERASE                  NEEDED FOR RECYCLE
R0187   DSPLIST   ERASE                  WAITING REG FOR DSP SYST INTERNAL USE
R0188   EXTVBACT  REASE                  EXTENDED VERB ACTIVITY INTERLOCK
R0189   DSPTEM1   ERASE          +2      BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
R0190   DSPTEM2   ERASE          +2      BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
R0191   END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION


R0192   TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R0193   DSEXIT    =       INTB15+        RETURN FOR DSPIN
R0194   EXITEM    =       INTB15+        RETURN FOR SCALE FACTOR ROUTINE SELECT
R0195   BLANKRET  =       INTB15+        RETURN FOR 2BLANK

R0196   WRDRET    =       INTBIT15       RETURN FOR 5BLANK
R0197   WDRET     =       INTBIT15       RETURN FOR DSPWD
R0198   DECRET    =       INTBIT15       RETURN FOR PUTCOM(DEC LOAD)
R0199   21/22REG  =       INTBIT15       TEMP FOR CHARIN

R0200   UPDATRET  =       POLISH         RETURN FOR UPDATNN, UPDATVB
R0201   CHAR      =       POLISH         TEMP FOR CHARIN
R0202   ERCNT     =       POLISH         COUNTER FOR ERROR LIGHT RESET
R0203   DECOUNT   =       POLISH         COUNTER FOR SCALING AND DISPLAY (DEC)

R0204   SGNON     =       VBUF           TEMP FOR +,- ON
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S PAGE NO. 5 EQ S3

```
R0205   NCUNTEM  =       VBUF            COUNTER FOR MIXNOUN FETCH
R0206   DISTEM   =       VBUF            COUNTER FOR OCTAL DISPLAY VERBS
R0207   DECTEM   =       VBUF            COUNTER FOR FETCH (DEC DISPLAY VERBS)

R0208   SGNOFF   =       VBUF    +1      TEMP FOR +,- ON
R0209   NVTEMP   =       VBUF    +1      TEMP FOR NVSUB
R0210   SFTEMP1  =       VBUF    +1      STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
R0211   HITEMIN  =       VBUF    +1      TEMP FOR LOAD OF HRS, MIN, SEC
R0212                                            MUST = LOTEMIN-1.
R0213   CODE     =       VBUF    +2      FOR DSPIN
R0214   SFTEMP2  =       VBUF    +2      STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
R0215   LOTEMIN  =       VBUF    +2      TEMP FOR LOAD OF HRS, MIN, SEC
R0216                                            MUST = HITEMIN+1.
R0217   MIXTEMP  =       VBUF    +3      FOR MIXNOUN DATA
R0218   SIGNRET  =       VBUF    +3      RETURN FOR +,- ON

R0219   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

R0220   ENTRET   =       DOTINC          EXIT FROM ENTER

R0221   WDCNT    =       DOTRET          CHAR COUNTER FOR DSPWD
R0222   INREL    =       DOTRET          INPUT BUFFER SELECTOR ( X,Y,Z, REG )

R0223   DSPMMTEM =       MATINC          DSPCOUNT SAVE FOR DSPMM
R0224   MIXBR    =       MATINC          INDICATOR FOR MIXED OR NORMAL NOUN

R0225   TEM1     ERASE                   EXEC TEMP
R0226   DSREL    =       TEM1            REL ADDRESS FOR DSPIN

R0227   TEM2     ERASE                   EXEC TEMP
R0228   DSMAG    =       TEM2            MAGNITUDE STORE FOR DSPIN
R0229   IDADDTEM =       TEM2            MIXNOUN INDIRECT ADDRESS STORAGE

R0230   TEM3     ERASE                   EXEC TEMP
R0231   COUNT    =       TEM3            FOR DSPIN

R0232   TEM4     ERASE                   EXEC TEMP
R0233   LSTPTR   =       TEM4            LIST POINTER FOR GRABUSY
R0234   RELRET   =       TEM4            RETURN FOR RELDSP
R0235   FREERET  =       TEM4            RETURN FOR FREEDSP
R0236   DSPWDRET =       TEM4            RETURN FOR DSPSIGN
R0237   SEPSCRET =       TEM4            RETURN FOR SEPSEC
R0238   SEPMNRET =       TEM4            RETURN FOR SEPMIN

R0239   TEM5     ERASE                   EXEC TEMP
R0240   NOUNADD  =       TEM5            TEMP STORAGE FOR NOUN ADDRESS

R0241   NNADTEM  ERASE                   TEMP FOR NOUN ADDRESS TABLE ENTRY
R0242   NNTYPTEM ERASE                   TEMP FOR NOUN TYPE TABLE ENTRY
R0243   IDADITEM ERASE                   TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
```

```
R0244                                   MUST = IDAD2TEM-1, = IDAD3TEM-2.
R0245   IDAD2TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0246                                   MUST = IDAD1TEM+1, = IDAD3TEM-1.
R0247   IDAD3TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0248                                   MUST = IDAD1TEM+2, = IDAD2TEM+1.
R0249   RUTMXTEM ERASE                  TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
R0250   END OF TEMPORARIES FOR PINBALL EXECUTIVE ACTION


R0251   ADDITIONAL TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R0252   MPAC, THRU MPAC +6
R0253   BUF, +1, +2
R0254   BUF2, +1, +2
R0256   MPTEMP
R0257   ADDRWD
R0259     END OF ADDITIONAL TEMPS FOR PINBALL EXEC ACTION


R0251   RESERVED FOR PINBALL INTERRUPT ACTION

R0252   DSPCNT   ERASE                  COUNTER FOR DSPOUT
R0253   UPLOCK   ERASE                  BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0254                                                   RECEPTION OF A BAD MESSAGE IN UPLINK)
R0255   END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION


R0256   TEMPORARIES FOR PINBALL INTERRUPT ACTION

R0257   KEYTEMP1 =      WAITEXIT        TEMP FOR KEYRUPT, UPRUPT
R0258   DSRUPTEM =      WAITEXIT        TEMP FOR DSPOUT
R0259   KEYTEMP2 =      RUPTAGN         TEMP FOR KEYRUPT, UPRUPT
R0260   END OF TEMPORARIES FOR PINBALL INTERRUPT ACTION
```

```
R0261   THE INPUT CODES ASSUMED FOR THE KEYBOARD ARE,
R0262   0         10000
R0263   1         00001
R0264   9         01001
R0265   VERB      10001
R0266   ERROR RES 10010
R0267   KEY RLSE  11001
R0268   +         11010
R0269   -         11011
R0270   ENTER     11100
R0271   CLEAR     11110
R0272   NOUN      11111


R0273   OUTPUT FORMAT FOR DISPLAY PANEL. SET OUTQ TO  AAAABCCCCCDDDDD.
R0274   A-S SELECT A RELAYWORD. THIS DETERMINES WHICH PAIR OF CHARACTERS ARE
R0275   ENERGIZED.
R0276   B FOR SPECIAL RELAYS SUCH AS SIGNS ETC.
R0277   C-S  5 BIT RELAY CODE FOR LEFT CHAR OF PAIR SELECTED BY RELAYWORD
R0278   D-S  5 BIT RELAY CODE FOR RIGHTCHAR OF PAIR SELECTED BY RELAYWORD.

R0279   THE PANEL APPEARS AS FOLLOWS,
R0280   MD1    MD2                              (MAJOR MODE)
R0281   VD1    VD2 (VERB)     ND1     ND2       (NOUN)
R0282   R1D1   R1D2   R1D3   R1D4   R1D5   (R1)
R0283   R2D1   R2D2   R2D3   R2D4   R2D5   (R2)
R0284   R3D1   R3D2   R3D3   R3D4   R3D5   (R3)

R0285   EACH OF THESE IS GIVEN A DSPCOUNT NUMBER FOR USE WITHIN COMPUTATION ONLY
R0286   MD1   25      R2D1  11          ALL ARE OCTAL
R0287   MD2   24      R2D2  10
R0288   VD1   23      R2D3   7
R0289   VD2   22      R2D4   6
R0290   ND1   21      R2D5   5
R0291   ND2   20      R3D1   4
R0292   R1D1  16      R3D2   3
R0293   R1D2  15      R3D3   2
R0294   R1D3  14      R3D4   1
R0295   R1D4  13      R3D5   0
R0296   R1D5  12

R0297   THERE IS AN 11 REGISTER TABLE (DSPTAB) FOR THE DISPLAY PANEL.

R0298   DSPTAB RELAYWD        BIT11     BITS 10-6      BITS 5-1
R0299   RELADD
R0300   10      1011                    MD1  (25)      MD2  (24)
R0301   9       1010                    VD1  (23)      VD2  (22)
R0302   8       1001                    ND1  (21)      ND2  (20)
R0303   7       1000                                   R1D1 (16)
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S PAGE NO. 8 EQ S3

R0304	6	0111	+R1	R1D2 (15)	R1D3 (14)	
R0305	5	0110	-R1	R1D4 (13)	R1D5 (12)	
R0306	4	0101	+R2	R2D1 (11)	R2D2 (10)	
R0307	3	0100	-R2	R2D3 (7)	R2D4 (6)	
R0308	2	0011		R2D5 (5)	R3D1 (4)	
R0309	1	0010	+R3	R3D2 (3)	R3D3 (2)	
R0310	0	0001	-R3	R3D4 (1)	R3D5 (0)	
R0311		0000	NO RELAYWORD			

R0312 THE 5 BIT OUTPUT RELAY CODES ARE:

R0313	BLANK	00000
R0314	0	10101
R0315	1	00011
R0316	2	11001
R0317	3	11011
R0318	4	01111
R0319	5	11110
R0320	6	11100
R0321	7	10011
R0322	8	11101
R0323	9	11111

R03231 OUTPUT BITS USED BY PINBALL:

R03232	KEY RELEASE LIGHT	- BIT 5 OF CHANNEL 11
R03233	VERB/NOUN FLASH	- BIT 6 OF CHANNEL 11
R03234	OPERATOR ERROR LIGHT	- BIT 7 OF CHANNEL 11

P0324 START OF EXECUTIVE SECTION OF PINBALL

```
032501 REF   1                40,2000                    SETLOC PINBALL1
032502                        40,2000                    BANK

                                                         COUNT* $$/PIN
03255  REF   1                                          
0330   REF  14  LAST  315     40,2000  3 4770 0  CHARIN   CAF    ONE        BLOCK DISPLAY SYST
0331   REF   2  LAST  204     40,2001  57'215 0          XCH    DSPLOCK    MAKE DSP SYST BUSY, BUT SAVE OLD
0332   REF   1                40,2002  54 115 0          TS     21/22REG   C(DSPLOCK) FOR ERROR LIGHT RESET.
03321  REF   2  LAST  204     40,2003  11'245 1          CCS    CADRSTOR   ALL KEYS EXCEPT ER TURN ON KR LITE IF
03322                         40,2004  0 2006 0          TC     +2         CADRSTOR IS FULL.  THIS REMINDS OPERATOR
03323  REF   1                40,2005  0 2013 1          TC     CHARIN2    TO RE-ESTABLISH A FLASHING DISPLAY
03324  REF   1                40,2006  4 2212 0          CS     ELRCODE1   WHICH HE HAS OBSCURED WITH DISPLAYS OF
03325  REF  59  LAST  317     40,2007  6 0154 1          AD     MPAC       HIS OWN (SEE REMARKS PRECEDING ROUTINE
03326                         40,2010  0 0006 1          EXTEND             VBRELDSP).
03327  REF   2  LAST  326     40,2011  1 2013 0          BZF    CHARIN2
03328  REF   1                40,2012  0 4356 0          TC     RELDSPON
0333   REF  60  LAST  326     40,2013  56 154 1  CHARIN2  XCH    MPAC
0334   REF   1                40,2014  54 117 1          TS     CHAR
0335   REF  81  LAST  315     40,2015  50 000 1          INDEX  A
0336                          40,2016  0 2017 0          TC     +1         INPUT CODE     FUNCTION
0337   REF   1                40,2017  0 3275 1          TC     CHARALRM   0
0338   REF   1                40,2020  0 2074 0          TC     NUM        1
0339   REF   2  LAST  326     40,2021  0 2074 0          TC     NUM        2
0340   REF   3  LAST  326     40,2022  0 2074 0          TC     NUM        3
0341   REF   4  LAST  326     40,2023  0 2074 0          TC     NUM        4
0342   REF   5  LAST  326     40,2024  0 2074 0          TC     NUM        5
0343   REF   6  LAST  326     40,2025  0 2074 0          TC     NUM        6
0344   REF   7  LAST  326     40,2026  0 2074 0          TC     NUM        7
0345   REF   1                40,2027  0 2064 1          TC     89TEST     10             8
0346   REF   2  LAST  326     40,2030  0 2064 1          TC     89TEST     11             9
0347   REF   2  LAST  326     40,2031  0 3275 1          TC     CHARALRM   12
0348   REF   3  LAST  326     40,2032  0 3275 1          TC     CHARALRM   13
0349   REF   4  LAST  326     40,2033  0 3275 1          TC     CHARALRM   14
0350   REF   5  LAST  326     40,2034  0 3275 1          TC     CHARALRM   15
0351   REF   6  LAST  326     40,2035  0 3275 1          TC     CHARALRM   16
0352   REF   7  LAST  326     40,2036  0 3275 1          TC     CHARALRM   17
0353   REF   8  LAST  326     40,2037  0 2072 0          TC     NUM    -2  20             0
0354   REF   1                40,2040  0 2251 0          TC     VERB       21             VERB
0355   REF   1                40,2041  0 3553 1          TC     ERROR      22             ERROR LIGHT RESET
0356   REF   8  LAST  326     40,2042  0 3275 1          TC     CHARALRM   23
0357   REF   9  LAST  326     40,2043  0 3275 1          TC     CHARALRM   24
0358   REF  10  LAST  326     40,2044  0 3275 1          TC     CHARALRM   25
0359   REF  11  LAST  326     40,2045  0 3275 1          TC     CHARALRM   26
0360   REF  12  LAST  326     40,2046  0 3275 1          TC     CHARALRM   27
0361   REF  13  LAST  326     40,2047  0 3275 1          TC     CHARALRM   30
0362   REF   1                40,2050  0 3325 0          TC     VBRELDSP   31             KEY RELEASE
0363   REF   1                40,2051  0 2304 1          TC     POSGN      32             +
0364   REF   1                40,2052  0 2271 1          TC     NEGSGN     33             -
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0365  REF   1                  40,2053  0 4200 1            TC    ENTERJMP   34          ENTER
0366  REF  14  LAST  326       40,2054  0 3275 1            TC    CHARALRM   35
0367  REF   1                  40,2055  0 2364 1            TC    CLEAR      36          CLEAR
0368  REF   1                  40,2056  0 2265 1            TC    NOUN       37          NOUN

0369  REF   3  LAST  204       40,2057  11'202 1  CHKDSP    CCS   DSPCOUNT
0370  REF  39  LAST  317       40,2060  0 0002 0            TC    Q
0371  REF  40  LAST  327       40,2061  0 0002 0            TC    Q
0372  REF  22  LAST  317       40,2062  1 5205 1            TCF   ENDOFJOB    BLOCK DATA IN IF DSPCOUNT NEG.
0373  REF  23  LAST  327       40,2063  1 5205 1            TCF   ENDOFJOB

0376  REF   1                  40,2064  0 2057 1  89TEST    TC    CHKDSP
03761 REF   5  LAST  262       40,2065  3 6214 0            CAF   THREE
0377  REF   1                  40,2066  7 1203 0            MASK  DECBRNCH
0378  REF  82  LAST  326       40,2067  10 000 0            CCS   A
0379  REF   9  LAST  326       40,2070  0 2074 0            TC    NUM         IF DECBRNCH IS +, 8 OR 9 OK
0380  REF  15  LAST  327       40,2071  0 3275 1            TC    CHARALRM    IF DECBRNCH IS +0, REJECT 8 OR 9

R0381  NUM ASSEMBLES OCTAL 3 BITS AT A TIME. FOR DECIMAL IT CONVERTS INCOMING
R0382  WORD AS A FRACTION, KEEPING RESULTS TO DP.
R0383  OCTAL RESULTS ARE LEFT IN XREG, YREG, OR ZREG. HI PART OF DEC IN XREG,
R0384  YREG, ZREG. THE LOW PARTS IN XREGLP, YREGLP, OR ZREGLP)
R0385  DECBRNCH IS LEFT AT +0 FOR OCT, +1 FOR + DEC, +2 FOR - DEC.
R0386  IF DSPCOUNT WAS LEFT -, NO MORE DATA IS ACCEPTED.

0387  REF  38  LAST  317       40,2072  3 4772 1    -2      CAF   ZERO
0388  REF   2  LAST  326       40,2073  54 117 1            TS    CHAR
0389  REF   2  LAST  327       40,2074  0 2057 1    NUM     TC    CHKDSP
0394  REF   1                  40,2075  0 2221 1            TC    GETINREL
0395  REF   2  LAST  204       40,2076  11'220 1            CCS   CLPASS      IF CLPASS IS + OR +0, MAKE IT +0
0396  REF  39  LAST  327       40,2077  3 4772 1            CAF   ZERO
0397  REF   3  LAST  327       40,2100  55'220 1            TS    CLPASS
0398                            40,2101  0 2102 0            TC    +1
0399  REF   3  LAST  327       40,2102  3 0117 0            CA    CHAR
0400  REF   1                  40,2103  0 4423 0            TC    CODSTOR
0405  REF   1                  40,2104  0 3161 1            TC    DSPIN
0406  REF   6  LAST  327       40,2105  3 6214 0            CAF   THREE
0407  REF   2  LAST  327       40,2106  7 1203 0            MASK  DECBRNCH
0408  REF  83  LAST  327       40,2107  10 000 0            CCS   A           +0, OCTAL.  +1, + DEC.  +2, - DEC.
0409  REF   1                  40,2110  0 2121 1            TC    DECTOBIN    +
0410  REF   1                  40,2111  50 137 1            INDEX INREL       +0 OCTAL
0411  REF   2  LAST  204       40,2112  57'204 0            XCH   VERBREG
0412  REF   5  LAST  214       40,2113  54 022 0            TS    CYL
0413  REF   6  LAST  327       40,2114  4 0022 0            CS    CYL
0414  REF   7  LAST  327       40,2115  4 0022 0            CS    CYL
0415  REF   8  LAST  327       40,2116  56 022 1            XCH   CYL
0416  REF   4  LAST  327       40,2117  6 0117 0            AD    CHAR
0417  REF   1                  40,2120  0 2136 1            TC    ENDNMTST
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0418   REF   2  LAST  327  40,2121  50 137 1  DECTOBIN INDEX  INREL
0419   REF   3  LAST  327  40,2122  57'204 0           XCH    VERBREG
0420   REF  61  LAST  326  40,2123  54 154 0           TS     MPAC            SUM X 2EXP-14 IN MPAC
0421   REF  40  LAST  327  40,2124  3 4772 1           CAF    ZERO
0422   REF  62  LAST  328  40,2125  54 155 1           TS     MPAC     +1
0423   REF   2  LAST  204  40,2126  3 4355 0           CAF    TEN             10 X 2EXP-14
0424   REF   3  LAST  303  40,2127  0 7256 1           TC     SHORTMP         10SUM X 2EXP-28 IN MPAC, MPAC+1
0425   REF  63  LAST  328  40,2130  56 155 0           XCH    MPAC     +1
0426   REF   5  LAST  327  40,2131  6 0117 0           AD     CHAR
0427   REF  64  LAST  328  40,2132  54 155 1           TS     MPAC     +1
0428   REF   2  LAST  327  40,2133  0 2136 1           TC     ENDNMTST        NO OF
0429   REF  65  LAST  328  40,2134  26 154 0           ADS    MPAC            OF MUST BE 5TH CHAR
0430   REF   1         -  40,2135  0 2156 1           TC     DECCEND
0431   REF   3  LAST  328  40,2136  50 137 1  ENDNMTST INDEX  INREL
0432   REF   4  LAST  328  40,2137  55'204 1           TS     VERBREG
0433   REF   4  LAST  327  40,2140  4 1202 1           CS     DSPCOUNT
0434   REF   4  LAST  328  40,2141  50 137 1           INDEX  INREL
0435   REF   1         -  40,2142  6 2212 1           AD     CRITCON
0436          -         -  40,2143  0 0006 1           EXTEND
0437   REF   1         -  40,2144  1 2150 0           BZF    ENDNUM          -0, DSPCOUNT = CRITCON
0438   REF   5  LAST  328  40,2145  11'202 1  MORNUM   CCS    DSPCOUNT        -, DSPCOUNT G/ CRITCON
04383  REF   6  LAST  328  40,2146  55'202 1           TS     DSPCOUNT        DECREMENT DSPCOUNT
04386  REF  24  LAST  327  40,2147  0 5205 0           TC     ENDOFJOB
0439   REF   7  LAST  327  40,2150  3 6214 0  ENDNUM   CAF    THREE
0440   REF   3  LAST  327  40,2151  7 1203 0           MASK   DECBRNCH
0441   REF  84  LAST  327  40,2152  10 000 0           CCS    A
0442   REF   2  LAST  328  40,2153  0 2156 1           TC     DECCEND
0443   REF   7  LAST  328  40,2154  4 1202 1  ENDALL   CS     DSPCOUNT        BLOCK NUMIN BY PLACING DSPCOUNT
0444   REF   1         -  40,2155  0 2146 0           TC     MORNUM   +1     NEGATIVELY
04442  REF  39  LAST  317  40,2156  0 4636 0  DECCEND  TC     BANKCALL
04443  REF   1         -  40,2157  60161 1            CADR   DECEND
04444  REF   1         -  40,2160  0 2154 0           TC     ENDALL
0445   REF  15  LAST  326  40,2161  4 4770 1  DECEND   CS     ONE
0446   REF   5  LAST  328  40,2162  6 0137 1           AD     INREL
0447          -         -  40,2163  0 0006 1           EXTEND
0448   REF   2  LAST  328  40,2164  6 2154 0           BZMF   ENDALL          IF INREL=0,1(VBREG,NNREG), LEAVE WHOLE
04481  REF   2  LAST  327  40,2165  0 2221 1    +4     TC     GETINREL
04482  REF   6  LAST  328  40,2166  50 137 1           INDEX  INREL
04483  REF   5  LAST  328  40,2167  3 1204 0           CA     VERBREG
04484  REF  66  LAST  328  40,2170  54 155 1           TS     MPAC +1
0449   REF   1         -  40,2171  0 7052 1           TC     DMP             IF INREL=2,3,4(R1,R2,R3),CONVERT TO FRAC
AC450                                                                       MULT SUM X 2EXP-28 IN MPAC, MPAC+1 BY
0451   REF   1         -  40,2172  02217 1            ADRES  DECON           2EXP14/10EXP5. GIVES(SUM/10EXP5)X2EXP-14
0452   REF   8  LAST  328  40,2173  3 6214 0           CAF    THREE           IN MPAC, +1, +2.
0453   REF   4  LAST  328  40,2174  7 1203 0           MASK   DECBRNCH
0454   REF  85  LAST  328  40,2175  50 000 1           INDEX  A
0455          -         -  40,2176  0 2176 0           TC     +0
0456   REF   1         -  40,2177  0 2203 1           TC     +DECSGN
0457          -         -  40,2200  0 0006 1           EXTEND                 - CASE
0458   REF  67  LAST  328  40,2201  4 0156 1           DCS    MPAC     +1
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0459   REF  68  LAST  328   40,2202  52 156 1          DXCH   MPAC    +1
0460   REF  69  LAST  329   40,2203  56 156 0  +DECSGN XCH    MPAC    +2
0461   REF   7  LAST  328   40,2204  50 137 1          INDEX  INREL
0462   REF   1              40,2205  55'207 1          TS     XREGLP  -2
0463   REF  70  LAST  329   40,2206  56 155 0          XCH    MPAC    +1
0464   REF   8  LAST  329   40,2207  50 137 1          INDEX  INREL
0465   REF   6  LAST  328   40,2210  55'204 1          TS     VERBREG
0466   REF   3  LAST  312   40,2211  0 4651 1          TC     SWRETURN
04695  REF   2  LAST  328   40,2212                    ELRCODE1 EQUALS CRITCON

0470                        40,2212  00022 1  CRITCON  OCT    22          (DEC 18)
0471                        40,2213  00020 0           OCT    20          (DEC 16)
0472                        40,2214  00012 1           OCT    12          (DEC 10)
0473                        40,2215  00005 1           OCT    5
0474                        40,2216  00000 1           OCT    0

0475                        40,2217  05174 0  DECON    2DEC   E-5 814     2EXP14/10EXP5 = .16384 DEC
0475                        40,2220  13261 0

R0476  GETINREL GETS PROPER DATA REG REL ADDRESS FOR CURRENT C(DSPCOUNT) AND
R0477  PUTS IN INTO INREL. +0 VERBREG, 1 NOUNREG, 2 XREG, 3 YREG, 4 ZREG.

0478   REF   8  LAST  328   40,2221  51'202 0  GETINREL INDEX  DSPCOUNT
0479   REF   1              40,2222  3 2225 0           CAF    INRELTAB
0480   REF   9  LAST  329   40,2223  54 137 0           TS     INREL       (A TEMP, REG)
0481   REF  41  LAST  327   40,2224  0 0002 0           TC     Q

0482                        40,2225  00004 0  INRELTAB OCT    4           R3D5 (DSPCOUNT = 0)
0483                        40,2226  00004 0           OCT    4           R3D4      =(1)
0484                        40,2227  00004 0           OCT    4           R3D3      =(2)
0485                        40,2230  00004 0           OCT    4           R3D2      =(3)
0486                        40,2231  00004 0           OCT    4           R3D1      =(4)
0487                        40,2232  00003 1           OCT    3           R2D5      =(5)
0488                        40,2233  00003 1           OCT    3           R2D4      =(6)
0489                        40,2234  00003 1           OCT    3           R2D3      =(7)
0490                        40,2235  00003 1           OCT    3           R2D2      =(8D)
0491                        40,2236  00003 1           OCT    3           R2D1      =(9D)
0492                        40,2237  00002 0           OCT    2           R1D5      =(10D)
0493                        40,2240  00002 0           OCT    2           R1D4      =(11D)
0494                        40,2241  00002 0           OCT    2           R1D3      =(12D)
0495                        40,2242  00002 0           OCT    2           R1D2      =(13D)
0496                        40,2243  00002 0           OCT    2           R1D1      =(14D)
0497                        40,2244  00244 0  VNDSPCON OCT    244         .01 ROUNDED UP. CANNOT GET HERE
0498                        40,2245  00001 0           OCT    1           ND2       =(16D)
0499                        40,2246  00001 0           OCT    1           ND1       =(17D)
0500                        40,2247  00000 1           OCT    0           VD2       =(18D)
0501                        40,2250  00000 1           OCT    0           VD1       =(19D)

0502   REF  41  LAST  328   40,2251  3 4772 1  VERB     CAF    ZERO
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0503	REF	7	LAST	329	40,2252	55'204 1		TS	VERBREG	
0504	REF	2	LAST	204	40,2253	3 4351 1		CAF	VD1	
0505	REF	9	LAST	329	40,2254	55'202 1	NVCOM	TS	DSPCOUNT	
0506	REF	1			40,2255	0 2473 0		TC	2BLANK	
0507	REF	16	LAST	328	40,2256	3 4770 0		CAF	ONE	
0508	REF	5	LAST	328	40,2257	55'203 0		TS	DECBRNCH	SET FOR DEC V/N CODE
0509	REF	42	LAST	329	40,2260	3 4772 1		CAF	ZERO	
0510	REF	2	LAST	204	40,2261	55'216 1		TS	REQRET	SET FOR ENTPAS
0511	REF	1			40,2262	3 4170 0		CAF	ENDINST	IF DSPALARM OCCURS BEFORE FIRST ENTPAS
0512	REF	2	LAST	71	40,2263	54 136 1		TS	ENTRET	OR NVSUB, ENTRET MUST ALREADY BE SET
A0513										TO TC ENDOFJOB
0514	REF	25	LAST	328	40,2264	0 5205 0		TC	ENDOFJOB	
0515	REF	43	LAST	330	40,2265	3 4772 1	NOUN	CAF	ZERO	
0516	REF	7	LAST	282	40,2266	55'205 0		TS	NOUNREG	
0517	REF	1			40,2267	3 4352 1		CAF	ND1	ND1, OCT 21 (DEC 17)
0518	REF	1			40,2270	0 2254 0		TC	NVCOM	
0519	REF	1			40,2271	0 2344 0	NEGSGN	TC	SIGNTEST	
0520	REF	1			40,2272	0 2330 0		TC	-ON	
0521	REF	6	LAST	313	40,2273	3 4767 0		CAF	TWO	
0522	REF	10	LAST	329	40,2274	50 137 1	BOTHSGN	INDEX	INREL	SET DEC COMP BIT TO 1 (IN DECBRNCH)
0523	REF	18	LAST	243	40,2275	6 4762 0		AD	BIT7	BIT 5 FOR R1, BIT 4 FOR R2,
0524	REF	6	LAST	330	40,2276	27'203 0		ADS	DECBRNCH	BIT 3 FOR R3
0525	REF	4	LAST	327	40,2277	11'220 1	FIXCLPAS	CCS	CLPASS	IF CLPASS IS + OR +0, MAKE IT +
0526	REF	44	LAST	330	40,2300	3 4772 1		CAF	ZERO	
0527	REF	5	LAST	330	40,2301	55'220 1		TS	CLPASS	
0528					40,2302	0 2303 0		TC	+1	
0529	REF	26	LAST	330	40,2303	0 5205 0		TC	ENDOFJOB	
0530	REF	2	LAST	330	40,2304	0 2344 0	POSGN	TC	SIGNTEST	
0531	REF	1			40,2305	0 2310 1		TC	+ON	
0532	REF	17	LAST	330	40,2306	3 4770 0		CAF	ONE	
0533	REF	1			40,2307	0 2274 1		TC	BOTHSGN	
0534	REF	42	LAST	329	40,2310	22 002 0	+ON	LXCH	Q	
0535	REF	3	LAST	328	40,2311	0 2221 1		TC	GETINREL	
0536	REF	11	LAST	330	40,2312	50 137 1		INDEX	INREL	
0537	REF	1			40,2313	3 2336 0		CAF	SGNTAB -2	
0538	REF	1			40,2314	54 123 0		TS	SGNOFF	
0539	REF	18	LAST	330	40,2315	6 4770 0		AD	ONE	
0540	REF	1			40,2316	54 122 1		TS	SGNON	
0541	REF	45	LAST	330	40,2317	3 4772 1	SGNCOM	CAF	ZERO	
0542	REF	1			40,2320	54 124 1		TS	CODE	
0543	REF	2	LAST	330	40,2321	56 123 1		XCH	SGNOFF	
0544	REF	1			40,2322	0 3247 0		TC	11DSPIN	
0545	REF	15	LAST	221	40,2323	3 4756 1		CAF	BIT11	
0546	REF	2	LAST	330	40,2324	54 124 1		TS	CODE	
0547	REF	2	LAST	330	40,2325	56 122 0		XCH	SGNON	
0548	REF	2	LAST	330	40,2326	0 3247 0		TC	11DSPIN	

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0549    REF  31  LAST  317   40,2327  0 0001 0    -1      TC      L
0550    REF  43  LAST  330   40,2330  22 002 0    -ON     LXCH    Q
0551    REF   4  LAST  330   40,2331  0 2221 1             TC      GETINREL
0552    REF  12  LAST  330   40,2332  50 137 1             INDEX   INREL
0553    REF   2  LAST  330   40,2333  3 2336 0             CAF     SGNTAB  -2
0554    REF   3  LAST  330   40,2334  54 122 1             TS      SGNON
0555    REF  19  LAST  330   40,2335  6 4770 0             AD      ONE
0556    REF   3  LAST  330   40,2336  54 123 0             TS      SGNOFF
0557    REF   1              40,2337  0 2317 0             TC      SGNCOM

0558                         40,2340  00005 1   SGNTAB     OCT     5       -R1
0559                         40,2341  00003 1             OCT     3       -R3
0560                         40,2342  00000 1   -1        OCT     00000
05601                        40,2343  02476 0   DECROUND  OCT     02476   MUST FOLLOW ZERO WORD
0561    REF  44  LAST  331   40,2344  22 002 0  SIGNTEST  LXCH    Q       ALLOWS +,- ONLY WHEN DSPCOUNT=R1D1,
0562    REF   9  LAST  328   40,2345  3 6214 0             CAF     THREE   R2D1, OR R3D1. ALLOWS ONLY FIRST OF
0563    REF   7  LAST  330   40,2346  7 1203 0             MASK    DECBRNCH CONSECUTIVE +/- CHARACTERS.
0564    REF  86  LAST  328   40,2347  10 000 0             CCS     A       IF LOW2 BITS OF DECBRNCH NOT= 0, SIGN
0565    REF  27  LAST  330   40,2350  0 5205 0             TC      ENDOFJOB FOR THIS WORD ALREADY IN. REJECT.
0566    REF   2  LAST  242   40,2351  4 4321 1             CS      R1D1
0567    REF   1              40,2352  0 2360 0             TC      SGNTST1
0568    REF   1              40,2353  4 4322 1             CS      R2D1
0569    REF   2  LAST  331   40,2354  0 2360 0             TC      SGNTST1
0570    REF   1              40,2355  4 4323 0             CS      R3D1
0571    REF   3  LAST  331   40,2356  0 2360 0             TC      SGNTST1
0572    REF  28  LAST  331   40,2357  0 5205 0             TC      ENDOFJOB        NO MATCH FOUND. SIGN ILLEGAL.
0573    REF  10  LAST  330   40,2360  6 1202 0  SGNTST1    AD      DSPCOUNT
0574                         40,2361  0 0006 1             EXTEND
0575    REF   2  LAST  330   40,2362  1 2327 1             BZF     -ON -1          MATCH FOUND. SIGN LEGAL
0576    REF  45  LAST  331   40,2363  0 0002 0             TC      Q
R0578   CLEAR BLANKS WHICH R1, R2, R3 IS CURRENT OR LAST TO BE DISPLAYED(PERTINE
R0579   NT XREG,YREG,ZREG IS CLEARED). SUCCESSIVE CLEARS TAKE CARE OF EACH RX
R0580   L/ RC UNTIL R1 IS DONE. THEN NO FURTHER ACTION

R0581   THE SINGLE COMPONENT LOAD VERBS ALLOW ONLY THE SINGLE RC THAT IS
R0582   APPROPRIATE TO BE CLEARED.

R0583   CLPASS    +0  PASSO, CAN BE BACKED UP
R0584             +NZ  HIPASS, CAN BE BACKED UP
R0585             -NZ  PASSO, CANNOT BE BACKED UP

0586    REF  11  LAST  331   40,2364  11'202 1  CLEAR     CCS     DSPCOUNT
0587    REF  20  LAST  331   40,2365  6 4770 0             AD      ONE
0588                         40,2366  0 2370 1             TC      +2
0589    REF  21  LAST  331   40,2367  6 4770 0             AD      ONE
0590    REF  87  LAST  331   40,2370  50 000 1             INDEX   A       DO NOT CHANGE DSPCOUNT BECAUSE MAY LATER
0591    REF   2  LAST  329   40,2371  3 2225 0             CAF     INRELTAB FAIL LEGALTST.
0592    REF  13  LAST  331   40,2372  54 137 0             TS      INREL   MUST SET INREL, EVEN FOR HIPASS.
0593    REF   6  LAST  330   40,2373  11'220 1             CCS     CLPASS
0594    REF   1              40,2374  0 2402 0             TC      CLPASHI +
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0595                          40,2375  0 2377 0          TC     +2              +     IF CLPASS IS +0 OR -, IT IS PASS0
0596                          40,2376  0 2377 0          TC     +1              -
0597  REF  14  LAST  331      40,2377  3 0137 1          CA     INREL
0598  REF   1                 40,2400  0 2424 1          TC     LEGALTST
0599  REF   1                 40,2401  0 2417 1          TC     CLEAR1
0600  REF  15  LAST  332      40,2402  10 137 0  CLPASHI  CCS    INREL
0601  REF  16  LAST  332      40,2403  54 137 0          TS     INREL
0602  REF   2  LAST  332      40,2404  0 2424 1          TC     LEGALTST
0603  REF   1                 40,2405  3 2472 1          CAF    DOUBLK +2       +3 TO - NUMBER. BACKS DATA REQUESTS.
0604  REF   3  LAST  330      40,2406  27'216 1          ADS    REQRET
0605  REF  17  LAST  332      40,2407  3 0137 1          CA     INREL
0606  REF   1                 40,2410  54 125 0          TS     MIXTEMP         TEMP STORAGE FOR INREL
0607                          40,2411  0 0006 1          EXTEND
0608  REF   8  LAST  330      40,2412  27'204 1          DIM    VERBREG         DECREMENT VERB AND RE-DISPLAY
0609  REF  40  LAST  328      40,2413  0 4636 0          TC     BANKCALL
0610  REF   1                 40,2414  62337 1           CADR   UPDATVB
0611  REF   2  LAST  332      40,2415  3 0125 1          CA     MIXTEMP
0612  REF  18  LAST  332      40,2416  54 137 0          TS     INREL           RESTORE INREL
0613  REF   1                 40,2417  0 2422 1  CLEAR1  TC     CLR5
0614  REF   7  LAST  331      40,2420  25'220 0          INCR   CLPASS          ONLY IF CLPASS IS + OR +0,
0615  REF  29  LAST  331      40,2421  0 5205 0          TC     ENDOFJOB        SET FOR HIGHER PASS.
0616  REF  46  LAST  331      40,2422  22 002 0  CLR5    LXCH   Q               USES 5BLANK  BUT AVOIDS ITS TC GETINREL
0617  REF   1                 40,2423  0 2433 1          TC     5BLANK  +2
0618  REF   3  LAST  314      40,2424  6 7702 0  LEGALTST AD    NEG1
0619                          40,2425  0 0006 1          EXTEND
0620  REF  30  LAST  332      40,2426  6 5205 0          BZMF   ENDOFJOB        ILLEGAL. INREL=0,1
0621  REF  47  LAST  332      40,2427  0 0002 0          TC     Q               LEGAL. INREL GE 2
R0624  5BLANK BLANKS 5 CHAR DISPLAY WORD IN R1, R2, OR R3. IT ALSO ZEROES XREG,
R0625  YREG, OR ZREG.PLACE ANY + DSPCOUNT NUMBER FOR PERTINENT RC INTO DSPCOUNT
R0626  DSPCOUNT IS LEFT SET TO LEFT MOST DSP NUMB FOR RC JUST BLANKED.

0627  REF  12  LAST  331      40,2430  55'202 1  -1      TS     DSPCOUNT        NEEDED FOR BLANKSUB
0628  REF  48  LAST  332      40,2431  22 002 0  5BLANK  LXCH   Q
0629  REF   5  LAST  331      40,2432  0 2221 1          TC     GETINREL
0630  REF  46  LAST  330      40,2433  3 4772 1  +2      CAF    ZERO
0631  REF  19  LAST  332      40,2434  50 137 1          INDEX  INREL
0632  REF   9  LAST  332      40,2435  55'204 1          TS     VERBREG         ZERO X, Y, Z REG.
0633  REF  20  LAST  332      40,2436  50 137 1          INDEX  INREL
0634  REF   2  LAST  329      40,2437  55'207 1          TS     XREGLP  -2
0635  REF   3  LAST  330      40,2440  54 124 1          TS     CODE
0636  REF  21  LAST  332      40,2441  50 137 1          INDEX  INREL           ZERO PERTINENT DEC COMP BIT.
0637  REF  19  LAST  330      40,2442  4 4762 1          CS     BIT7            PROTECT OTHERS
0638  REF   8  LAST  331      40,2443  7 1203 0          MASK   DECBRNCH
0639  REF   1                 40,2444  7 7700 0          MASK   BRNCHCON        ZERO LOW 2 BITS.
0640  REF   9  LAST  332      40,2445  55'203 0          TS     DECBRNCH
0641  REF  22  LAST  332      40,2446  50 137 1          INDEX  INREL
0642  REF   1                 40,2447  3 2463 1          CAF    SINBLANK -2     BLANK ISOLATED CHAR SEPARATELY
0643  REF   1                 40,2450  54 143 0          TS     COUNT
0644  REF   2  LAST  327      40,2451  0 3161 1          TC     DSPIN
0645  REF  23  LAST  332      40,2452  50 137 1  5BLANK1 INDEX  INREL
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0646   REF   2  LAST  332   40,2453  3 2466 1          CAF     DOUBLK -2
0647   REF  13  LAST  332   40,2454  55'202 1          TS      DSPCOUNT
0648   REF   2  LAST  330   40,2455  0 2473 0          TC      2BLANK
0649   REF   7  LAST  330   40,2456  4 4767 1          CS      TWO
0650   REF  14  LAST  333   40,2457  27'202 1          ADS     DSPCOUNT
0651   REF   3  LAST  333   40,2460  0 2473 0          TC      2BLANK
0652   REF  24  LAST  332   40,2461  50 137 1          INDEX   INREL
0653   REF   3  LAST  331   40,2462  3 4317 0          CAF     R1D1   -2
0654   REF  15  LAST  333   40,2463  55'202 1          TS      DSPCOUNT        SET DSPCOUNT TO LEFT MOST DSP NUMBER
0655   REF  32  LAST  331   40,2464  0 0001 0          TC      L               OF REG. JUST BLANKED

0656                        40,2465  00016 0  SINBLANK OCT     16              DEC 14
0657                        40,2466  00005 1           OCT     5
0658                        40,2467  00004 0           OCT     4
0659                        40,2470  00015 0  DOUBLK   OCT     15              DEC 13
0660                        40,2471  00011 1           OCT     11              DEC 9
0661                        40,2472  00003 1  +2       OCT     3
0662   REF   1                7700                BRNCHCON EQUALS NEG3

R0663  2BLANK BLANKS TWO CHAR. PLACE DSP NUMBER OF LEFT CHAR OF THE PAIR INTO
R0664  DSPCOUNT. THIS NUMBER IS LEFT IN DSPCOUNT

0665   REF  16  LAST  333   40,2473  3 1202 0  2BLANK  CA      DSPCOUNT
0666   REF   1               40,2474  54 021 0          TS      SR
0667   REF   1               40,2475  4 4755 0          CS      BLANKCON
0668                        40,2476  0 0004 0          INHINT
0669   REF   2  LAST  333   40,2477  50 021 1          INDEX   SR
0670   REF  25  LAST  204   40,2500  57'226 0          XCH     DSPTAB
0671                        40,2501  0 0006 1          EXTEND
0672                        40,2502  6 2504 1          BZMF    +2              IF OLD CONTENTS -, NOUT OK
0673   REF   6  LAST  204   40,2503  25'221 1          INCR    NOUT            IF OLD CONTENTS +, +1 TO NOUT
0674   REF   2  LAST  238   40,2504  1 5642 0          TCF     REQ             IF -,NOUT OK
0676   REF  18  LAST  312      4755              BLANKCON EQUALS BIT12
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R0677   ENTER PASS 0 IS THE EXECUTE FUNCTION. HIGHER ORDER ENTERS ARE TO LOAD
R0678   DATA. THE SIGN OF REQRET DETERMINES THE PASS, + FOR PASS 0,- FOR HIGHER
R0679   PASSES.


R0680   MACHINE CADR TO BE SPECIFIED (MCTBS) NOUNS DESIRE AN ECADR TO BE LOADED
R0681   WHEN USED WITH LOAD VERBS, MONITOR VERBS, OR DISPLAY VERBS (EXCEPT
R0682   VERB = FIXED MEMORY DISPLAY, WHICH REQUIRES AN FCADR).


 068301 REF   1                 41,2000                        SETLOC PINBALL2
 068302                         41,2000                        BANK

 06835  REF   1                                                COUNT* $$/PIN
 0684   REF   1                 41,3513              NVSUBB    EQUALS NVSUBI
 0685   REF   1                 41,3001              LOADLV1   EQUALS LOADLV
 0687   REF  47 LAST  332       41,2000  3 4772 1    ENTER     CAF    ZERO
 0688   REF   8 LAST  332       41,2001  55'220 1             TS     CLPASS
 0689   REF   2 LAST  330       41,2002  3 4170 0             CAF    ENDINST
 0690   REF   3 LAST  330       41,2003  54 136 1             TS     ENTRET
 0691   REF   4 LAST  332       41,2004  11'216 1             CCS    REQRET
 0692   REF   1                 41,2005  0 2040 1             TC     ENTPASO     IF +, PASS 0
 0693   REF   2 LAST  334       41,2006  0 2040 1             TC     ENTPASO     IF +, PASS 0
 0694                           41,2007  0 2010 1             TC     +1          IF -, NOT PASS 0
 0695   REF   1                 41,2010  3 2036 0    ENTPASHI  CAF    MMADREF
 0696   REF   5 LAST  334       41,2011  6 1216 0             AD     REQRET      IF L/ 2 CHAR IN FOR MM CODE, ALARM
 0697                           41,2012  0 0006 1             EXTEND             AND RECYCLE(DECIDE AT MMCHANG+1)
 0698   REF   1                 41,2013  1 2025 0             BZF    ACCEPTWD
 0699   REF  10 LAST  331       41,2014  3 6214 0             CAF    THREE       IF DEC, L/5 CHAR IN FOR DATA MUST BE
 0700   REF  10 LAST  332       41,2015  7 1203 0             MASK   DECBRNCH    SCALED (DECEND); IF 5 CHAR IN, DATA
 0701   REF  88 LAST  331       41,2016  10 000 0             CCS    A           HAS ALREADY BEEN SCALED. ANY NUMBER
 0702                           41,2017  0 2021 0             TC     +2          OF DECIMAL CHARACTERS ARE ACCEPTABLE.SCR
 0703   REF   2 LAST  334       41,2020  0 2025 1             TC     ACCEPTWD    OCTAL. ANY NUMBER OF CHAR OK.
 0704   REF  17 LAST  333       41,2021  11'202 1             CCS    DSPCOUNT
 0705   REF   1                 41,2022  0 2031 1             TC     LT5
 0706   REF   2 LAST  334       41,2023  0 2031 1             TC     LT5
 0707                           41,2024  0 2025 1             TC     +1          5 CHAR IN (DSPCOUNT IS -)
 0708   REF   6 LAST  334       41,2025  4 1216 1    ACCEPTWD  CS     REQRET      5 CHAR IN (DSPCOUNT IS -)
 0709   REF   7 LAST  334       41,2026  55'216 1             TS     REQRET      SET REQRET +.
 0710   REF   2 LAST  257       41,2027  0 4417 1             TC     FLASHOFF
 0711   REF   8 LAST  334       41,2030  0 1216 0             TC     REQRET

 071108 REF  48 LAST  334       41,2031  3 4772 1    LT5       CAF    ZERO
 071109 REF  71 LAST  329       41,2032  54 154 0             TS     MPAC
 07111  REF  41 LAST  332       41,2033  0 4636 0             TC     BANKCALL
 07112  REF   2 LAST  328       41,2034  60165 0              CADR   DECEND +4
 07113  REF   3 LAST  334       41,2035  0 2025 1             TC     ACCEPTWD
 0713   REF   1                 41,2036  03377 1     MMADREF   ADRES  MMCHANG +1  ASSUMES TC REQMM AT MMCHANG.

 0714                           41,2037  00034 0     LOWVERB   DEC    28          LOWER VERB THAT AVOIDS NOUN TEST.
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0715  REF  49  LAST  334   41,2040  3 4772 1  ENTPASO  CAF     ZERO          NOUN VERB SUB ENTERS HERE
0716  REF  11  LAST  334   41,2041  55'203 0           TS      DECBRNCH
0717  REF   1              41,2042  0 4261 0           TC      -VD1SET
0719  REF  10  LAST  332   41,2043  4 1204 1  TESTVB   CS      VERBREG       IF VERB IS G/E LOWVB, SKIP NOUN TEST
0720  REF   1              41,2044  55'244 0           TS      VERBSAVE      SAVE VERB FOR POSSIBLE RECYCLE.
0721  REF   1              41,2045  6 2037 1           AD      LOWVERB       LOWVERB - VB
0722                       41,2046  0 0006 1           EXTEND
0723  REF   1              41,2047  6 2133 1           BZMF    VERBFAN       VERB G/E LOWVERB
0724                       41,2050  0 0006 1  TESTNN   EXTEND                VERB L/ LOWVERB
0725  REF   1              41,2051  3 2115 0           DCA     LODNNLOC      SWITCH BANKS TO NOUN TABLE READING
0726  REF   3  LAST  283   41,2052  52 006 0           DXCH    Z             ROUTINE.
0727  REF   3  LAST  282   41,2053  50 140 1           INDEX   MIXBR
0728                       41,2054  0 2054 1           TC      +0
0729                       41,2055  0 2057 1           TC      +2            NORMAL
0730  REF   1              41,2056  0 2220 0           TC      MIXNOUN       MIXED
0731  REF   3  LAST  282   41,2057  10 146 0           CCS     NNADTEM       NORMAL
0732  REF   2  LAST  335   41,2060  0 2131 0           TC      VERBFAN -2          NORMAL IF +
0733  REF   1              41,2061  0 2350 0           TC      GODSPALM      NOT IN USE   IF +0
0734  REF   1              41,2062  0 2066 0           TC      REQADD        SPECIFY MACHINE CADR IF -
0735  REF   1              41,2063  25'222 1           INCR    NOUNCADR      AUGMENT MACHINE CADR IF -0
0736  REF   1              41,2064  0 4313 1           TC      SETNADD       ECADR FROM NOUNCADR. SETS EB, NOUNADD.
0737  REF   1              41,2065  0 2120 0           TC      INTMCTBS +2
0738  REF  24  LAST  201   41,2066  3 4752 0  REQADD   CAF     BIT15         SET CLPASS FOR PASS0 ONLY
0739  REF   9  LAST  334   41,2067  55'220 1           TS      CLPASS
0740  REF   3  LAST  334   41,2070  4 4170 1           CS      ENDINST       TEST IF REACHED HERE FROM INTERNAL OR
0741  REF   1              41,2071  6 0136 0           AD      ENTEXIT                 FROM EXTERNAL
0742                       41,2072  0 0006 1           EXTEND
0743                       41,2073  1 2075 0           BZF     +2            EXTERNAL MACH CADR TO BE SPECIFIED
0744  REF   2  LAST  335   41,2074  0 2116 0           TC      INTMCTBS
0745  REF   1              41,2075  0 2304 1           TC      REQDATZ       EXTERNAL MACH CADR TO BE SPECIFIED
0746  REF  12  LAST  335   41,2076  11'203 0           CCS     DECBRNCH      ALARM AND RECYCLE IF DECIMAL USED
0747  REF   1              41,2077  0 4173 0           TC      ALMCYCLE      FOR MCTBS.
0748  REF   2  LAST  335   41,2100  0 4261 0           TC      -VD1SET
0750  REF   3  LAST  326   41,2101  11'245 1           CCS     CADRSTOR
0751                       41,2102  0 2105 1           TC      +3            EXTERNAL MCTBS DISPLAY WILL LEAVE FLASH
0752  REF   1              41,2103  0 2106 1           TC      USEADD        ON IF ENDIDLE NOT = +0.
0753                       41,2104  0 2105 1           TC      +1
0754  REF   1              41,2105  0 4360 0           TC      FLASHON
0755  REF   1              41,2106  57'210 0  USEADD   XCH     ZREG
0756  REF   1              41,2107  0 4305 0           TC      SETNCADR      ECADR INTO NOUNCADR. SET EB, NOUNADD.
0757                       41,2110  0 0006 1           EXTEND
0758  REF   2  LAST  335   41,2111  3 2115 0           DCA     LODNNLOC      SWITCH BANKS TO NOUN TABLE READING
0759  REF   4  LAST  335   41,2112  52 006 0           DXCH    Z             ROUTINE.
0760  REF   3  LAST  335   41,2113  0 2133 1           TC      VERBFAN

0761  REF  18  LAST  334      1202                    EBANK=  DSPCOUNT
0762  REF   1              41,2114    02056 0  LODNNLOC 2CADR  LODNNTAB
0762  REF   1              41,2115    64102 0

0764  REF  72  LAST  334   41,2116  3 0156 0  INTMCTBS CA      MPAC    +2    INTERNAL MACH CADR TO BE SPECIFIED.
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0765  REF   2  LAST  335   41,2117   0 4305 0          TC      SETNCADR        ECADR INTO NOUNCADR. SET EB, NOUNADD.
0766  REF   7  LAST  241   41,2120   4 4773 1   +2     CS      FIVE            NVSUB CALL LEFT CADR IN MPAC+2 FOR MACH
0767  REF  11  LAST  335   41,2121   6 1204 0          AD      VERBREG         CADR TO BE SPECIFIED.
0768                       41,2122   0 0006 1          EXTEND
0769  REF   4  LAST  335   41,2123   1 2133 0          BZF     VERBFAN         DONT DISPLAY CADR IF VB = 05
0770  REF   2  LAST  331   41,2124   3 4323 1          CAF     R3D1            VB NOT = 05. DISPLAY CADR.
0771  REF  19  LAST  335   41,2125  55'202 1          TS      DSPCOUNT
0772  REF   2  LAST  335   41,2126   3 1222 1          CA      NOUNCADR
0773  REF   1               41,2127   0 3351 0          TC      DSPOCTWD
0774  REF   5  LAST  336   41,2130   0 2133 1          TC      VERBFAN

0775  REF  22  LAST  331   41,2131   6 4770 0   -2     AD      ONE
0776  REF   3  LAST  336   41,2132   0 4305 0          TC      SETNCADR        ECADR INTO NOUNCADR. SETS EB, NOUNADD.
0777  REF   1               41,2133   4 5004 1   VERBFAN CS     LST2CON
0778  REF  12  LAST  336   41,2134   6 1204 0          AD      VERBREG         VERB-LST2CON
0779  REF  89  LAST  334   41,2135  10 000 0           CCS     A
0780  REF  23  LAST  336   41,2136   6 4770 0          AD      ONE             VERB G/ LST2CON
0781                       41,2137   0 2141 1          TC      +2
0782  REF   1               41,2140   0 2145 0          TC      V8FANDIR        VERB L/ LST2CON
0783  REF  73  LAST  335   41,2141  54 154 0           TS      MPAC
0784  REF   5  LAST  221   41,2142   0 4432 0          TC      RELDSP          RELEASE DISPLAY SYST
0785  REF  14  LAST  276   41,2143   0 4655 0          TC      POSTJUMP        GO TO GOEXTV8 WITH V8-40 IN MPAC.
0786  REF   1               41,2144    66000 1          CADR    GOEXTV8
0788  REF   4  LAST  282        5004                 LST2CON EQUALS  OCT50           DEC40-FIRST EXTENDED VERB
0790  REF  13  LAST  336   41,2145  51'204 0   V8FANDIR INDEX   VERBREG
0791  REF   1               41,2146   3 2150 1          CAF     VERBTAB
0792  REF   2  LAST  242   41,2147   0 4660 0          TC      BANKJUMP

0793  REF   2  LAST  335   41,2150   62350 0   VERBTAB CADR    GODSPALM        V800 ILLEGAL
0794  REF   1               41,2151   62364 1          CADR    DSPA            V801 DISPLAY OCT COMP 1 (R1)
0795  REF   1               41,2152   62372 0          CADR    DSPB            V802 DISPLAY OCT COMP 2 (R1)
0796  REF   1               41,2153   62377 0          CADR    DSPC            V803 DISPLAY OCT COMP 3 (R1)
0797  REF   1               41,2154   62357 1          CADR    DSPAB           V804 DISPLAY OCT COMP 1,2 (R1,R2)
0798  REF   1               41,2155   62352 1          CADR    DSPABC          V805 DISPLAY OCT COMP 1,2,3 (R1,R2,R3)
0799  REF   1               41,2156   62516 1          CADR    DECDSP          V806 DECIMAL DISPLAY
0800  REF   1               41,2157   60657 0          CADR    DSPDPDEC        V807 DP DECIMAL DISPLAY (R1,R2)
0801  REF   3  LAST  336   41,2160   62350 0          CADR    GODSPALM        V808 SPARE
0802  REF   4  LAST  336   41,2161   62350 0          CADR    GODSPALM        V809 SPARE
0803  REF   1               41,2162   61261 0          CADR    DSPALARM        V810 SPARE
0804  REF   1               41,2163   63224 0          CADR    MONITOR         V811 MONITOR OCT COMP 1 (R1)
0805  REF   2  LAST  336   41,2164   63224 0          CADR    MONITOR         V812 MONITOR OCT COMP 2 (R1)
0806  REF   3  LAST  336   41,2165   63224 0          CADR    MONITOR         V813 MONITOR OCT COMP 3 (R1)
0807  REF   4  LAST  336   41,2166   63224 0          CADR    MONITOR         V814 MONITOR OCT COMP 1,2 (R1,R2)
0808  REF   5  LAST  336   41,2167   63224 0          CADR    MONITOR         V815 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
0809  REF   6  LAST  336   41,2170   63224 0          CADR    MONITOR         V816 MONITOR DECIMAL
0810  REF   7  LAST  336   41,2171   63224 0          CADR    MONITOR         V817 MONITOR DP DEC  (R1,R2)
0811  REF   5  LAST  336   41,2172   62350 0          CADR    GODSPALM        V818 SPARE
0812  REF   6  LAST  336   41,2173   62350 0          CADR    GODSPALM        V819 SPARE
0813  REF   7  LAST  336   41,2174   62350 0          CADR    GODSPALM        V820 SPARE
0814  REF   1               41,2175   62741 1          CADR    ALOAD           V821 LOAD COMP 1 (R1)
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 0815   REF   1                  41,2176   62750 1                CADR   BLOAD     VB22 LOAD COMP 2 (R2)
 0816   REF   1                  41,2177   62765 1                CADR   CLOAD     VB23 LOAD COMP 3 (R3)
 0817   REF   1                  41,2200   62716 0                CADR   ABLOAD    VB24 LOAD COMP 1,2 (R1,R2)
 0818   REF   1                  41,2201   62611 0                CADR   ABCLOAD   VB25 LOAD COMP 1,2,3 (R1,R2,R3)
 0819   REF   8  LAST  336       41,2202   62350 0                CADR   GODSPALM   VB26 SPARE
 0820   REF   1                  41,2203   63341 1                CADR   DSPFMEM    VB27 FIXED MEMORY DISPLAY
A0821                                                                               THE FOLLOWING VERBS MAKE NO NOUN TEST
 0822   REF   9  LAST  337       41,2204   62350 0                CADR   GODSPALM   VB28 SPARE
 0823   REF  10  LAST  337       41,2205   62350 0                CADR   GODSPALM   VB29 SPARE
 0824   REF   1                  41,2206   63433 0   REQEXLOC     CADR   VBRQEXEC   VB30 REQUEST EXECUTIVE
 0825   REF   1                  41,2207   63462 1                CADR   VBRQWAIT   VB31 REQUEST WAITLIST
 0826   REF   1                  41,2210   61323 1                CADR   VBRESEQ    VB32 RESEQUENCE
 0827   REF   1                  41,2211   61301 1                CADR   VBPROC     VB33 PROCEED WITHOUT DATA
 0828   REF   1                  41,2212   61307 1                CADR   VBTERM     VB34 TERMINATE CURRENT TEST OR LOAD REQ
 0829   REF   1                  41,2213   61432 0                CADR   VBTSTLTS   VB35 TEST LIGHTS
 0830   REF   1                  41,2214   12367 0                CADR   SLAP1      VB36 FRESH START
 0831   REF   2  LAST  334       41,2215   63376 0                CADR   MMCHANG    VB37 CHANGE MAJOR MODE
 0832   REF  11  LAST  337       41,2216   62350 0                CADR   GODSPALM   VB38 SPARE
 0833   REF  12  LAST  337       41,2217   62350 0                CADR   GODSPALM   VB39 SPARE


R0834   THE LIST2 VERBFAN IS LOCATED IN THE EXTENDED VERB BANK.
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PC835   NNADTAB CONTAINS A RELATIVE ADDRESS, IDADDREL(IN LOW 10 BITS), REFERRING
RC836   TO WHERE 3 CONSECUTIVE ADDRESSES ARE STORED (IN IDADDTAB).
RC837   MIXNOUN GETS DATA AND STORES IN MIXTEMP,+1,+2. IT SETS NOUNADD FOR
RC838    MIXTEMP.

 C839   REF   4  LAST  335   41,2220  10 146 0  MIXNOUN  CCS    NNADTEM
 C840                        41,2221   0 2225 0           TC     +4          +  IN USE
 C841   REF  13  LAST  337   41,2222   0 2350 0           TC     GODSPALM    +  NOT IN USE
 C842                        41,2223   0 2225 0           TC     +2          -  IN USE
 C843                        41,2224   0 2225 0           TC     +1          -  IN USE
 C844   REF  10  LAST  246   41,2225   4 6211 1           CS     SIX
 C845   REF  14  LAST  336   41,2226   6 1204 0           AD     VERBREG
 C846                        41,2227   0 0006 1           EXTEND
 C847                        41,2230   6 2232 0           BZMF   +2          VERB L/E 6
 C848   REF   6  LAST  336   41,2231   0 2133 1           TC     VERBFAN     AVOID MIXNOUN SWAP IF VB NOT = DISPLAY
 C849   REF   8  LAST  333   41,2232   3 4767 0           CAF    TWO
 C850   REF   1              41,2233  54 117 1  MIXNN1   TS     DECOUNT
 C851   REF   1              41,2234   6 2257 0           AD     MIXAD
 C852   REF   1              41,2235  54 145 0           TS     NOUNADD     SET NOUNADD TO MIXTEMP + K
 C853   REF   2  LAST  338   41,2236  50 117 0           INDEX  DECOUNT     GET IDADDTAB ENTRY FOR COMPONENT K
 C854   REF   2  LAST  282   41,2237   3 0150 0           CA     IDADITEM    OF NOUN.
 C855   REF   1              41,2240  54 122 1           TS     NOUNTEM
AC856                                                                      TEST FOR DP(FOR OCT DISPLAY). IF SO, GET
AC857                                                                       MINOR PART ONLY.
 C858   REF   1              41,2241   0 3033 1           TC     SFRUTMIX    GET SF ROUT NUMBER IN A
 C859   REF   1              41,2242   0 2260 1           TC     DPTEST
 C860   REF   1              41,2243   0 2245 0           TC     MIXNN2      NO DP
 C861   REF   2  LAST  338   41,2244  24 122 0           INCR   NOUNTEM     DP  GET MINOR PART
 C862   REF   3  LAST  338   41,2245   3 0122 0  MIXNN2   CA     NOUNTEM
 C863   REF   3  LAST  143   41,2246   7 4347 1           MASK   LOW11       ESUBK (NO DP)  OR (ESUBK)+1    FOR DP
 C864   REF   1              41,2247   0 4315 1           TC     SETEBANK    SET EBANK, LEAVE EADRES IN A.
 C865   REF  90  LAST  336   41,2250  50 000 1           INDEX  A           PICK UP C(ESUBK)  NOT DP
 C866                        41,2251   3 0000 1           CA     0           OR C((ESUBK)+1)  FOR DP MINOR PART
 C867   REF   2  LAST  338   41,2252  50 145 1           INDEX  NOUNADD
 C868                        41,2253  56 000 1           XCH    0           STORE IN MIXTEM + K
 C869   REF   3  LAST  338   41,2254  10 117 1           CCS    DECOUNT
 C870   REF   1              41,2255   0 2233 1           TC     MIXNN1
 C871   REF   7  LAST  338   41,2256   0 2133 1           TC     VERBFAN

 C872   REF   3  LAST  332   41,2257   0 0125 1  MIXAD    TC     MIXTEMP


RC873   DPTEST  ENTER WITH SF ROUT NUMBER IN A.
RC874           RETURNS TO L+1 IF NO DP.
RC875           RETURNS TO L+2 IF DP.

 C876   REF  91  LAST  338   41,2260  50 000 1  DPTEST   INDEX  A
 C877                        41,2261   1 2262 1           TCF    +1
 C878   REF  49  LAST  332   41,2262   0 0002 0           TC     Q           OCTAL ONLY  NO DP
 C879   REF  50  LAST  338   41,2263   0 0002 0           TC     Q           FRACT NO DP
```

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0880   REF  51  LAST  338   41,2264  0 0002 0            TC     Q          DEG  NO DP
0881   REF  52  LAST  339   41,2265  0 0002 0            TC     Q          ARITH  NO DP
0882   REF   1              41,2266  1 6706 1            TCF    DPTEST1    DP1OUT
0883   REF   2  LAST  339   41,2267  1 6706 1            TCF    DPTEST1    DP2OUT
0884   REF  53  LAST  339   41,2270  0 0002 0            TC     Q          DPDEG  NO DP
0885   REF   3  LAST  339   41,2271  1 6706 1            TCF    DPTEST1    DP3OUT
0886   REF  54  LAST  339   41,2272  0 0002 0            TC     Q          HMS   NO DP
0887   REF  55  LAST  339   41,2273  0 0002 0            TC     Q          M/S   NO DP
0888   REF   4  LAST  339   41,2274  1 6706 1            TCF    DPTEST1    DP4OUT
08881  REF  56  LAST  339   41,2275  0 0002 0            TC     Q          ARITH1   NO DP
08882  REF  57  LAST  339   41,2276  0 0002 0            TC     Q          2INTOUT  NO DP TO GET HI PART IN MPAC
08883  REF   5  LAST  339   41,2277  1 6706 1            TCF    DPTEST1    DPFRACOT
0889   REF   2  LAST  143      6706                DPTEST1 EQUALS Q+1
0891   REF   4  LAST  333   41,2300  3 4321 0  REQDATX   CAF    R1D1
0892   REF   1              41,2301  1 2305 1            TCF    REQCOM
0893   REF   2  LAST  331   41,2302  3 4322 0  REQDATY   CAF    R2D1
0894   REF   2  LAST  339   41,2303  1 2305 1            TCF    REQCOM
0895   REF   3  LAST  336   41,2304  3 4323 1  REQDATZ   CAF    R3D1
0896   REF  20  LAST  336   41,2305  55'202 1  REQCOM    TS     DSPCOUNT
0897   REF  58  LAST  339   41,2306  4 0002 1            CS     Q
0898   REF   9  LAST  334   41,2307  55'216 1            TS     REQRET
0899   REF  42  LAST  334   41,2310  0 4636 0            TC     BANKCALL
0900   REF   2  LAST  332   41,2311    60431 1           CADR   5BLANK
0901   REF   2  LAST  335   41,2312  0 4360 0            TC     FLASHON
0902   REF   2  LAST  335   41,2313  0 0136 0  ENDRQDAT  TC     ENTEXIT

09025  REF  74  LAST  336   41,2314  3 0157 1  -2        CA     MPAC +3
0903   REF   8  LAST  330   41,2315  55'205 0  -1        TS     NOUNREG
0904   REF  59  LAST  339   41,2316  56 002 0  UPDATNN   XCH    Q
0905   REF   1              41,2317  54 117 1            TS     UPDATRET
0906                        41,2320  0 0006 1            EXTEND
0907   REF   3  LAST  335   41,2321  3 2115 0            DCA    LODNNLOC   SWITCH BANKS TO NOUN TABLE READING
0908   REF   5  LAST  335   41,2322  52 006 0            DXCH   Z          ROUTINE.
0909   REF   5  LAST  338   41,2323  10 146 0            CCS    NNADTEM
0910   REF  24  LAST  336   41,2324  6 4770 0            AD     ONE        NORMAL
0911   REF   1              41,2325  1 2330 1            TCF    PUTADD
0912   REF   2  LAST  339   41,2326  1 2331 0            TCF    PUTADD +1  MCTBS  DONT CHANGE NOUNADD
0913   REF   3  LAST  339   41,2327  1 2331 0            TCF    PUTADD +1  MCTBI  DONT CHANGE NOUNADD
0914   REF   4  LAST  336   41,2330  0 4305 0  PUTADD    TC     SETNCADR   ECADR INTO NOUNCADR. SETS EB, NOUNADD.
0915   REF   2  LAST  330   41,2331  3 4352 1            CAF    ND1
0916   REF  21  LAST  339   41,2332  55'202 1            TS     DSPCOUNT
0917   REF   9  LAST  339   41,2333  3 1205 1            CA     NOUNREG
0918   REF   1              41,2334  1 2344 1            TCF    UPDAT1

09185  REF  75  LAST  339   41,2335  3 0160 0  -2        CA     MPAC +4
0919   REF  15  LAST  338   41,2336  55'204 1  -1        TS     VERBREG
0920   REF  60  LAST  339   41,2337  56 002 0  UPDATVB   XCH    Q
0921   REF   2  LAST  339   41,2340  54 117 1            TS     UPDATRET
0922   REF   3  LAST  330   41,2341  3 4351 1            CAF    VD1
0923   REF  22  LAST  339   41,2342  55'202 1            TS     DSPCOUNT
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0924  REF  16  LAST  339  41,2343  3 1204 0          CA    VERBREG
0925  REF  15  LAST  336  41,2344  0 4655 0  UPDAT1  TC    POSTJUMP     CANT USE SWCALL TO GO TO DSPDECVN,SINCE
0926  REF   1              41,2345   61156 1          CADR  GOVNUPDT     UPDATVB CAN ITSELF BE CALLED BY SWCALL.
0927  REF   3  LAST  339  41,2346  0 0117 0  +2      TC    UPDATRET

0928  REF   2  LAST  335  41,2347  0 4173 0  GOALMCYC TC     ALMCYCLE     NEEDED BECAUSE BANKJUMP CANT HANDLE F/F.

0929  REF  16  LAST  340  41,2350  0 4655 0  GODSPALM TC     POSTJUMP
0930  REF   2  LAST  336  41,2351   61261 0          CADR  DSPALARM
```

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PC931                NOUN   TABLES
RC932   NOUN CODE L/40, NORMAL NOUN CASE.  NOUN CODE G/E 40, MIXED NOUN CASE.
RC933   FOR NORMAL CASE, NNADTAB CONTAINS ONE       ECADR     FOR EACH NOUN.
RC934   +0 INDICATES NOUN NOT USED.   - ENTRY INDICATES MACHINE CADR(E OR F) TO
RC935   BE SPECIFIED. -1 INDICATES CHANNEL TO BE SPECIFIED. -0 INDICATES AUGMENT
RC936   OF LAST MACHINE CADR SUPPLIED.

RC937   FOR MIXED CASE, NNADTAB CONTAINS ONE INDIRECT ADDRESS(IDADDREL) IN LOW
RC938   10 BITS, AND THE COMPONENT CODE NUMBER IN THE HIGH 5 BITS.

RC939   NNTYPTAB IS A PACKED TABLE OF THE FORM MMMMMNNNNNPPPPP.

RC940   FOR THE NORMAL CASE, M-S ARE THE COMPONENT CODE NUMBER.
RC941                      N-S ARE THE SF ROUTINE CODE NUMBER.
RC942                      P-S ARE THE SF CONSTANT CODE NUMBER.

RC943   MIXED CASE,M-S ARE THE SF CONSTANT3 CODE NUMBER     3 COMPONENT CASE
RC944              N-S ARE THE SF CONSTANT2 CODE NUMBER
RC945              P-S ARE THE SF CONSTANT1 CODE NUMBER
RC946              N-S ARE THE SF CONSTANT2 CODE NUMBER     2 COMPONENT CASE
RC947              P-S ARE THE SF CONSTANT1 CODE NUMBER
RC948              P-S ARE THE SF CONSTANT1 CODE NUMBER      1 COMPONENT CASE

RC949   THERE IS ALSO AN INDIRECT ADDRESS TABLE(IDADDTAB) FOR MIXED CASE ONLY.
RC950   EACH ENTRY CONTAINS ONE ECADR.    IDADDREL IS THE RELATIVE ADDRESS OF
RC951   THE FIRST OF THESE ENTRIES.
RC952   THERE IS ONE ENTRY IN THIS TABLE FOR EACH COMPONENT OF A MIXED NOUN
RC953   THEY ARE LISTED IN ORDER OF ASCENDING K.

RC954   THERE IS ALSO A SCALE FACTOR ROUTINE NUMBER TABLE( RUTMXTAB ) FOR MIXED
RC955   CASE ONLY. THERE IS ONE ENTRY PER MIXED NOUN. THE FORM IS,
RC956         QQQQQRRRRRSSSSS
RC957   Q-S ARE THE SF ROUTINE 3 CODE NUMBER     3 COMPONENT CASE
RC958   R-S ARE THE SF ROUTINE 2 CODE NUMBER
RC959   S-S ARE THE SF ROUTINE 1 CODE NUMBER
RC960   R-S ARE THE SF ROUTINE 2 CODE NUMBER     2 COMPONENT CASE
RC961   S-S ARE THE SF ROUTINE 1 CODE NUMBER


RC962   IN OCTAL DISPLAY AND LOAD (OCT OR DEC) VERBS, EXCLUDE USE OF VERBS WHOSE
RC963   COMPONENT NUMBER IS GREATER THAN THE NUMBER OF COMPONENTS IN NOUN.
RC964   (ALL MACHINE ADDRESS TO BE SPECIFIED NOUNS ARE 3 COMPONENT.)


RC967   IN MULTI-COMPONENT LOAD VERBS, NO MIXING OF OCTAL AND DECIMAL DATA
RC968   COMPONENT WORDS IS ALLOWED. ALARM IF VIOLATION.

RC969   IN DECIMAL LOADS OF DATA, 5 NUMERICAL CHARACTERS MUST BE KEYED IN
RC970   BEFORE EACH ENTER. IF NOT, ALARM.
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P0971                DISPLAY  VERBS
 0972   REF    9  LAST  338   41,2352  4 4767 1  DSPABC   CS     TWO
 0973   REF    1                41,2353  0 2423 0          TC     COMPTEST
 0974   REF    3  LAST  338   41,2354  50 145 1          INDEX  NOUNADD
 0975                          41,2355  4 0002 1          CS     2
 0976   REF   36  LAST  317   41,2356  56 132 1          XCH    BUF      +2
 0977   REF   25  LAST  339   41,2357  4 4770 1  DSPAB   CS     ONE
 0978   REF    2  LAST  342   41,2360  0 2423 0          TC     COMPTEST
 0979   REF    4  LAST  342   41,2361  50 145 1          INDEX  NOUNADD
 0980                          41,2362  4 0001 1          CS     1
 0981   REF   37  LAST  342   41,2363  56 131 1          XCH    BUF      +1
 0982   REF   50  LAST  335   41,2364  4 4772 0  DSPA    CS     ZERO
 09825  REF    1                41,2365  0 2436 1          TC     DCOMPTST
 0983   REF    1                41,2366  0 2461 0          TC     TSTFORDP
 0984   REF    5  LAST  342   41,2367  50 145 1          INDEX  NOUNADD
 0985                          41,2370  4 0000 0          CS     0
 0986   REF    1                41,2371  0 2403 1          TC     DSPCOM1
 0988   REF   26  LAST  342   41,2372  4 4770 1  DSPB    CS     ONE
 0989   REF    2  LAST  342   41,2373  0 2436 1          TC     DCOMPTST
 0990   REF    6  LAST  342   41,2374  50 145 1          INDEX  NOUNADD
 0991                          41,2375  4 0001 1          CS     1
 0992   REF    2  LAST  342   41,2376  0 2403 1          TC     DSPCOM1
 0993   REF   10  LAST  342   41,2377  4 4767 1  DSPC    CS     TWO
 0994   REF    3  LAST  342   41,2400  0 2436 1          TC     DCOMPTST
 0995   REF    7  LAST  342   41,2401  50 145 1          INDEX  NOUNADD
 0996                          41,2402  4 0002 1          CS     2
 0997   REF   38  LAST  342   41,2403  56 130 0  DSPCOM1  XCH    BUF
 0998   REF   11  LAST  342   41,2404  4 4767 1  DSPCOM2  CS     TWO      A  B  C  AB  ABC
 0999   REF   17  LAST  340   41,2405  6 1204 0          AD     VERBREG  -1 -0 +1 +2  +3   IN A
 1000   REF   92  LAST  338   41,2406  10 000 0    +2    CCS    A        +0 +0 +0 +1  +2   IN A AFTER CCS
 1001   REF    1                41,2407  0 2412 1          TC     DSPCOM3
 1002   REF    3  LAST  339   41,2410  0 0136 0          TC     ENTEXIT
 1003                          41,2411  0 2412 1          TC     +1
 1004   REF    1                41,2412  54 122 1  DSPCOM3  TS     DISTEM   +0,+1,+2 INTO DISTEM
 1005   REF   93  LAST  342   41,2413  50 000 1          INDEX  A
 1006   REF    5  LAST  339   41,2414  3 4321 0          CAF    R1D1
 1007   REF   23  LAST  339   41,2415  55'202 1          TS     DSPCOUNT
 1008   REF    2  LAST  342   41,2416  50 122 0          INDEX  DISTEM
 1009   REF   39  LAST  342   41,2417  4 0130 1          CS     BUF
 1010   REF    2  LAST  336   41,2420  0 3351 0          TC     DSPOCTWD
 1011   REF    3  LAST  342   41,2421  56 122 0          XCH    DISTEM
 1012   REF    1                41,2422  0 2406 1          TC     DSPCOM2 +2

R1013   COMPTEST ALARMS IF COMPONENT NUMBER OF VERB(LOAD OR OCT DISPLAY) IS
R1014   GREATER THAN THE HIGHEST COMPONENT NUMBER OF NOUN.
 1016   REF    4  LAST  283   41,2423  54 123 0  COMPTEST TS     SFTEMP1  - VERB COMP
 1017   REF   61  LAST  339   41,2424  22 002 0          LXCH   Q
 1022   REF    1                41,2425  0 2510 1  COMPTST1 TC     GETCOMP
 1023   REF    1                41,2426  0 4333 0          TC     LEFT5
 1024   REF   11  LAST  334   41,2427  7 6214 1          MASK   THREE    NOUN COMP
```

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1025  REF   5  LAST  342   41,2430  6 0123 1            AD      SFTEMP1        NOUN COMP - VERB COMP
1026  REF  94  LAST  342   41,2431  10 000 0            CCS     A
1027  REF  33  LAST  333   41,2432  0 0001 0            TC      L              NOUN COMP G/ VERB COMP
1028  REF   1               41,2433   04151 0  MONBACK  ADRES   PASTEVB        CANNOT GET HERE
1029  REF  14  LAST  338   41,2434  0 2350 0            TC      GODSPALM       NOUN COMP L/ VERB COMP
1030  REF  34  LAST  343   41,2435  0 0001 0  NDCMPTST  TC      L              NOUN COMP = VERB COMP


R1031 DCOMPTST ALARMS IF DECIMAL ONLY BIT (BIT4 OF COMP CODE NUMBER) = 1.
R1032 IF NOT, IT PERFORMS REGULAR COMPTEST.
1033  REF   6  LAST  343   41,2436  54 123 0  DCOMPTST TS      SFTEMP1        - VERB COMP
1034  REF  62  LAST  342   41,2437  22 002 0            LXCH    Q
1039  REF   2  LAST  342   41,2440  0 2510 1            TC      GETCOMP
1040  REF  21  LAST  262   41,2441  7 4753 0            MASK    BIT14
1041  REF  95  LAST  343   41,2442  10 000 0            CCS     A
1042  REF  15  LAST  343   41,2443  0 2350 0            TC      GODSPALM
1043  REF   1               41,2444  0 2425 0            TC      COMPTST1
1044  REF  63  LAST  343   41,2445  22 002 0  DCTSTCYC  LXCH    Q              ALARMS AND RECYCLES IF DEC ONLY BIT = 1
1045  REF   3  LAST  343   41,2446  0 2510 1            TC      GETCOMP        ( BIT4 OF COMP CODE NUMBER). RETURNS
1046  REF  22  LAST  343   41,2447  7 4753 0            MASK    BIT14          IF NOT.  USED BY LOAD VERBS.
1047  REF  96  LAST  343   41,2450  10 000 0            CCS     A
1048  REF   3  LAST  340   41,2451  0 4173 0            TC      ALMCYCLE
1049  REF  35  LAST  343   41,2452  0 0001 0            TC      L
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R1050 NOUNTEST ALARMS IF NO-LOAD BIT (BIT5 OF COMP CODE NUMBER) = 1.
R1051 IF NOT, IT RETURNS.
1052  REF  64  LAST  343   41,2453  22 002 0  NOUNTEST LXCH    Q
1053  REF   4  LAST  343   41,2454  0 2510 1            TC      GETCOMP
1054  REF  97  LAST  343   41,2455  10 000 0            CCS     A
1055  REF  36  LAST  343   41,2456  0 0001 0            TC      L
1056  REF  37  LAST  343   41,2457  0 0001 0            TC      L
1057  REF  16  LAST  343   41,2460  0 2350 0            TC      GODSPALM


1058  REF  65  LAST  343   41,2461  22 002 0  TSTFORDP  LXCH    Q              TEST FOR DP. IF SO, GET MINOR PART ONLY.
1059  REF   6  LAST  339   41,2462  3 0146 1            CA      NNADTEM
1060  REF  27  LAST  342   41,2463  6 4770 0            AD      ONE            IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
1061                       41,2464  0 0006 1            EXTEND
1062  REF   1               41,2465  1 2477 0            BZF     CHANDSP
1063  REF   4  LAST  335   41,2466  50 140 1            INDEX   MIXBR
1064                       41,2467  0 2467 0            TC      +0
1065                       41,2470  0 2472 1            TC      +2             NORMAL
1066  REF  38  LAST  343   41,2471  0 0001 0            TC      L              MIXED CASE ALREADY HANDLED IN MIXNOUN
1067  REF   1               41,2472  0 3025 0            TC      SFRUTNOR
1068  REF   2  LAST  338   41,2473  0 2260 1            TC      DPTEST
1069  REF  39  LAST  343   41,2474  0 0001 0            TC      L              NO DP
1070  REF   8  LAST  342   41,2475  24 145 1            INCR    NOUNADD        DP    E+1 INTO NOUNADD FOR MINOR PART.
1071  REF  40  LAST  343   41,2476  0 0001 0            TC      L
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1072   REF   3  LAST  336   41,2477  3 1222 1  CHANDSP  CA     NOUNCADR
1073   REF   2  LAST  160   41,2500  7 5021 0           MASK   LOW9
1731                        41,2501  0 0006 1           EXTEND
1732   REF  98  LAST  343   41,2502  5 0000 1           INDEX  A
1074                        41,2503  00 000 1           READ   0
1075   REF  99  LAST  344   41,2504  4 0000 0           CS     A
1076   REF   3  LAST  342   41,2505  1 2403 0           TCF    DSPCOM1


1077   REF   2  LAST  282   41,2506    00147 0  COMPICK  ADRES  NNTYPTEM
1078   REF   7  LAST  343   41,2507    00146 1           ADRES  NNADTEM

1079   REF   5  LAST  343   41,2510  50 140 1  GETCOMP  INDEX  MIXBR          NORMAL                    MIXED
1080   REF   1              41,2511  3 2505 0           CAF    COMPICK -1     ADRES NNTYPTEM            ADRES NNADTEM
1081   REF 100  LAST  344   41,2512  50 000 1           INDEX  A
1082                        41,2513  3 0000 1           CA     0              C(NNTYPTEM)               C(NNADTEM)
1083   REF   4  LAST  221   41,2514  7 4344 1           MASK   HI5            GET HI5 OF NNTYPTAB(NORM) OF NNADTAB(MIX)
1084   REF  66  LAST  343   41,2515  0 0002 0           TC     Q


1085   REF   5  LAST  343   41,2516  0 2510 1  DECDSP   TC     GETCOMP
1086   REF   2  LAST  342   41,2517  0 4333 0           TC     LEFT5
1087   REF  12  LAST  342   41,2520  7 6214 1           MASK   THREE
1088   REF   4  LAST  338   41,2521  54 117 1           TS     DECOUNT        COMP NUMBER INTO DECOUNT
1089   REF   1              41,2522  54 122 1  DSPDCGET TS     DECTEM         PICKS UP DATA
1090   REF   9  LAST  343   41,2523  6 0145 1           AD     NOUNADD        DECTEM  1COMP +0, 2COMP +1, 3COMP +2
1091   REF 101  LAST  344   41,2524  50 000 1           INDEX  A
1092                        41,2525  4 0000 0           CS     0
1093   REF   2  LAST  344   41,2526  50 122 0           INDEX  DECTEM
1094   REF   2  LAST  283   41,2527  57'206 1           XCH    XREG           CANT USE BUF SINCE DMP USES IT.
1095   REF   3  LAST  344   41,2530  10 122 1           CCS    DECTEM
1096   REF   1              41,2531  0 2522 0           TC     DSPDCGET       MORE TO GET
1097   REF  51  LAST  342   41,2532  3 4772 1  DSPDCPUT CAF    ZERO           DISPLAYS DATA
1098   REF  76  LAST  339   41,2533  54 155 1           TS     MPAC    +1     DECOUNT 1COMP +0, 2COMP +1, 3COMP +2
1099   REF  77  LAST  344   41,2534  54 156 1           TS     MPAC    +2
1100   REF   5  LAST  344   41,2535  50 117 0           INDEX  DECOUNT
1101   REF   6  LAST  342   41,2536  3 4321 0           CAF    R1D1
1102   REF  24  LAST  342   41,2537  55'202 1           TS     DSPCOUNT
1103   REF   6  LAST  344   41,2540  50 117 0           INDEX  DECOUNT
1104   REF   3  LAST  344   41,2541  4 1206 0           CS     XREG
1105   REF  78  LAST  344   41,2542  54 154 0           TS     MPAC
1106   REF   1              41,2543  0 3042 1           TC     SFCONUM        2X( SF CON NUMB ) IN A
1107   REF   7  LAST  343   41,2544  54 123 0           TS     SFTEMP1
1108                        41,2545  0 0006 1           EXTEND                SWITCH BANKS TO SF CONSTANT TABLE
1109   REF   1              41,2546  3 2560 0           DCA    GTSFOUTL          READING ROUTINE.
1110   REF   6  LAST  339   41,2547  52 006 0           DXCH   Z              LOADS SFTEMP1, SFTEMP2.
1111   REF   6  LAST  344   41,2550  50 140 1           INDEX  MIXBR
1112                        41,2551  0 2551 1           TC     +0
1113   REF   1              41,2552  0 2555 0           TC     DSPSFNOR
1114   REF   2  LAST  338   41,2553  0 3033 1           TC     SFROTMIX
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1115   REF   1                 41,2554  0 2570 1             TC      DECDSP3

1116   REF   2  LAST  343      41,2555  0 3025 0  DSPSFNOR   TC      SFRUTNOR
1117   REF   2  LAST  345      41,2556  0 2570 1             TC      DECDSP3

1118   REF  25  LAST  344        1202                       EBANK=  DSPCOUNT
1119   REF   1                 41,2557    02114 1  GTSFOUTL 2CADR   GTSFOUT
1119   REF   1                 41,2560    64102 0

1120   REF  43  LAST  339      41,2561  0 4636 0  DSPDCEND   TC      BANKCALL        ALL SFOUT ROUTINES END HERE
1121   REF   1                 41,2562    61072 0             CADR    DSPDECWD
1122   REF   7  LAST  344      41,2563  10 117 1    +2       CCS     DECOUNT
1123                           41,2564  0 2566 0             TC      +2
1124   REF   4  LAST  342      41,2565  0 0136 0             TC      ENTEXIT
1125   REF   8  LAST  345      41,2566  54 117 1             TS      DECOUNT
1126   REF   1                 41,2567  0 2532 1             TC      DSPDCPUT        MORE TO DISPLAY

1127   REF 102  LAST  344      41,2570  50 000 1  DECDSP3    INDEX   A
1128   REF   1                 41,2571  3 2573 1             CAF     SFOUTABR
1129   REF   3  LAST  336      41,2572  0 4660 0             TC      BANKJUMP

1130   REF   1                 41,2573    61260 1  SFOUTABR CADR    PREDSPAL        ALARM IF DEC DISP WITH OCTAL ONLY NOUN
1131   REF   1                 41,2574    62561 1             CADR    DSPDCEND
1132   REF   1                 41,2575    60531 0             CADR    DEGOUTSF
1133   REF   1                 41,2576    60563 1             CADR    ARTOUTSF
1134   REF   1                 41,2577    60574 1             CADR    DP1OUTSF
1135   REF   1                 41,2600    60601 0             CADR    DP2OUTSF
1136   REF   1                 41,2601    60505 1             CADR    DPDEGOUT
1137   REF   1                 41,2602    60603 1             CADR    DP3OUTSF
1138   REF   1                 41,2603    65137 1             CADR    HMSOUT
1139   REF   1                 41,2604    65212 0             CADR    M/SOUT
1140   REF   2  LAST  345      41,2605    60601 0             CADR    DP2OUTSF
11401  REF   1                 41,2606    60570 0             CADR    ARDUT1SF
11402  REF   1                 41,2607    60616 0             CADR    2INTOUT
11403  REF   1                 41,2610    60633 1             CADR    DPFRACOT
R1142          THE FOLLOWING IS ATYPICAL SF ROUTINE . IT USES MPAC. LEAVES RESU
R1143  LTS IN MPAC, MPAC+1. ENDS WITH TC DSPDCEND

1144   REF   2  LAST  326      40,2000                      SETLOC  PINBALL1
11441                           40,2505                      BANK
11445  REF   2 LAST  326 TO  334:   325   325*              COUNT*  $$/PIN
R1153  DPDEGOUT SCALES BY .45 (THE RANGE IS 90 DEGREES) AND ADDS A 20 DEG BIAS.

1154   REF  79  LAST  344      40,2505  10 154 0  DPDEGOUT  CCS     MPAC            RANGE IS 90 DEG
1155   REF  80  LAST  345      40,2506  56 154 1             XCH     MPAC            IF POS OR POS 0 THEN ADD BIAS AND
1156                           40,2507  0 2512 0             TC      +3              CORRECT FOR POSSIBLE OVERFLOW
1157   REF   1                 40,2510  0 2521 0             TC      NEGOPT          IF NEG NON ZERO
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1158   REF   4  LAST  332   40,2511  6 7702 0          AD     NEG1      IF NEG ZERO SUBTRACT 1
1159   REF   1                40,2512  6 2562 1          AD     20BIAS
1160   REF  81  LAST  345   40,2513  54 154 0  BIASCOM  TS     MPAC      TEST FOR OVERFLOW
1161                         40,2514  0 2517 0          TC     +3        NO OVFLOW
1162   REF  25  LAST  335   40,2515  3 4752 0          CAF    BIT15     IF OVFLOW
1163   REF  82  LAST  346   40,2516  26 154 0          ADS    MPAC
1164   REF  12  LAST  342   40,2517  3 4767 0          CAF    TWO       SET MULTIPLIER TO .45
1165   REF   2  LAST  345   40,2520  0 2532 1          TC     DEGOUTSF +1

1166   REF  83  LAST  346   40,2521  56 154 1  NEGOPT   XCH    MPAC      NEGATIVE CASE
1167   REF   2  LAST  346   40,2522  6 2562 1          AD     20BIAS
1168   REF 103  LAST  345   40,2523  10 000 0          CCS    A
1169   REF   1                40,2524  0 2513 1          TC     BIASCOM   IF POS THEN SUBTRACT 1 BECAUSE OF 2SCOM
1170                         40,2525   71527 1  NEG.2    OCT    -06250    =.197753906 TRUN BIAS (CANNOT GET HERE)
1171   REF  28  LAST  343   40,2526  6 4770 0          AD     ONE       IF NEG RESTORE SUM
1172                         40,2527  4 0000 0          COM              IF NEG 0 LEAVE NEG 0
1173   REF   2  LAST  346   40,2530  0 2513 1          TC     BIASCOM

R1174      DEGOUTSF SCALES BY .18 THE LOW 14 BITS OF ANGLE, ADDING .18 FOR
R11745 NUMBERS IN THE NEGATIVE (AGC) RANGE
1175   REF  52  LAST  344   40,2531  3 4772 1  DEGOUTSF CAF    ZERO
1176   REF  84  LAST  346   40,2532  54 156 1    +1     TS     MPAC +2   SET INDEX FOR FULL SCALE
1177   REF  85  LAST  346   40,2533  10 154 0          CCS    MPAC
1178   REF   1                40,2534  1 2546 0          TCF    DEGCOM    NO AUGMENT NEEDED (SFTEMP1,SFTEMP2 ARE 0
1179   REF   2  LAST  346   40,2535  1 2546 0          TCF    DEGCOM    MPAC IS +)
1180                         40,2536  1 2537 0          TCF    +1
1181   REF  26  LAST  346   40,2537  4 4752 1          CS     BIT15     MPAC IS -, MASK OUT SIGN BIT AND ADD
1182   REF  86  LAST  346   40,2540  7 0154 0          MASK   MPAC      AUGMENTER ACCORDING TO C(MPAC +2)
1183   REF  87  LAST  346   40,2541  54 154 0          TS     MPAC
1184                         40,2542  0 0006 1          EXTEND
1185   REF  88  LAST  346   40,2543  5 0156 0          INDEX  MPAC +2
1186   REF   1                40,2544  3 2557 1          DCA    DEGTAB    LOAD SFTEMP1,SFTEMP2 WITH DP AUGMENTER
1187   REF   8  LAST  344   40,2545  52 124 1          DXCH   SFTEMP1   CONSTANT
1188                         40,2546  0 0006 1  DEGCOM   EXTEND           LOADS MULTIPLIER , DOES SHORTMP, AND
1189   REF  89  LAST  346   40,2547  5 0156 0          INDEX  MPAC   +2   ADDS AUGMENTER.
1190   REF   2  LAST  346   40,2550  3 2557 1          DCA    DEGTAB
1191   REF  90  LAST  346   40,2551  52 155 1          DXCH   MPAC      ADJUSTED ANGLE IN A
1192   REF   4  LAST  328   40,2552  0 7256 1          TC     SHORTMP
1193   REF   9  LAST  346   40,2553  52 124 1          DXCH   SFTEMP1
1194   REF  91  LAST  346   40,2554  20 155 1          DAS    MPAC
1195   REF   1                40,2555  0 2566 0          TC     SCOUTEND


1196                         40,2556   05605 1  DEGTAB   OCT    05605     HI PART OF    .18
1197                         40,2557   03656 1          OCT    03656     LOW PART OF   .18
1198                         40,2560   16314 0          OCT    16314     HI PART OF    .45
1199                         40,2561   31463 1          OCT    31463     LO PART OF    .45

1200                         40,2562   16040 1  20BIAS   OCT    16040     20 DEG BIAS FOR OPTICS
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1201   REF  10  LAST  346   40,2563  52 124 1  ARTOUTSF DXCH  SFTEMP1        ASSUMES POINT AT LEFT OF DP SECON
1202   REF  92  LAST  346   40,2564  52 155 1           DXCH  MPAC
1203   REF   1              40,2565  0 4403 1           TC    PRSHRTMP      IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
1204   REF  17  LAST  340   40,2566  0 4655 0  SCOUTEND TC    POSTJUMP
1205   REF   2  LAST  345   40,2567   62561 1           CADR  DSPDCEND

12051  REF  11  LAST  347   40,2570  52 124 1  AROUT1SF DXCH  SFTEMP1        ASSUMES POINT BETWEEN HI AND LO PARTS OF
12052  REF  93  LAST  347   40,2571  52 155 1           DXCH  MPAC            DP SFCON. SHIFTS RESULTS LEFT 14, BY
12053  REF   2  LAST  347   40,2572  0 4403 1           TC    PRSHRTMP      TAKING RESULTS FROM MPAC+1, MPAC+2.
12054  REF   1              40,2573  0 2575 1           TC    L14/OUT

1206   REF   1              40,2574  0 2607 1  DP1OUTSF TC    DPOUT         SCALES MPAC, MPAC +1 BY DP SCALE FACTOR
1207   REF  94  LAST  347   40,2575  56 156 0  L14/OUT  XCH   MPAC    +2    IN SFTEMP1, SFTEMP2. THEN SCALE RESULT
1208   REF  95  LAST  347   40,2576  56 155 0           XCH   MPAC    +1    BY B14.
1209   REF  96  LAST  347   40,2577  54 154 0           TS    MPAC
1210   REF   2  LAST  346   40,2600  0 2566 0           TC    SCOUTEND

1211   REF   2  LAST  347   40,2601  0 2607 1  DP2OUTSF TC    DPOUT         SCALES MPAC , MPAC +1 BY DP SCALE FACTOR
1212   REF   3  LAST  347   40,2602  0 2566 0           TC    SCOUTEND

1213   REF   3  LAST  347   40,2603  0 2607 1  DP3OUTSF TC    DPOUT         ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
1214   REF  11  LAST  338   40,2604  3 6211 0           CAF   SIX           LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1.
1215   REF   1              40,2605  0 3034 0           TC    TPLEFTN       SHIFT LEFT 7.
1216   REF   4  LAST  347   40,2606  0 2566 0           TC    SCOUTEND

12165  REF  97  LAST  347     0162             MPAC+6   =     MPAC +6       USE MPAC +6 INSTEAD OF OVFIND

1217   REF  67  LAST  344   40,2607  56 002 0  DPOUT    XCH   Q
1218   REF   1              40,2610  54 162 0           TS    MPAC+6
1219   REF   1              40,2611  0 2635 0           TC    READLO        GET FRESH DATA FOR BOTH HI AND LO.
1220   REF   1              40,2612  0 7226 0           TC    TPAGREE       MAKE DP DATA AGREE
1221   REF   2  LAST  328   40,2613  0 7052 1           TC    DMP
1222   REF  12  LAST  347   40,2614    00123 1          ADRES SFTEMP1
1223   REF   2  LAST  347   40,2615  0 0162 1           TC    MPAC+6
R12231 THE FOLLOWING ROUTINE DISPLAYS TWO CONTIGUOUS SP POSITIVE INTEGERS
R12232 AS TWO POSITIVE DECIMAL INTEGERS IN RXD1-RXD2 AND RXD4-RXD5 (RXD3 IS
R12233 BLANKED). THE INTEGER IN THE LOWER NUMBERED ADDRESS IS DISPLAYED IN
R12234 RXD1-RXD2.

12235  REF   3  LAST  339   40,2616  0 2431 0  2INTOUT  TC    5BLANK        TO BLANK RXD3
122355 REF   2  LAST  330   40,2617  0 2310 1           TC    +ON           TURN ON + SIGN
12236  REF  98  LAST  347   40,2620  3 0154 1           CA    MPAC
12237  REF   1              40,2621  0 3146 1           TC    DSPDECVN      DISPLAY 1ST INTEGER (LIKE VERB AND NOUN)
122371 REF  13  LAST  344   40,2622  4 6214 1           CS    THREE
122372 REF   9  LAST  345   40,2623  50 117 0           INDEX DECOUNT
122373 REF   7  LAST  344   40,2624  6 4321 0           AD    R1D1          RXD4
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122374 REF  26 LAST 345  40,2625  55'202 1          TS    DSPCOUNT
122375 REF   2 LAST 347  40,2626  0 2635 0          TC    READLO          GET 2ND INTEGER
122376 REF  99 LAST 347  40,2627  3 0155 0          CA    MPAC +1
122377 REF   2 LAST 347  40,2630  0 3146 1          TC    DSPDECVN        DISPLAY 2ND INTEGER (LIKE VERB AND NOUN)
122378 REF  18 LAST 347  40,2631  0 4655 0          TC    POSTJUMP
122379 REF   3 LAST 347  40,2632   62563 0          CADR  DSPDCEND +2


12238  REF   3 LAST 348  40,2633  0 2635 0 DPFRACOT TC    READLO          DP FRACTION TO MPAC,+1
122381 REF   5 LAST 347  40,2634  0 2566 0          TC    SCOUTEND


R1224  READLO PICKS UP FRESH DATA FOR BOTH HI AND LO AND LEAVES IT IN
R1225  MPAC, MPAC+1. THIS IS NEEDED FOR TIME DISPLAY. IT ZEROES MPAC+2, BUT
R1226  DOES NOT FORCE TPAGREE.

 1227  REF  68 LAST 347  40,2635  56 002 0 READLO  XCH   Q
 1228  REF   6 LAST  72  40,2636  54 144 1          TS    TEM4
 1229  REF   7 LAST 344  40,2637  50 140 1          INDEX MIXBR
 1230                    40,2640  0 2640 1          TC    +0
 1231  REF   1           40,2641  0 2655 0          TC    RDLONOR
 1232  REF  10 LAST 347  40,2642  50 117 0          INDEX DECOUNT
 1233  REF   3 LAST 338  40,2643  3 0150 0          CA    IDADITEM        GET IDADDTAB ENTRY FOR COMP K OF NOUN.
 1234  REF   4 LAST 338  40,2644  7 4347 1          MASK  LOW11           E SUBK
 1235  REF   2 LAST 338  40,2645  0 4315 1          TC    SETEBANK        SET EB, LEAVE EADRES IN A.
 1236                    40,2646  0 0006 1 READLO1  EXTEND                MIXED           NORMAL
 1237  REF 104 LAST 346  40,2647  5 0000 1          INDEX A               C(ESUBK)        C(E)
 1238                    40,2650  3 0001 0          DCA   0               C((E SUBK)+1)       C(E+1)
 1239  REF 100 LAST 348  40,2651  52 155 1          DXCH  MPAC
 1240  REF  53 LAST 346  40,2652  3 4772 1          CAF   ZERO
 1241  REF 101 LAST 348  40,2653  54 156 1          TS    MPAC    +2
 1242  REF   7 LAST 348  40,2654  0 0144 0          TC    TEM4

 1243  REF  10 LAST 344  40,2655  3 0145 1 RDLONOR  CA    NOUNADD         E
 1244  REF   1           40,2656  0 2646 1 ENDRDLO  TC    READLO1


124501 REF   2 LAST 282  42,2000                   SETLOC PINBALL3
124502                   42,3137                   BANK

 12455 REF   1                                     COUNT* $$/PIN
 1246  REF  44 LAST 345  42,3137  0 4636 0 HMSOUT  TC    BANKCALL        READ FRESH DATA FOR HI AND LO INTO MPAC,
 1247  REF   4 LAST 348  42,3140   60635 1          CADR  READLO          MPAC+1.
 1248  REF   2 LAST 347  42,3141  0 7226 0          TC    TPAGREE         MAKE DP DATA AGREE
 1249  REF   1           42,3142  0 3326 0          TC    SEPSECNR        LEAVE FRACT SEC/60 IN MPAC, MPAC+1.LEAVE
A1250                                                                    WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
 1251  REF   3 LAST 347  42,3143  0 7052 1          TC    DMP             USE ONLY FRACT SEC/60 MOD 60
 1252  REF   1           42,3144   03200 0          ADRES SECON2          MULT BY .06
 1253  REF   4 LAST 339  42,3145  3 4323 1          CAF   R3D1            GIVES CENTI-SEC/10EXP5 MOD 60
 1254  REF  27 LAST 348  42,3146  55'202 1          TS    DSPCOUNT
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1255   REF  45  LAST  348   42,3147  0 4636 0          TC      BANKCALL        DISPLAY SEC MOD 60
1256   REF   2  LAST  345   42,3150   61072 0          CADR    DSPDECWD
1257   REF   1               42,3151  0 3344 1          TC      SEPMIN          REMOVE REST OF SECONDS
1258   REF   1               42,3152  3 3202 1          CAF     MINCON2         LEAVE FRACT MIN/60 IN MPAC+1. LEAVE
1259   REF 102  LAST  348   42,3153  56 154 1          XCH     MPAC            WHOLE HOURS IN MPAC.
1260   REF   1               42,3154  55'212 0          TS      HITEMOUT        SAVE WHOLE HOURS.
1261   REF   2  LAST  349   42,3155  3 3203 0          CAF     MINCON2 +1
1262   REF 103  LAST  349   42,3156  56 155 0          XCH     MPAC    +1      USE ONLY FRACT MIN/60 MOD 60
1263   REF   3  LAST  347   42,3157  0 4403 1          TC      PRSHRTMP        IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
A1264                                                                          MULT BY .0006
1265   REF   3  LAST  339   42,3160  3 4322 0          CAF     R2D1            GIVES MIN/10EXP5 MOD 60
1266   REF  28  LAST  348   42,3161  55'202 1          TS      DSPCOUNT
1267   REF  46  LAST  349   42,3162  0 4636 0          TC      BANKCALL        DISPLAY MIN MOD 60
1268   REF   3  LAST  349   42,3163   61072 0          CADR    DSPDECWD
1269                         42,3164  0 0006 1          EXTEND                  MINUTES, SECONDS HAVE BEEN REMOVED
1270   REF   1               42,3165  3 3207 1          DCA     HRCON1
1271   REF 104  LAST  349   42,3166  52 155 1          DXCH    MPAC
1272   REF   2  LAST  349   42,3167  3 1212 1          CA      HITEMOUT        USE WHOLE HOURS
1273   REF   4  LAST  349   42,3170  0 4403 1          TC      PRSHRTMP        IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
A1274                                                                          MULT BY .16384
1275   REF   8  LAST  347   42,3171  3 4321 0          CAF     R1D1            GIVES HOURS/10EXP5
1276   REF  29  LAST  349   42,3172  55'202 1          TS      DSPCOUNT
1277   REF  47  LAST  349   42,3173  0 4636 0          TC      BANKCALL        USE REGULAR DSPDECWD, WITH ROUND OFF.
1278   REF   4  LAST  349   42,3174   61072 0          CADR    DSPDECWD
1279   REF   5  LAST  345   42,3175  0 0136 0          TC      ENTEXIT

1280                         42,3176   25660 0  SECON1  2DEC*  1.666666666 E-4 B12*  2EXP12/6000
1280                         42,3177   31742 1
1281                         42,3200   01727 1  SECON2  OCT     01727           .06 FOR SECONDS DISPLAY
1282                         42,3201   01217 1          OCT     01217
1283                         42,3202   00011 1  MINCON2 OCT     00011           .0006 FOR MINUTES DISLPAY
1284                         42,3203   32445 0    +1    OCT     32445
1285                         42,3204   02104 0  MINCON1 OCT     02104           .066..66 UPPED BY 2EXP-28
1286                         42,3205   10422 1          OCT     10422
1287                         42,3206   05174 0  HRCON1  2DEC    .16384
1287                         42,3207   13261 0
1288                         42,3210   00000 1    -1    OCT     00000
1289                         42,3211   00062 0  RNDCON  DEC     50              *** USED DP WITH PRECEDING ZERO ***
1290   REF  48  LAST  349   42,3212  0 4636 0  M/SOUT  TC      BANKCALL        READ FRESH DATA FOR HI AND LO INTO MPAC,
1291   REF   5  LAST  348   42,3213   60635 1          CADR    READLO          MPAC+1.
1292   REF   3  LAST  348   42,3214  0 7226 0          TC      TPAGREE         MAKE DP DATA AGREE
1293   REF 105  LAST  349   42,3215  10 154 0          CCS     MPAC            IF MAG OF (MPAC, MPAC+1) G/ 59 M 59 S,
1294                         42,3216  0 3220 1          TC      +2              DISPLAY 59859, WITH PROPER SIGN.
1295   REF   1               42,3217  0 3251 1          TC      M/SNORM         MPAC = +0. L/ 59M58.5S
1296   REF   1               42,3220  6 3306 1          AD      M/SCON1         - HI PART OF (59M58.5S) +1  FOR CCS
1297   REF 105  LAST  348   42,3221  10 000 0          CCS     A               MAG OF MPAC - HI PART OF (59M58.5S)
1298   REF   1               42,3222  0 3235 0          TC      M/SLIMIT        G/ 59M58.5S
1299   REF   2  LAST  349   42,3223  0 3251 1          TC      M/SNORM         ORIGINAL MPAC = -0. L/ 59M58.5S
1300   REF   3  LAST  349   42,3224  0 3251 1          TC      M/SNORM         L/ 59M58.5S
1301   REF 106  LAST  349   42,3225  10 155 1          CCS     MPAC    +1      MAG OF MPAC = HI PART OF 59M58.5S
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1302                                42,3226  0 3230 0                TC      +2
1303   REF   4  LAST  349           42,3227  0 3251 1                TC      M/SNORM         MPAC+1 = +0. L/ 59M58.5S
1304   REF   1                      42,3230  6 3307 0                AD      M/SCON2         - LO PART OF (59M58.5S) +1  FOR CCS
1305   REF 106  LAST  349           42,3231 10 000 0                CCS     A               MAG OF MPAC+1 - LO PART OF (59M58.5S)
1306   REF   2  LAST  349           42,3232  0 3235 0                TC      M/SLIMIT        G/ 59M58.5S
1307   REF   5  LAST  350           42,3233  0 3251 1                TC      M/SNORM         ORIGINAL MPAC+1 = -0. L/ 59M58.5S
1308   REF   6  LAST  350           42,3234  0 3251 1                TC      M/SNORM         L/ 59M58.5S
1309   REF 107  LAST  349           42,3235 10 154 0        M/SLIMIT CCS     MPAC            = 59M58.5S    LIMIT
1310   REF   1                      42,3236  3 3311 1                CAF     M/SCON3         MPAC CANNOT BE +/- 0 AT THIS POINT.
1311   REF   1                      42,3237  0 3246 1                TC      +LIMIT          FORCE MPAC, MPAC+1 TO +/- 59M59.5S
1312   REF   2  LAST  350           42,3240  4 3311 0                CS      M/SCON3
1313   REF 108  LAST  350           42,3241 54 154 0                TS      MPAC            WILL DISPLAY 59M59S IN DSPDECNR
1314   REF   3  LAST  350           42,3242  4 3312 0                CS      M/SCON3 +1
1315   REF 109  LAST  350           42,3243 54 155 1        LIMITCOM TS     MPAC    +1
1316   REF   1                      42,3244  3 3310 0                CAF     NORMADR         SET RETURN TO M/SNORM+1.
1317   REF   2  LAST  348           42,3245  0 3327 1                TC      SEPSECNR +1
1318   REF 110  LAST  350           42,3246 54 154 0        +LIMIT   TS      MPAC
1319   REF   4  LAST  350           42,3247  3 3312 1                CAF     M/SCON3 +1
1320   REF   1                      42,3250  0 3243 1                TC      LIMITCOM
1321   REF   1                      42,3251  0 3313 0        M/SNORM  TC      SEPSEC          LEAVE FRACT SEC/60 IN MPAC,MPAC+1. LEAVE
A1322                                                                                           WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
1323   REF   1                      42,3252  3 3304 0          +1     CAF     HISECON         USE ONLY FRACT SEC/60 MOD 60
1324   REF   5  LAST  346           42,3253  0 7256 1                TC      SHORTMP         MULT BY .6 + 2EXP-14
1325   REF  14  LAST  347           42,3254  4 6214 1                CS      THREE           GIVES SEC/100 MOD 60
1326   REF  30  LAST  349           42,3255 27'202 1                ADS     DSPCOUNT        DSPCOUNT ALREADY SET TO RXD1
1327   REF  49  LAST  349           42,3256  0 4636 0                TC      BANKCALL        DISPLAY SEC MOD 60 IN D4D5.
1328   REF   1                      42,3257  61126 0                CADR    DSPDC2NR
1329   REF  54  LAST  348           42,3260  3 4772 1                CAF     ZERO
1330   REF   4  LAST  332           42,3261 54 124 1                TS      CODE
1331   REF  13  LAST  346           42,3262  4 4767 1                CS      TWO
1332   REF  11  LAST  348           42,3263 50 117 0                INDEX   DECOUNT
1333   REF   9  LAST  349           42,3264  6 4321 0                AD      R1D1            RXD3
1334   REF   2  LAST  332           42,3265 54 143 0                TS      COUNT
1335   REF  50  LAST  350           42,3266  0 4636 0                TC      BANKCALL        BLANK MIDDLE CHAR
1336   REF   3  LAST  332           42,3267  61161 0                CADR    DSPIN
1337   REF   2  LAST  349           42,3270  0 3344 1                TC      SEPMIN          REMOVE REST OF SECONDS
1338   REF 111  LAST  350           42,3271 56 155 0                XCH     MPAC    +1      LEAVE FRACT MIN/60 IN MPAC+1
1339                                42,3272  0 0006 1                EXTEND                  USE ONLY FRACT MIN/60 MOD 60
1340   REF   1                      42,3273  7 3305 0                MP      HIMINCON        MULT BY .6 + 2EXP-7
1341   REF 112  LAST  350           42,3274 52 155 1                DXCH    MPAC            GIVES MIN/100 MOD 60
1342   REF  12  LAST  350           42,3275 50 117 0                INDEX   DECOUNT
1343   REF  10  LAST  350           42,3276  3 4321 0                CAF     R1D1            RXD1
1344   REF  31  LAST  350           42,3277 55'202 1                TS      DSPCOUNT
1345   REF  51  LAST  350           42,3300  0 4636 0                TC      BANKCALL        DISPLAY MIN MOD 60 IN D1D2.
1346   REF   2  LAST  350           42,3301  61126 0                CADR    DSPDC2NR
1347   REF  19  LAST  348           42,3302  0 4655 0                TC      POSTJUMP
1348   REF   4  LAST  348           42,3303  62563 0                CADR    DSPDCEND +2

1349                                42,3304  23147 1        HISECON  OCT     23147           .6 + 2EXP-14
1350                                42,3305  23346 1        HIMINCON OCT     23346           .6 + 2EXP-7
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1351                          42,3306  77753 0  M/SCON1  OCT     77753          - HI PART OF (59M58.5S) +1
1352                          42,3307  41126 1  M/SCON2  OCT     41126          - LO PART OF (59M58.5S) +1
1353  REF   7  LAST  350      42,3310  03252 1  NORMADR  ADRES   M/SNORM +1
1354                          42,3311  00025 0  M/SCON3  OCT     00025          59M 59.5S
1355                          42,3312  37016 1    +1     OCT     37016
1356  REF 113  LAST  350      42,3313  10 155 1 SEPSEC   CCS     MPAC    +1     IF +, ROUND BY ADDING .5 SEC
1357  REF   1                 42,3314  1 3323 1         TCF     POSEC          IF -, ROUND BY SUBTRACTING .5 SEC
1358  REF   2  LAST  351      42,3315  1 3323 1         TCF     POSEC          FINDS TIME IN MPAC, MPAC+1
1359                          42,3316  1 3317 0         TCF     +1             ROUNDS OFF BY +/- .5 SEC
1360                          42,3317  0 0006 1         EXTEND                 LEAVES WHOLE MIN IN BIT13 OF
1361  REF   1                 42,3320  4 3211 1         DCS     RNDCON  -1     LOTEMOUT AND ABOVE.
1362  REF 114  LAST  351      42,3321  20 155 1 SEPSEC1  DAS     MPAC           LEAVES FRACT SEC/60 IN MPAC, MPAC+1.
1363  REF   3  LAST  350      42,3322  1 3326 1         TCF     SEPSECNR
1364                          42,3323  0 0006 1 POSEC    EXTEND
1365  REF   2  LAST  351      42,3324  3 3211 0         DCA     RNDCON  -1
1366  REF   1                 42,3325  1 3321 0         TCF     SEPSEC1
1367  REF  69  LAST  348      42,3326  56 002 0 SEPSECNR XCH     Q              THIS ENTRY AVOIDS ROUNDING BY .5 SEC
1368  REF   1                 42,3327  54 144 1   +1     TS      SEPSCRET
1369  REF   4  LAST  348      42,3330  0 7052 1         TC      DMP            MULT BY 2EXP12/6000
1370  REF   1                 42,3331   03176 1         ADRES   SECON1         GIVES FRACT SEC/60 IN BIT12 OF MPAC+1
1371                          42,3332  0 0006 1         EXTEND                 AND BELOW.
1372  REF 115  LAST  351      42,3333  3 0155 0         DCA     MPAC           SAVE MINUTES AND HOURS
1373  REF   3  LAST  349      42,3334  53'213 1         DXCH    HITEMOUT
1374  REF   1                 42,3335  0 4372 0         TC      TPSL1
1375  REF   2  LAST  351      42,3336  0 4372 0         TC      TPSL1          GIVES FRACT SEC/60 IN MPAC+1, MPAC+2.
1376  REF  55  LAST  350      42,3337  3 4772 1         CAF     ZERO
1377  REF 116  LAST  351      42,3340  56 156 0         XCH     MPAC    +2     LEAVE FRACT SEC/60 IN MPAC, MPAC+1.
1378  REF 117  LAST  351      42,3341  56 155 0         XCH     MPAC    +1
1379  REF 118  LAST  351      42,3342  56 154 1         XCH     MPAC
1380  REF   2  LAST  351      42,3343  0 0144 0         TC      SEPSCRET

1381  REF  70  LAST  351      42,3344  56 002 0 SEPMIN   XCH     Q              FINDS WHOLE MINUTES IN BIT13
1382  REF   1                 42,3345  54 144 1         TS      SEPMNRET       OF LOTEMOUT AND ABOVE.
1383  REF   1                 42,3346  3 1213 0         CA      LOTEMOUT       REMOVES REST OF SECONDS.
1384                          42,3347  0 0006 1         EXTEND                 LEAVES FRACT MIN/60 IN MPAC+1.
1385  REF  18  LAST  308      42,3350  7 4766 0         MP      BIT3           LEAVES WHOLE HOURS IN MPAC.
1386                          42,3351  0 0006 1         EXTEND                 SR 12, THROW AWAY LP.
1387  REF  21  LAST  206      42,3352  7 4754 1         MP      BIT13          SR 2, TAKE FROM LP. = SL 12.
1388  REF 119  LAST  351      42,3353  22 155 0         LXCH    MPAC    +1     THIS FORCES BITS 12-1 TO 0 IF +,
A1389                                                                         FORCES BITS 12-1 TO 1 IF -.
1390  REF   4  LAST  351      42,3354  3 1212 1         CA      HITEMOUT
1391  REF 120  LAST  351      42,3355  54 154 0         TS      MPAC
1392  REF   5  LAST  351      42,3356  0 7052 1         TC      DMP            MULT BY 1/15
1393  REF   1                 42,3357   03204 1         ADRES   MINCON1        GIVES FRACT MIN/60 IN MPAC+1.
1394  REF   2  LAST  351      42,3360  0 0144 0 ENDSPMIN TC     SEPMNRET       GIVES WHOLE HOURS IN MPAC.

R1395  THIS IS A SPECIAL PURPOSE VERB FOR DISPLAYING A DOUBLE PRECISION AGC
R1396  WORD AS 10 DECIMAL DIGITS ON THE AGC DISPLAY PANEL.  IT CAN BE USED WITH
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R1397   ANY NOUN, EXCEPT MIXED NOUNS. IT DISPLAYS THE CONTENTS
R1398   OF THE REGISTER NOUNADD IS POINTING TO . IF USED WITH NOUNS WHICH ARE
R1399   INHERENTLY NOT DP SUCH AS THE CDU COUNTERS THE DISPLAY WILL BE GARBAGE.
R1400   DISPLAY IS IN R1 AND R2 ONLY WITH THE SIGN IN R1.


1401    REF   3  LAST  345    40,2000                        SETLOC  PINBALL1
14011                         40,2657                        BANK
14015   REF   3 LAST  345 TO  348:    106    431*            COUNT*  $$/PIN
1402    REF   8  LAST  348    40,2657  50 140 1  DSPDPDEC    INDEX   MIXBR
1403                          40,2660  0 2660 0               TC      +0
1404                          40,2661  0 2663 0               TC      +2              NORMAL NOUN
1405    REF   3  LAST  340    40,2662  0 3261 1               TC      DSPALARM
1406                          40,2663  0 0006 1               EXTEND
1407    REF  11  LAST  348    40,2664  5 0145 1               INDEX   NOUNADD
1408                          40,2665  3 0001 0               DCA     0
1409    REF 121  LAST  351    40,2666  52 155 1              DXCH    MPAC
1410    REF  11  LAST  350    40,2667  3 4321 0               CAF     R1D1
1411    REF  32  LAST  350    40,2670  55'202 1              TS      DSPCOUNT
1414    REF   2  LAST  258    40,2671  0 7224 1               TC      DPAGREE
1415    REF   1               40,2672  0 3133 0               TC      DSP2DEC
1416    REF   6  LAST  349    40,2673  0 0136 0  ENDDPDEC     TC      ENTEXIT
```

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P1417 LOAD VERBS IF ALARM CONDITION IS DETECTED DURING EXECUTE,
R1418 CHECK FAIL LIGHT IS TURNED ON AND ENDOFJOB. IF ALARM CONDITION IS
R1419 DETECTED DURING ENTER OF DATA, CHECK FAIL IS TURNED ON AND IT RECYCLES
R1420 TO EXECUTE OF ORIGINAL LOAD VERB. RECYCLE CAUSED BY 1) DECIMAL MACHINE
R1421 CADR 2) MIXTURE OF OCTAL/DECIMAL DATA 3) OCTAL DATA INTO DECIMAL
R1422 ONLY NOUN 4) DEC DATA INTO OCT ONLY NOUN 5) DATA TOO LARGE FOR SCALE
R1423 6) FEWER THAN 3 DATA WORDS LOADED FOR HRS, MIN, SEC NOUN.8(2)-(6) ALARM
R1424 AND RECYCLE OCCUR AT FINAL ENTER OF SET. (1) ALARM AND RECYCLE OCCUR AT
R1425 ENTER OF CADR.

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1426   REF   2  LAST  334   41,2000                          SETLOC  PINBALL2
14261                       41,2611                          BANK
14265  REF   2 LAST  334 TO  345:   393   393*               COUNT*  $$/PIN
1427   REF  14  LAST  350   41,2611  4 4767 1  ABCLOAD      CS      TWO
1428   REF   3  LAST  342   41,2612  0 2423 0                TC      COMPTEST
1429   REF   1               41,2613  0 2453 1              TC      NOUNTEST        TEST IF NOUN CAN BE LOADED.
1430   REF   1               41,2614  3 4353 0              CAF     VBSP1LD
1431   REF   2  LAST  332   41,2615  0 2336 0                TC      UPDATVB  -1
1432   REF   1               41,2616  0 2300 0              TC      REQDATX
1433   REF   1               41,2617  3 4354 1              CAF     VBSP2LD
1434   REF   3  LAST  353   41,2620  0 2336 0                TC      UPDATVB  -1
1435   REF   1               41,2621  0 2302 1              TC      REQDATY
1436   REF   1               41,2622  3 4615 1              CAF     VBSP3LD
1437   REF   4  LAST  353   41,2623  0 2336 0                TC      UPDATVB -1
1438   REF   2  LAST  335   41,2624  0 2304 1                TC      REQDATZ

1439   REF  12  LAST  347   41,2625  4 6211 1  PUTXYZ        CS      SIX             TEST THAT THE 3 DATA WORDS LOADED ARE
1440   REF   1               41,2626  0 3011 1              TC      ALLDC/OC        ALL DEC OR ALL OCT.
1441                         41,2627  0 0006 1              EXTEND
1442   REF   4  LAST  339   41,2630  3 2115 0              DCA     LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
1443   REF   7  LAST  344   41,2631  52 006 0              DXCH    Z               ROUTINE.
1444   REF  56  LAST  351   41,2632  3 4772 1              CAF     ZERO            X COMP
1445   REF   1               41,2633  0 3071 1              TC      PUTCOM
1446   REF  12  LAST  352   41,2634  50 145 1              INDEX   NOUNADD
1447                         41,2635  54 000 0              TS      0
1448   REF  29  LAST  346   41,2636  3 4770 0              CAF     CNE             Y COMP
1449   REF   2  LAST  353   41,2637  0 3071 1              TC      PUTCOM
1450   REF  13  LAST  353   41,2640  50 145 1              INDEX    NOUNADD
1451                         41,2641  54 001 1              TS      1
1452   REF  15  LAST  353   41,2642  3 4767 0              CAF     TWO             Z COMP
1453   REF   3  LAST  353   41,2643  0 3071 1              TC      PUTCOM
1454   REF  14  LAST  353   41,2644  50 145 1              INDEX   NOUNADD
1455                         41,2645  54 002 1              TS      2
145501 REF   5  LAST  248   41,2646  4 4774 0              CS      SEVEN           IF NOUN 7 HAS JUST BEEN LOADED, SET
145502 REF  10  LAST  339   41,2647  6 1205 1              AD      NOUNREG          FLAG BITS AS SPECIFIED.
145503                       41,2650  0 0006 1              EXTEND
145504                       41,2651  1 2653 1              BZF     +2
145505 REF   2  LAST  334   41,2652  0 3001 0              TC      LOADLV
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145506                          41,2653  0 0004 0           INHINT
145508 REF    1                 41,2654  4 5001 1           CS      OCT30          IS IT A CHANNEL (30 OR UNDER)
14551  REF    4  LAST  344      41,2655  6 1206 1           AD      XREG
145512                          41,2656  0 0006 1           EXTEND
145514 REF    1                 41,2657  6 2667 1           BZMF    CHANBITS       YES

145516 REF    5  LAST  354      41,2660  3 1206 1           CA      XREG           ECADR OF ERASABLE CELL
145518 REF    5  LAST  339      41,2661  0 4306 0           TC      SETNCADR +1    SET EBANK, NOUNADD

14552  REF   15  LAST  353      41,2662  50 145 1           INDEX   NOUNADD
145522                          41,2663  3 0000 1           CA      0
145524 REF   41  LAST  343      41,2664  54 001 1           TS      L
145526 REF   30  LAST  353      41,2665  3 4770 0           CAF     ONE
145528 REF    6  LAST  354      41,2666  55'206 0           TS      XREG           MAKE IT LOOK LIKE A CHANNEL FOR A WHILE

14553  REF    1                 41,2667  6 4352 1  CHANBITS AD      OCT21
145532                          41,2670  0 0006 1           EXTEND
145534 REF    1                 41,2671  1 2714 0           BZF     BITSOFF2       DONT TOUCH CHAN7 (SUPERBANK)

145536 REF    2  LAST  335      41,2672  3 1210 0           CA      ZREG
145538                          41,2673  0 0006 1           EXTEND
14554  REF    1                 41,2674  6 2702 0           BZMF    BITSOFF        R3 IS ZERO FOR OFF, NONZERO FOR ON

145542 REF    1                 41,2675  3 1207 0           CA      YREG
145544                          41,2676  0 0006 1           EXTEND
145546 REF    7  LAST  354      41,2677  5 1206 1           INDEX   XREG
145548                          41,2700  05 000 1           WOR     0
14555  REF    1                 41,2701  1 2706 0           TCF     BITSOFF1

145552 REF    2  LAST  354      41,2702  4 1207 1  BITSOFF  CS      YREG
145553                          41,2703  0 0006 1           EXTEND
145554 REF    8  LAST  354      41,2704  5 1206 1           INDEX   XREG
145556                          41,2705  03 000 1           WAND    0

145558 REF    9  LAST  354      41,2706  11'206 0  BITSOFF1 CCS     XREG           WAS IT REALLY A CHANNEL
14556  REF  107  LAST  350      41,2707  10 000 0           CCS     A
145562 REF    2  LAST  354      41,2710  1 2714 0           TCF     BITSOFF2       YES

145563 REF  108  LAST  354      41,2711  22 000 1           LXCH    A
145564 REF   16  LAST  354      41,2712  50 145 1     -2    INDEX   NOUNADD
145566                          41,2713  54 000 0           TS      0
145568                          41,2714  0 0003 1  BITSOFF2 RELINT
1456   REF    3  LAST  353      41,2715  0 3001 0           TC      LOADLV

14565  REF    6  LAST  260        5001           OCT30    =       BITS4&5
14566  REF    3  LAST  339        4352           OCT21    =       ND1

1457   REF   31  LAST  354      41,2716  4 4770 1  ABLOAD   CS      ONE
1458   REF    4  LAST  353      41,2717  0 2423 0           TC      COMPTEST
1459   REF    2  LAST  353      41,2720  0 2453 1           TC      NOUNTEST       TEST IF NOUN CAN BE LOADED.
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1460  REF   2  LAST  353  41,2721  3 4353 0          CAF    VBSP1LD
1461  REF   5  LAST  353  41,2722  0 2336 0          TC     UPDATVB -1
1462  REF   2  LAST  353  41,2723  0 2300 0          TC     REQDATX
1463  REF   2  LAST  353  41,2724  3 4354 1          CAF    VBSP2LD
1464  REF   6  LAST  355  41,2725  0 2336 0          TC     UPDATVB -1
1465  REF   2  LAST  353  41,2726  0 2302 1          TC     REQDATY
1466  REF   8  LAST  336  41,2727  4 4773 1  PUTXY    CS     FIVE          TEST THAT THE 2 DATA WORDS LOADED ARE
1467  REF   2  LAST  353  41,2730  0 3011 1          TC     ALLDC/OC      ALL DEC OR ALL OCT.
1468                      41,2731  0 0006 1          EXTEND
1469  REF   5  LAST  353  41,2732  3 2115 0          DCA    LODNNLOC      SWITCH BANKS TO NOUN TABLE READING
1470  REF   8  LAST  353  41,2733  52 006 0          DXCH   Z             ROUTINE.
1471  REF  57  LAST  353  41,2734  3 4772 1          CAF    ZERO          X COMP
1472  REF   4  LAST  353  41,2735  0 3071 1          TC     PUTCOM
1473  REF  17  LAST  354  41,2736  50 145 1          INDEX  NOUNADD
1474                      41,2737  54 000 0          TS     0
1475  REF   1            41,2740  1 2760 0          TCF    COMBLOAD      Y COMP
1481  REF   3  LAST  355  41,2741  0 2300 0  ALOAD   TC     REQDATX
1482                      41,2742  0 0006 1          EXTEND
1483  REF   6  LAST  355  41,2743  3 2115 0          DCA    LODNNLOC      SWITCH BANKS TO NOUN TABLE READING
1484  REF   9  LAST  355  41,2744  52 006 0          DXCH   Z             ROUTINE.
1485  REF  58  LAST  355  41,2745  3 4772 1          CAF    ZERO          X COMP
1486  REF   5  LAST  355  41,2746  0 3071 1          TC     PUTCOM
1487  REF   3  LAST  354  41,2747  1 2712 0          TCF    BITSOFF2 -2
1490  REF  32  LAST  354  41,2750  4 4770 1  BLOAD   CS     ONE
1491  REF   5  LAST  354  41,2751  0 2423 0          TC     COMPTEST
1493  REF  27  LAST  346  41,2752  3 4752 0          CAF    BIT15         SET CLPASS FOR PASS0 ONLY
1494  REF  10  LAST  335  41,2753  55'220 1          TS     CLPASS
1495  REF   3  LAST  355  41,2754  0 2302 1          TC     REQDATY
1496                      41,2755  0 0006 1          EXTEND
1497  REF   7  LAST  355  41,2756  3 2115 0          DCA    LODNNLOC      SWITCH BANKS TO NOUN TABLE READING
1498  REF  10  LAST  355  41,2757  52 006 0          DXCH   Z             ROUTINE.
1499  REF  33  LAST  355  41,2760  3 4770 0  COMBLOAD CAF    ONE
1500  REF   6  LAST  355  41,2761  0 3071 1          TC     PUTCOM
1501  REF  18  LAST  355  41,2762  50 145 1          INDEX  NOUNADD
1502                      41,2763  54 001 1          TS     1
1503  REF   4  LAST  354  41,2764  0 3001 0          TC     LOADLV

1504  REF  16  LAST  353  41,2765  4 4767 1  CLOAD   CS     TWO
1505  REF   6  LAST  355  41,2766  0 2423 0          TC     COMPTEST
1507  REF  28  LAST  355  41,2767  3 4752 0          CAF    BIT15         SET CLPASS FOR PASS0 ONLY
1508  REF  11  LAST  355  41,2770  55'220 1          TS     CLPASS
1509  REF   3  LAST  353  41,2771  0 2304 1          TC     REQDATZ
1510                      41,2772  0 0006 1          EXTEND
1511  REF   8  LAST  355  41,2773  3 2115 0          DCA    LODNNLOC      SWITCH BANKS TO NOUN TABLE READING
1512  REF  11  LAST  355  41,2774  52 006 0          DXCH   Z             ROUTINE.
1513  REF  17  LAST  355  41,2775  3 4767 0          CAF    TWO
1514  REF   7  LAST  355  41,2776  0 3071 1          TC     PUTCOM
1515  REF  19  LAST  355  41,2777  50 145 1          INDEX  NOUNADD
1516                      41,3000  54 002 1          TS     2
1518  REF  59  LAST  355  41,3001  3 4772 1  LOADLV   CAF    ZERO
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1519   REF  13  LAST  335   41,3002  55'203 0                TS      DECBRNCH
1520   REF  60  LAST  355   41,3003  4 4772 0                CS      ZERO
1521   REF   1               41,3004  55'217 0                TS      LOADSTAT
15215  REF   6  LAST  336   41,3005  0 4432 0                TC      RELDSP          RELEASE FOR PRIORITY DISPLAY PROBLEM
1522   REF   3  LAST  335   41,3006  0 4261 0                TC      -VD1SET
1524   REF  20  LAST  350   41,3007  0 4655 0                TC      POSTJUMP        AFTER COMPLETED LOAD, GO TO RECALTST
1525   REF   1               41,3010   61412 1               CADR    RECALTST        TO SEE IF THERE IS RECALL FROM ENDIDLE.

1529   REF  13  LAST  350   41,3011  54 117 1  ALLDC/OC      TS      DECOUNT         TESTS THAT DATA WORDS LOADED ARE EITHER
1530   REF  14  LAST  356   41,3012  4 1203 0                CS      DECBRNCH        ALL DEC OR ALL OCT. ALARMS IF NOT.
1531   REF   3  LAST  333   41,3013  54 021 0                TS      SR
1532   REF   4  LAST  356   41,3014  4 0021 0                CS      SR
1533   REF   5  LAST  356   41,3015  4 0021 0                CS      SR              SHIFTED RIGHT 2
1534   REF 109  LAST  354   41,3016  10 000 0                CCS     A               DEC COMP BITS IN LOW 3
1535                        41,3017  1 3021 0                TCF     +2              SOME ONES IN LOW 3
1536   REF  71  LAST  351   41,3020  0 0002 0  GOQ           TC      Q               ALL ZEROS. ALL OCTAL. OK.
1537   REF  14  LAST  356   41,3021  6 0117 0                AD      DECOUNT         DEC COMP = 7 FOR 3COMP, =6 FOR 2COMP
1538                        41,3022  0 0006 1                EXTEND                  (BUT IT HAS BEEN DECREMENTED BY CCS)
1539   REF   5  LAST  271   41,3023  1 6711 1                BZF     TCQ             MUST MATCH 6 FOR 3COMP, 5 FOR 2COMP
1540   REF   4  LAST  343   41,3024  0 4173 0                TC      ALMCYCLE        ALARM AND RECYCLE.
1542   REF  72  LAST  356   41,3025  56 002 0  SFRUTNOR      XCH     Q               GETS SF ROUTINE NUMBER FOR NORMAL CASE
1543   REF   1               41,3026  54 114 1                TS      EXITEM          CANT USE L FOR RETURN. TSTFORDP USES L.
1544   REF   1               41,3027  3 4343 1                CAF     MID5
1545   REF   3  LAST  344   41,3030  7 0147 1                MASK    NNTYPTEM
1546   REF   1               41,3031  0 4324 0                TC      RIGHT5
1547   REF   2  LAST  356   41,3032  0 0114 0                TC      EXITEM          SF ROUTINE NUMBER IN A

1548   REF  73  LAST  356   41,3033  56 002 0  SFRUTMIX      XCH     Q               GETS SF ROUTINE NUMBER FOR MIXED CASE
1549   REF   3  LAST  356   41,3034  54 114 1                TS      EXITEM
1550   REF   1               41,3035  0 3063 1                TC      GETTCRLQ
1555   REF   2  LAST  282   41,3036  7 0153 1                MASK    RUTMXTEM        GET HI5, MID5, OR LOW5 OF RUTMXTAB ENTRY
1556   REF  42  LAST  354   41,3037  50 001 0                INDEX   L
1557                        41,3040  0 0000 1                TC      0
R1558  DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
1559   REF   4  LAST  356   41,3041  0 0114 0  SFRET1        TC      EXITEM          SF ROUTINE NUMBER IN A

1560   REF  74  LAST  356   41,3042  56 002 0  SFCONUM       XCH     Q               GETS 2X( SF CONSTANT NUMBER)
1561   REF   5  LAST  356   41,3043  54 114 1                TS      EXITEM
1562   REF   9  LAST  352   41,3044  50 140 1                INDEX   MIXBR
1563                        41,3045  0 3045 0                TC      +0
1564   REF   1               41,3046  0 3060 1                TC      CONUMNOR        NORMAL NOUN
1565   REF   2  LAST  356   41,3047  0 3063 1                TC      GETTCRLQ
1570   REF   4  LAST  356   41,3050  7 0147 1                MASK    NNTYPTEM
1571   REF  43  LAST  356   41,3051  50 001 0                INDEX   L
1572                        41,3052  0 0000 1                TC      0
R1573  DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
1574                        41,3053  6 0000 1  SFRET         DOUBLE                  2X(SF CONSTANT NUMBER ) IN A
1575   REF   6  LAST  356   41,3054  0 0114 0                TC      EXITEM

1576   REF   1               41,3055  0 3020 0  DISPLACE     TC      GOQ
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1577   REF   2  LAST  356  41,3056  0 4324 0          TC     RIGHT5
1578   REF   3  LAST  344  41,3057  0 4333 0          TC     LEFT5

1579   REF   2  LAST  214  41,3060  3 4342 0 CONUMNOR CAF    LOW5       NORMAL NOUN ALWAYS GETS LOW 5 OF
1580   REF   5  LAST  356  41,3061  7 0147 1          MASK   NNTYPTEM   NNTYPTAB FOR SF CONUM.
1581   REF   1            41,3062  1 3053 0          TCF    SFRET
15821  REF  15  LAST  356  41,3063  50 117 0 GETTCRLQ INDEX  DECOUNT
15822  REF   1            41,3064  3 3055 1          CAF    DISPLACE
15823  REF  44  LAST  356  41,3065  54 001 1          TS     L          PUT TC GOQ, TC RIGHT5, TC LEFT5 IN L
15824  REF  16  LAST  357  41,3066  50 117 0          INDEX  DECOUNT
15825  REF   3  LAST  357  41,3067  3 4342 0          CAF    LOW5       LOW5, MID5, HI5 IN A
15826  REF  75  LAST  356  41,3070  0 0002 0          TC     Q
1583   REF  17  LAST  357  41,3071  54 117 1 PUTCOM   TS     DECOUNT
1584   REF  76  LAST  357  41,3072  56 002 0          XCH    Q
1585   REF   1            41,3073  54 115 0          TS     DECRET

1586   REF  61  LAST  356  41,3074  3 4772 1          CAF    ZERO
1587   REF   3  LAST  347  41,3075  54 162 0          TS     MPAC+6
1588   REF  18  LAST  357  41,3076  50 117 0          INDEX  DECOUNT
1589   REF   3  LAST  332  41,3077  57'211 1          XCH    XREGLP
1590   REF 122  LAST  352  41,3100  54 155 1          TS     MPAC +1
1591   REF  19  LAST  357  41,3101  50 117 0          INDEX  DECOUNT
1592   REF  10  LAST  354  41,3102  57'206 1          XCH    XREG
1593   REF 123  LAST  357  41,3103  54 154 0          TS     MPAC
1594   REF  10  LAST  356  41,3104  50 140 1          INDEX  MIXBR
1595               41,3105  0 3105 0          TC     +0
1596   REF   1            41,3106  0 3133 0          TC     PUTNORM    NORMAL NOUN
R1597  IF MIXNOUN, PLACE ADDRESS FOR COMPONENT K INTO NOUNADD, SET EBANK BITS.
1598   REF  20  LAST  357  41,3107  50 117 0          INDEX  DECOUNT    GET IDADDTAB ENTRY FOR COMPONENT K
1599   REF   4  LAST  348  41,3110  3 0150 0          CA     IDADITEM             OF NOUN.
1600   REF   5  LAST  348  41,3111  7 4347 1          MASK   LOW11      (ECADR)SUBK FOR CURRENT COMP OF NOUN
1601   REF   6  LAST  354  41,3112  0 4305 0          TC     SETNCADR   ECADR INTO NOUNCADR. SETS EB, NOUNADD
1602               41,3113  0 0006 1          EXTEND                    C(NOUNADD) IN A UPON RETURN
1603   REF  21  LAST  357  41,3114  60 117 0          SU     DECOUNT    PLACE (ESUBK)-K INTO NOUNADD

1604   REF  20  LAST  355  41,3115  54 145 0          TS     NOUNADD
1605   REF  15  LAST  356  41,3116  11'203 0          CCS    DECBRNCH
1606   REF   1            41,3117  0 3170 1          TC     PUTDECSF   +  DEC
1607   REF   1            41,3120  0 2445 0          TC     DCTSTCYC   +0 OCTAL
1608   REF   3  LAST  344  41,3121  0 3033 1          TC     SFRUTMIX   TEST IF DEC ONLY BIT = 1. IF SO,
1609   REF   3  LAST  343  41,3122  0 2260 1          TC     DPTEST     ALARM AND RECYCLE. IF NOT, CONTINUE

1610   REF   1            41,3123  0 3151 1          TC     PUTCOM2    NO DP
A1611                                                                  TEST FOR DP SCALE FOR OCT LOAD. IF SO,
A1612                                                                  +0 INTO MAJOR PART. SET NOUNADD FOR
A1613                                                                  LOADING OCTAL WORD INTO MINOR PART
1614   REF  21  LAST  357  41,3124  24 145 1 PUTDPCOM INCR   NOUNADD    DP  (ESUBK)-K+1  OR  E+1
1615   REF  22  LAST  357  41,3125  3 0145 1          CA     NOUNADD    NOUNADD NOW SET FOR MINOR PART

1616   REF  22  LAST  357  41,3126  26 117 1          ADS    DECOUNT    (ESUBK)+1  OR  E+1  INTO DECOUNT
1617   REF  62  LAST  357  41,3127  3 4772 1          CAF    ZERO       NOUNADD SET FOR MINOR PART
1618   REF  23  LAST  357  41,3130  50 117 0          INDEX  DECOUNT
1619               41,3131  53'777 0          TS     L          -1      ZERO MAJOR PART(ESUBK OR E)
1620   REF   2  LAST  357  41,3132  0 3151 1          TC     PUTCOM2
```

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```
1621  REF   2  LAST  335   41,3133  0 4313 1  PUTNORM  TC      SETNADD      ECADR FROM NOUNCADR. SETS EB, NOUNADD.
1622  REF  16  LAST  357   41,3134  11'203 0            CCS     DECBRNCH
1623  REF   2  LAST  357   41,3135  0 3170 1            TC      PUTDECSF     + DEC
1624  REF   2  LAST  357   41,3136  0 2445 0            TC      OCTSTCYC     +0 OCTAL
1625  REF   3  LAST  345   41,3137  0 3025 0            TC      SFRUTNOR     TEST IF DEC ONLY BIT = 1. IF SO,
1626  REF   4  LAST  357   41,3140  0 2260 1            TC      DPTEST       ALARM AND RECYCLE. IF NOT, CONTINUE.
1627  REF   3  LAST  357   41,3141  0 3145 1            TC      PUTCOM2 -4   NO DP
1628  REF  63  LAST  357   41,3142  3 4772 1            CAF     ZERO         DP
1629  REF  24  LAST  357   41,3143  54 117 1            TS      DECOUNT
1630  REF   1             41,3144  0 3124 0            TC      PUTDPCOM

1631  REF   8  LAST  344   41,3145  3 0146 1  -4       CA      NNADTEM
1632  REF  34  LAST  355   41,3146  6 4770 0            AD      ONE          IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
1633                       41,3147  0 0006 1            EXTEND
1634  REF   1             41,3150  1 3155 1            BZF     CHANLOAD
1635  REF 124  LAST  357   41,3151  56 154 1  PUTCOM2  XCH     MPAC
1636  REF   2  LAST  357   41,3152  0 0115 1            TC      DECRET

1637  REF  33  LAST  352      1202                     EBANK=  DSPCOUNT
1638  REF   1             41,3153    02122 1  GTSFINLC 2CADR  GTSFIN
1638  REF   1             41,3154    64102 0
```

```
1639  REF   6  LAST  353   41,3155  4 4774 0  CHANLOAD CS      SEVEN        DONT LOAD CHAN 7. (IT = SUPERBANK)
16391 REF   4  LAST  344   41,3156  6 1222 1            AD      NOUNCADR
16392                      41,3157  0 0006 1            EXTEND
16393 REF   5  LAST  355   41,3160  1 3001 1            BZF     LOADLV
16394 REF   5  LAST  358   41,3161  3 1222 1            CA      NOUNCADR
1640  REF   3  LAST  344   41,3162  7 5021 0            MASK    LOW9
1641  REF 125  LAST  358   41,3163  56 154 1            XCH     MPAC
16411                      41,3164  0 0006 1            EXTEND
16412 REF 126  LAST  358   41,3165  5 0154 1            INDEX   MPAC
1642                       41,3166  01 000 0            WRITE   0
1643  REF   6  LAST  358   41,3167  0 3001 0            TC      LOADLV
```

R1644 PUTDECSF FINDS MIXBR AND DECOUNT STILL SET FROM PUTCOM

```
1645  REF   2  LAST  344   41,3170  0 3042 1  PUTDECSF TC      SECONUM      2X(SF CON NUMB) IN A
1646  REF  13  LAST  347   41,3171  54 123 0            TS      SFTEMP1
1647                       41,3172  0 0006 1            EXTEND               SWITCH BANKS TO SF CONSTANT TABLE
1648  REF   1             41,3173  3 3154 1            DCA     GTSFINLC     READING ROUTINE.
1649  REF  12  LAST  355   41,3174  52 006 0            DXCH    Z            LOADS SFTEMP1, SFTEMP2.
1650  REF  11  LAST  357   41,3175  50 140 1            INDEX   MIXBR
1651                       41,3176  0 3176 1            TC      +0
1652  REF   1             41,3177  0 3202 1            TC      PUTSFNOR
1653  REF   4  LAST  357   41,3200  0 3033 1            TC      SFRUTMIX
1654  REF   1             41,3201  0 3203 0            TC      PUTDCSF2
1655  REF   4  LAST  358   41,3202  0 3025 0  PUTSFNOR TC      SFRUTNOR
```

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 1656   REF 110  LAST  356   41,3203  50 000 1  PUTDCSF2 INDEX  A
 1657   REF   1              41,3204  3 3206 0           CAF    SFINTABR
 1658   REF   4  LAST  345   41,3205  0 4660 0           TC     BANKJUMP      SWITCH BANKS FOR EXPANSHION ROOM
 1659   REF   1              41,3206   62347 0  SFINTABR CADR   GOALMCYC      ALARM AND RECYCLE IF DEC LOAD
A1660                                                                        WITH OCTAL ONLY NOUN
 1661   REF   1              41,3207   60753 0           CADR   BINROUND
 1662   REF   1              41,3210   60674 1           CADR   DEGINSF
 1663   REF   1              41,3211   60743 1           CADR   ARTHINSF
 1664   REF   1              41,3212   60776 1           CADR   DPINSF
 1665   REF   1              41,3213   61023 1           CADR   DPINSF2
 1666   REF   1              41,3214   60761 1           CADR   DPTDEGIN
 1667   REF   2  LAST  359   41,3215   60776 1           CADR   DPINSF       SAME AS ARITHDP1
 1668   REF   1              41,3216   65361 0           CADR   HMSIN
 1669   REF   4  LAST  352   41,3217   61261 0           CADR   DSPALARM     MIN/SEC CANT BE LOADED.
 1671   REF   1              41,3220   61027 0           CADR   DPINSF4
16711   REF   1              41,3221   60756 0           CADR   ARTIN1SF
16712   REF   5  LAST  359   41,3222   61261 0           CADR   DSPALARM     2INTOUT CANT BE LOADED.
16713   REF   1              41,3223   61007 1           CADR   DPFRACIN
R1673   SCALE FACTORS FOR THOSE ROUTINES NEEDING THEM ARE AVAILABLE IN SFTEMP1.
R1674   ALL SFIN ROUTINES USE MPAC MPAC+1. LEAVE RESULT IN A. END WITH TC DECRET

 1675   REF   4  LAST  352   40,2000                    SETLOC PINBALL1
16751                        40,2674                    BANK
16755   REF   4  LAST  352 TO  353:    13   444*       COUNT* $$/PIN
R1676   DEGINSF APPLIES 1000/180 =5.55555(10) = 5.43434(8)

 1677   REF   6  LAST  351   40,2674  0 7052 1  DEGINSF  TC     DMP           SF ROUTINE FOR DEC DEGREES
 1678   REF   1              40,2675   02737 0           ADRES  DEGCON1       MULT BY 5.5  5(10)X2EXP-3
 1679   REF 127  LAST  358   40,2676  10 155 1           CCS    MPAC    +1    THIS ROUNDS OFF MPAC+1 BEFORE SHIFT
 1680   REF  16  LAST  330   40,2677  3 4756 1           CAF    BIT11         LEFT 3, AND CAUSES 360.00 TO OF/UF
 1681                        40,2700  0 2702 0           TC     +2            WHEN SHIFTED LEFT AND ALARM.
 1682   REF  17  LAST  359   40,2701  4 4756 0           CS     BIT11
 1683   REF 128  LAST  359   40,2702  6 0155 0           AD     MPAC    +1
 1684   REF   1              40,2703  0 3046 0           TC     2ROUND  +2
 1685   REF   3  LAST  351   40,2704  0 4372 0           TC     TPSL1         LEFT 1
 1686   REF   4  LAST  359   40,2705  0 4372 0  DEGINSF2 TC     TPSL1         LEFT 2
 1687   REF   1              40,2706  0 3051 0           TC     TESTOFUF
 1688   REF   5  LAST  359   40,2707  0 4372 0           TC     TPSL1         RETURNS IF NO OF/UF (LEFT3)
 1689   REF 129  LAST  359   40,2710  10 154 0           CCS    MPAC
 1690   REF   1              40,2711  0 2715 0           TC     SIGNFIX       IF+, GO TO SIGNFIX
 1691   REF   2  LAST  359   40,2712  0 2715 0           TC     SIGNFIX       IF +0, GO TO SIGNFIX
 1692                        40,2713  4 0000 0           COM                  IF - , USE -MAGNITUDE +1
 1693   REF 130  LAST  359   40,2714  54 154 0           TS     MPAC          IF -0, USE +0
 1694   REF   4  LAST  357   40,2715  10 162 0  SIGNFIX  CCS    MPAC+6
 1695   REF   1              40,2716  0 2733 1           TC     SGNTU1        IF OVERFLOW
 1696   REF   1              40,2717  0 2727 1           TC     ENDSCALE      NO OVERFLOW/UNDERFLOW
 1697   REF 131  LAST  359   40,2720  10 154 0           CCS    MPAC          IF UF FORCE SIGN TO 0 EXCEPT -180
 1698   REF   2  LAST  343   40,2721   04151 0  MONADR   GENADR PASTEVB       CANNOT GET HERE
 1699   REF   1              40,2722  0 2731 0           TC     NEG180
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1700                              40,2723  0 2724 1             TC      +1
1701  REF 132  LAST  359          40,2724  56 154 1             XCH     MPAC
1702  REF   8  LAST  315          40,2725  7 4750 0             MASK    POSMAX
1703  REF 133  LAST  360          40,2726  54 154 0    -1       TS      MPAC
1704  REF  21  LAST  356          40,2727  0 4655 0    ENDSCALE TC      POSTJUMP
1705  REF   4  LAST  358          40,2730   63151 1             CADR    PUTCOM2

1706  REF   9  LAST  360          40,2731  4 4750 0    NEG180   CS      POSMAX
1707  REF   2  LAST  359          40,2732  0 2726 0             TC      ENDSCALE  -1

1708  REF 134  LAST  360          40,2733  4 0154 0    SGNTO1   CS      MPAC            IF OF FORCE SIGN TO 1
1709  REF  10  LAST  360          40,2734  7 4750 0             MASK    POSMAX
1710  REF 111  LAST  359          40,2735  4 0000 0             CS      A
1711  REF   3  LAST  360          40,2736  0 2726 0             TC      ENDSCALE  -1

1712                              40,2737    26161 0    DEGCON1  2DEC    5.555555555 B-3
1712                              40,2740    30707 1

1713                              40,2741    21616 0    DEGCON2  2DEC    2.222222222 B-2
1713                              40,2742    07071 0
1715  REF   7  LAST  359          40,2743  0 7052 1    ARTHINSF TC      DMP             SCALES MPAC, +1 BY SFTEMP1, SFTEMP2
1716  REF  14  LAST  358          40,2744    00123 1             ADRES   SFTEMP1        ASSUMES POINT BETWEEN HI AND LO PARTS
1717  REF 135  LAST  360          40,2745  56 156 0             XCH     MPAC    +2      OF SFCON. SHIFTS RESULTS LEFT BY 14
1718  REF 136  LAST  360          40,2746  56 155 0             XCH     MPAC    +1      (BY TAKING RESULTS FROM MPAC+1, MPAC+2)
1719  REF 137  LAST  360          40,2747  56 154 1             XCH     MPAC
1720                              40,2750  0 0006 1             EXTEND
1721  REF   2  LAST  359          40,2751  1 2753 0             BZF     BINROUND
1722  REF   5  LAST  356          40,2752  0 4173 0             TC      ALMCYCLE        TOO LARGE A LOAD. ALARM AND RECYCLE.
1723  REF   2  LAST  359          40,2753  0 3044 1    BINROUND TC      2ROUND
1724  REF   2  LAST  359          40,2754  0 3051 0             TC      TESTOFUF
1725  REF   4  LAST  360          40,2755  0 2727 1             TC      ENDSCALE        RETURNS IF NO OF/UF

17251 REF   8  LAST  360          40,2756  0 7052 1    ARTIN1SF TC      DMP             SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
17252 REF  15  LAST  360          40,2757    00123 1             ADRES   SFTEMP1        ROUNDS MPAC+1 INTO MPAC.
17253 REF   3  LAST  360          40,2760  0 2753 1             TC      BINROUND

1726  REF 138  LAST  360          40,2761  10 154 0    OPTDEGIN CCS     MPAC            OPTICS SCALING ROUTINE
1727                              40,2762  0 2766 1             TC      +4
1728                              40,2763  0 2766 1             TC      +3
1729  REF   6  LAST  360          40,2764  0 4173 0             TC      ALMCYCLE        REJECT - INPUT. ALARM AND RECYCLE.
1730  REF   7  LAST  360          40,2765  0 4173 0             TC      ALMCYCLE        REJECT - INPUT. ALARM AND RECYCLE.
1731  REF   1                     40,2766  3 2525 1    OPDEGIN2 CAF     NEG.2           RANGE IS 90 DEG
1732  REF 139  LAST  360          40,2767  26 154 0             ADS     MPAC            SUBTRACT BIAS
1733  REF   9  LAST  360          40,2770  0 7052 1             TC      DMP             MULT BY 100 / 45  B-2
1734  REF   1                     40,2771    02741 1             ADRES   DEGCON2
1735  REF  19  LAST  333          40,2772  3 4755 1             CAF     BIT12           ROUND AS IN DEGINSF
1736  REF 140  LAST  360          40,2773  6 0155 0             AD      MPAC    +1
1737  REF   3  LAST  360          40,2774  0 3046 0             TC      2ROUND  +2
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1738   REF   1                 40,2775   0 2705 1            TC     BEGINSF2

1739   REF  10  LAST  360      40,2776   0 7052 1  DPINSF    TC     DMP             SCALES MPAC, MPAC +1 BY SFTEMP1,
1740   REF  16  LAST  360      40,2777    00123 1             ADRES  SFTEMP1         SFTEMP2.  STORES LOW PART OF RESULT
1741   REF 141  LAST  360      40,3000  56 156 0     +2       XCH    MPAC +2         IN (E SUBK) +1 OR E+1
1742                           40,3001   6 0000 1            DOUBLE
1743   REF 142  LAST  361      40,3002  54 156 1             TS     MPAC     +2
1744   REF  64  LAST  358      40,3003   3 4772 1            CAF    ZERO
1745   REF 143  LAST  361      40,3004   6 0155 0            AD     MPAC     +1
1746   REF   4  LAST  360      40,3005   0 3046 0            TC     2ROUND   +2
1747   REF   3  LAST  360      40,3006   0 3051 0            TC     TESTOFUF
1748   REF  12  LAST  358      40,3007  50 140 1  DPFRACIN  INDEX  MIXBR          RETURNS IF NO OF/UF
1749                           40,3010   0 3010 0            TC     +0
1750   REF   1                 40,3011   0 3021 1            TC     DPINORM
1751   REF  25  LAST  358      40,3012   3 0117 0            CA     DECOUNT         MIXEDNOUN
1752   REF  23  LAST  357      40,3013   6 0145 1  DPINCOM   AD     NOUNADD              MIXED              NORMAL
1753   REF  77  LAST  357      40,3014  54 002 1             TS     Q                  E SUBK             E
1754   REF 144  LAST  361      40,3015  56 155 0             XCH    MPAC     +1
1755   REF  78  LAST  361      40,3016  50 002 0             INDEX  Q
1756                           40,3017  54 001 1             TS     1               PLACE LOW PART IN
1757   REF   5  LAST  360      40,3020   0 2727 1            TC     ENDSCALE        (E SUBK) +1    MIXED
1758   REF  65  LAST  361      40,3021   3 4772 1  DPINORM   CAF    ZERO            E +1           NORMAL
1759   REF   1                 40,3022   0 3013 0            TC     DPINCOM

1760   REF  11  LAST  361      40,3023   0 7052 1  DPINSF2   TC     DMP             ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
1761   REF  17  LAST  361      40,3024    00123 1             ADRES  SFTEMP1         PART OF SF CONST.  DPINSF2 SHIFTS RESULTS
1762   REF  13  LAST  353      40,3025   3 6211 0            CAF    SIX             LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1
1763                           40,3026   1 3032 1            TCF    +4              SHIFT LEFT 7
1765   REF  12  LAST  361      40,3027   0 7052 1  DPINSF4   TC     DMP             ASSUMES POINT BETWEEN BITS 11-12 OF HIGH
1766   REF  18  LAST  361      40,3030    00123 1             ADRES  SFTEMP1         PART OF SF CONST.  DPINSF2 SHIFTS RESULTS
1767   REF  18  LAST  355      40,3031   3 4767 0            CAF    TWO             LEFT BY 3, ROUNDS MPAC+2 INTO MPAC+1.
1768   REF   2  LAST  347      40,3032   0 3034 0            TC     TPLEFTN         SHIFT LEFT 3.
1769   REF   3  LAST  359      40,3033   0 3000 1            TC     DPINSF   +2

1770   REF  79  LAST  361      40,3034  56 002 0  TPLEFTN   XCH    Q               SHIFTS MPAC, +1, +2 LEFT N.  SETS OVFIND
1771   REF   1                 40,3035  54 124 1             TS     SFTEMP2         TO +1 FOR OF, -1 FOR UF.
1772   REF  80  LAST  361      40,3036  56 002 0             XCH    Q               CALL WITH N-1 IN A.
1773   REF  19  LAST  361      40,3037  54 123 0  LEFTNCOM  TS     SFTEMP1              LOOP TIME .37 MSEC.
1774   REF   6  LAST  359      40,3040   0 4372 0            TC     TPSL1
1775   REF  20  LAST  361      40,3041  10 123 0             CCS    SFTEMP1
1776   REF   1                 40,3042   0 3037 0            TC     LEFTNCOM
1777   REF   2  LAST  361      40,3043   0 0124 0            TC     SFTEMP2

1778   REF 145  LAST  361      40,3044  56 155 0  2ROUND    XCH    MPAC     +1
1779                           40,3045   6 0000 1            DOUBLE
1780   REF 146  LAST  361      40,3046  54 155 1     +2       TS     MPAC +1
1781   REF  81  LAST  361      40,3047   0 0002 0            TC     Q               IF MPAC+1 DOES NOT OF/UF
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1782   REF   7  LAST  361   40,3050  1 4376 0          TCF     TPSLI +4          CHECK FOR MPAC UF/OF
1787   REF   5  LAST  359   40,3051  3 0162 1  TESTOFUF CA      MPAC+6            RETURNS IF NO UF/OF
1788                       40,3052  0 0006 1          EXTEND
1789   REF   6  LAST  356   40,3053  1 6711 1          BZF     TCQ
1790   REF   8  LAST  360   40,3054  0 4173 0          TC      ALMCYCLE          UF   ALARM AND RECYCLE.


1791   REF   3  LAST  348   42,2000                    SETLOC  PINBALL3
17911                      42,3361                    BANK
17915  REF   2 LAST 348 TO  352:   146   146*         COUNT*  $$/PIN
1792   REF  17  LAST  358   42,3361  4 1203 0  HMSIN   CS      DECBRNCH          CHECK FOR ALL 3.COMPS DEC
17923  REF   3  LAST  248   42,3362  7 4172 0          MASK    OCT34             BITS 3,4,5
17925  REF 112  LAST  360   42,3363  10 000 0          CCS     A
17927  REF   1              42,3364  0 3501 0          TC      FORCEV25
1793   REF  13  LAST  361   42,3365  0 7052 1          TC      DMP               XREG, XREGLP (=HOURS) WERE ALREADY PUT
1794   REF   1              42,3366   03444 0          ADRES   WHOLECON          INTO MPAC, MPAC+1.
1795   REF   1              42,3367  0 3453 0          TC      RND/TST           ROUND OFF TO WHOLE HRS IN MPAC+1
1796   REF  66  LAST  361   42,3370  3 4772 1          CAF     ZERO              ALARM IF MPAC NON ZERO (G/ 16383 )
1797   REF 147  LAST  361   42,3371  54 156 1          TS      MPAC    +2
1798   REF   1              42,3372  3 3446 1          CAF     HRCON
1799   REF 148  LAST  362   42,3373  54 154 0          TS      MPAC
1800   REF   2  LAST  362   42,3374  3 3447 0          CAF     HRCON   +1
1801   REF 149  LAST  362   42,3375  56 155 0          XCH     MPAC    +1
1802   REF   6  LAST  350   42,3376  0 7256 1          TC      SHORTMP
1803   REF   1              42,3377  0 3464 1          TC      MPACTST           ALARM IF MPAC NON ZERO (G/ 745)
1804   REF 150  LAST  362   42,3400  52 156 1          DXCH    MPAC    +1        STORE HOURS CONTRIBUTION
1805   REF   1              42,3401  52 124 1          DXCH    HITEMIN
1806   REF   3  LAST  354   42,3402  3 1207 0          CA      YREG              PUT YREG, YREGLP INTO MPAC, +1.
1807   REF   2  LAST   82   42,3403  23'212 1          LXCH    YREGLP
1808   REF 151  LAST  362   42,3404  52 155 1          DXCH    MPAC
1809   REF  14  LAST  362   42,3405  0 7052 1          TC      DMP
1810   REF   2  LAST  362   42,3406   03444 0          ADRES   WHOLECON
1811   REF   2  LAST  362   42,3407  0 3453 0          TC      RND/TST           ROUND OFF TO WHOLE MIN IN MPAC+1
1812   REF   1              42,3410  4 3451 0          CS      59MIN             ALARM IF MPAC NON ZERO (G/16383)
1813   REF   1              42,3411  0 3470 1          TC      SIZETST           ALARM IF MPAC+1 G/ 59MIN
1814   REF 152  LAST  362   42,3412  56 155 0          XCH     MPAC    +1
1815                       42,3413  0 0006 1          EXTEND
1816   REF   1              42,3414  7 3450 1          MP      MINCON            LEAVES MINUTES CONTRIBUTION IN A,L
1817   REF   2  LAST  362   42,3415  20 124 1          DAS     HITEMIN           ADD IN MINUTES CONTRIBUTION
1818                       42,3416  0 0006 1          EXTEND                    IF THIS DAS OVERFLOWS, G/ 745HR,39MIN
1819                       42,3417  1 3421 1          BZF     +2
1820   REF   9  LAST  362   42,3420  0 4173 0          TC      ALMCYCLE
1821   REF   3  LAST  354   42,3421  3 1210 0          CA      ZREG              PUT ZREG, ZREGLP INTO MPAC, +1.
1822   REF   2  LAST   82   42,3422  23'213 0          LXCH    ZREGLP
1823   REF 153  LAST  362   42,3423  52 155 1          DXCH    MPAC
1824   REF  15  LAST  362   42,3424  0 7052 1          TC      DMP
1825   REF   3  LAST  362   42,3425   03444 0          ADRES   WHOLECON
1826   REF   3  LAST  362   42,3426  0 3453 0          TC      RND/TST           ROUND OFF TO WHOLE CENTI-SEC IN MPAC+1
1827   REF   1              42,3427  4 3452 0          CS      59.99SEC          ALARM IF MPAC NON ZERO (G/163.83 SEC)
1828   REF   2  LAST  362   42,3430  0 3470 1          TC      SIZETST           ALARM IF MPAC+1 G/59.99 SEC
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1829   REF   3  LAST  362   42,3431  52 124 1            DXCH   HITEMIN      ADD IN SECONDS CONTRIBUTION
1830   REF 154  LAST  362   42,3432  20 155 1            DAS    MPAC         IF THIS DAS OVERFLOWS,
1831                        42,3433  0 0006 1            EXTEND              G/ 745 HR, 39 MIN, 14.55 SEC
1832                        42,3434  1 3436 1            BZF    +2
1833   REF  10  LAST  362   42,3435  0 4173 0            TC     ALMCYCLE     ALARM AND RECYCLE
1836   REF   3  LAST  352   42,3436  0 7224 1            TC     DPAGREE
1837   REF 155  LAST  363   42,3437  52 155 1            DXCH   MPAC
1838   REF  24  LAST  361   42,3440  50 145 1            INDEX  NOUNADD
1839                        42,3441  52 001 1            DXCH   0
1840   REF  22  LAST  360   42,3442  0 4655 0            TC     POSTJUMP
1841   REF   7  LAST  358   42,3443   63001 0            CADR   LOADLV

1842                        42,3444   00006 1 WHOLECON   OCT    00006        (10EXP5/2EXP14)2EXP14
1843                        42,3445   03240 1            OCT    03240
1844                        42,3446   00025 0 HRCON      OCT    00025        1 HOUR IN CENTI-SEC
1845                        42,3447   37100 1   +1       OCT    37100
1846                        42,3450   13560 0 MINCON     OCT    13560        1 MINUTE IN CENTI-SEC
1847                        42,3451   00073 0 59MIN      OCT    00073        59 AS WHOLE
1848                        42,3452   13557 1 59.99SEC   OCT    13557        5999 CENTI-SEC

1849   REF 156  LAST  363   42,3453  56 156 0 RND/TST    XCH    MPAC    +2   ROUNDS MPAC+2 INTO MPAC+1.
1850                        42,3454  6 0000 1            DOUBLE              ALARMS IF MPAC NOT 0
1851   REF 157  LAST  363   42,3455  54 156 1            TS     MPAC    +2
1852   REF  67  LAST  362   42,3456  3 4772 1            CAF    ZERO
1853   REF 158  LAST  363   42,3457  6 0155 0            AD     MPAC    +1
1854   REF 159  LAST  363   42,3460  54 155 1            TS     MPAC    +1
1855   REF  68  LAST  363   42,3461  3 4772 1            CAF    ZERO
1856   REF 160  LAST  363   42,3462  6 0154 1            AD     MPAC        CANT OVFLOW
1857   REF 161  LAST  363   42,3463  56 154 1            XCH    MPAC
1858   REF 162  LAST  363   42,3464  3 0154 1 MPACTST    CA     MPAC        ALARM IF MPAC NON ZERO
1859                        42,3465  0 0006 1            EXTEND
1860   REF   7  LAST  362   42,3466  1 6711 1            BZF    TCQ
1861   REF  11  LAST  363   42,3467  0 4173 0            TC     ALMCYCLE    ALARM AND RECYCLE.
1863   REF 163  LAST  363   42,3470  54 156 1 SIZETST    TS     MPAC    +2  CALLED WITH - CON IN A
1864   REF 164  LAST  363   42,3471  10 155 1            CCS    MPAC    +1  GET MAG OF MPAC+1
1865   REF  35  LAST  358   42,3472  6 4770 0            AD     ONE
1866                        42,3473  1 3475 0            TCF    +2
1867   REF  36  LAST  363   42,3474  6 4770 0            AD     ONE
1868   REF 165  LAST  363   42,3475  6 0156 0            AD     MPAC    +2
1869                        42,3476  0 0006 1            EXTEND              MAG OF MPAC+1 - CON
1870   REF   8  LAST  363   42,3477  6 6711 0            BZMF   TCQ
1871   REF  12  LAST  363   42,3500  0 4173 0            TC     ALMCYCLE    MAG OF MPAC+1 G/ CON. ALARM AND RECYCLE.
18825  REF   1              42,3501  4 4125 1 FORCEV25   CS     OCT31       FORCE VERB 25 TO BE EXECUTED BY RECYCLE
18826  REF   2  LAST  335   42,3502  55'244 0            TS     VERBSAVE     IN CASE OPERATOR EXECUTED A LOWER LOAD
18827  REF  13  LAST  363   42,3503  0 4173 0            TC     ALMCYCLE     VERB.  ALARM AND RECYCLE.
```

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P1884   MONITOR ALLOWS OTHER KEYBOARD ACTIVITY. IT IS ENDED BY VERB TERMINATE,
R1885   VERB PROCEED WITHOUT DATA, VERB RESEQUENCE,
R1886   ANOTHER MONITOR, OR ANY NVSUB CALL THAT PASSES THE DSPLOCK (PROVIDED
R18861  THAT THE OPERATOR HAS SOMEHOW ALLOWED THE ENDING OF A MONITOR WHICH
R18862  HE HAS INITIATED THROUGH THE KEYBOARD).

R1887   MONITOR ACTION IS SUSPENDED, BUT NOT ENDED, BY ANY KEYBOARD ACTION,
R1888   EXCEPT ERROR LIGHT RESET. IT BEGINS AGAIN WHEN KEY RELEASE IS PERFORMED.
R1889   MONITOR SAVES THE NOUN AND APPROPRIATE DISPLAY VERB IN MONSAVE. IT SAVES
R1890   NOUNCADR IN MONSAVE1, IF NOUN = MACHINE CADR TO BE SPECIFIED. BIT 15 OF
R1891   MONSAVE1 IS THE KILL MONITOR SIGNAL (KILLER BIT). BIT 14 OF MONSAVE1
R18911  INDICATES THE CURRENT MONITOR WAS EXTERNALLY INITIATED (EXTERNAL
R18912  MONITOR BIT). IT IS TURNED OFF BY RELDSP AND KILMONON.

R1892   MONSAVE INDICATES IF MONITOR IS ON(+=ON, +0=OFF)
R1893   IF MONSAVE IS +, MONITOR ENTERS NO REQUEST, BUT TURNS KILLER BIT OFF.
R1894   IF MONSAVE IS +0, MONITOR ENTERS REQUEST AND TURNS KILLER BIT OFF.

R1895   NVSUB (IF EXTERNAL MONITOR BIT IS OFF), VB=PROCEED WITHOUT DATA,
R1896   VB=RESEQUENCE, AND VB=TERMINATE TURN KILL MONITOR BIT ON.

R1897   IF KILLER BIT IS ON, MONREQ ENTERS NO FURTHER REQUESTS, ZEROS MONSAVE
R1898   AND MONSAVE1 (TURNING OFF KILLER BIT AND EXTERNAL MONITOR BIT).

R1899   MONITOR DOSENT TEST FOR MATBS SINCE NVSUB CAN HANDLE INTERNAL MATBS NOW
  1900  REF   3  LAST  353   41,2000                    SETLOC  PINBALL2
  19001                     41,3224                    BANK
  19005 REF   3 LAST  353 TO  359:   267   660*         COUNT*  $$/PIN
  1901  REF   1                 41,3224  4 4076 0 MONITOR CS     BIT15/14
  1902  REF   6  LAST  358     41,3225  7 1222 0         MASK    NOUNCADR
  1903  REF 166  LAST  363     41,3226  54 155 1 MONIT1  TS      MPAC    +1      TEMP STORAGE
  19031 REF   7  LAST  352     41,3227  4 0136 1         CS      ENTEXIT
  19032 REF   4  LAST  335     41,3230  6 4170 0         AD      ENDINST
  19033 REF 113  LAST  362     41,3231  10 000 0         CCS     A
  19034 REF   1                41,3232  0 3241 0         TC      MONIT2
  19035                        41,3233   75377 0 MONREF  OCT     75377           -DEC10,STARTING IN BIT8. CANNOT GET HERE
  19036 REF   2  LAST  364     41,3234  0 3241 0         TC      MONIT2
  19037 REF  23  LAST  343     41,3235  3 4753 1         CAF     BIT14           EXTERNALLY INITIATED MONITOR,
  19038 REF 167  LAST  364     41,3236  26 155 1         ADS     MPAC +1         SET BIT 14 FOR MONSAVE1.
  190381 REF  69  LAST  363    41,3237  3 4772 1         CAF     ZERO
  190382 REF   1               41,3240  55'225 1         TS      MONSAVE2        ZERO NVMONOPT OPTIONS
  1904  REF   3  LAST  221     41,3241  3 6043 0 MONIT2  CAF     LOW7
  1905  REF  18  LAST  342     41,3242  7 1204 1         MASK    VERBREG
  1906  REF   4  LAST  357     41,3243  0 4333 0         TC      LEFT5
  1907  REF   9  LAST  327     41,3244  54 022 0         TS      CYL
  1908  REF  10  LAST  364     41,3245  4 0022 0         CS      CYL
  1909  REF  11  LAST  364     41,3246  56 022 1         XCH     CYL
  1910  REF  11  LAST  353     41,3247  6 1205 1         AD      NOUNREG
  1911  REF 168  LAST  364     41,3250  54 154 0         TS      MPAC            TEMP STORAGE
  1912  REF  70  LAST  364     41,3251  3 4772 1         CAF     ZERO
```

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1913  REF   3  LAST  326   41,3252  55'215 1          TS      OSPLOCK     +  INTO OSPLOCK SO MONITOR CAN RUN.
1914  REF   4  LAST  335   41,3253  11'245 1          CCS     CADRSTOR    TURN OFF KR LITE IF CADRSTOR AND DSPLIST
1915                       41,3254  0 3256 0          TC      +2          ARE BOTH EMPTY. (LITE COMES ON IF NEW
1916  REF   1               41,3255  0 4455 1          TC      RELDSPI     MONITOR IS KEYED IN OVER OLD MONITOR )
1917                       41,3256  0 0004 0          INHINT
1918  REF   2  LAST  204   41,3257  11'223 1          CCS     MONSAVE
1919                       41,3260  0 3263 0          TC      +3          IF MONSAVE WAS +, NO REQUEST
1921  REF   1               41,3261  0 5222 0          TC      TWIDBIT1    IF MONSAVE WAS 0, REQUEST MONREQ
1923  REF   1               41,3262   03267 1         ADRES   MONREQ
1924  REF 169  LAST  364   41,3263  52 155 1          DXCH    MPAC        PLACE MONITOR VERB AND NOUN INTO MONSAVE
1925  REF   3  LAST  365   41,3264  53'224 0          DXCH    MONSAVE     ZERO THE KILL MONITOR BIT
1926                       41,3265  0 0003 1          RELINT              SET UP EXTERNAL MONITOR BIT
1927  REF   4  LAST  334   41,3266  0 0136 0          TC      ENTRET


1928  REF   1               41,3267  0 4366 0  MONREQ  TC      LODSAMPT    CALLED BY WAITLIST
1929  REF   1               41,3270  0 3307 0          TC      B15MONCK    CHECK FOR KILLER BIT
1933  REF   1               41,3271  0 3303 1          TC      KILLMON     IF KILLER BIT = 1, NO REQUESTS
1934  REF   1               41,3272  3 5016 0          CAF     MONDEL
1935  REF   7  LAST  244   41,3273  0 5233 0  TCWAIT  TC      WAITLIST    ENTER WAITLIST REQUEST FOR MONREQ
1936  REF  34  LAST  358      1202                    EBANK=  DSPCOUNT
1937  REF   2  LAST  365   41,3274   03267 1         2CADR   MONREQ
1937                       41,3275   62102 0
1938  REF   1               41,3276  3 4346 1          CAF     CHRPRIO
1939  REF   7  LAST  312   41,3277  0 5121 0  TCNOVAC TC      NOVAC       ENTER EXEC REQUEST FOR MONDO
1940  REF  35  LAST  365      1202                    EBANK=  DSPCOUNT
1941  REF   1               41,3300   03314 1         2CADR   MONDO
1941  REF   1               41,3301   62102 0
1942  REF  11  LAST  261   41,3302  0 5314 1          TC      TASKOVER


1943  REF  71  LAST  364   41,3303  3 4772 1  KILLMON CAF     ZERO        ZERO MONSAVE AND TURN KILLER BIT OFF
1944  REF   4  LAST  365   41,3304  55'223 1          TS      MONSAVE
1945  REF   2  LAST  204   41,3305  55'224 0          TS      MONSAVE1    TURN OFF KILL MONITOR BIT.
1946  REF  12  LAST  365   41,3306  0 5314 1          TC      TASKOVER    TURN OFF EXTERNAL MONITOR BIT.
1947  REF   1                  5016           MONDEL  EQUALS  1SEC
19471 REF   3  LAST  365   41,3307  11'224 0  B15MONCK CCS     MONSAVE1    CHECK FOR KILLER BIT=1
19473                      41,3310  1 3311 0          TCF     +1          =0
19475 REF  82  LAST  361   41,3311  24 002 0          INCR    Q           =0
19477 REF  83  LAST  365   41,3312  0 0002 0          TC      Q           =1
19479 REF  84  LAST  365   41,3313  0 0002 0          TC      Q           =1
1948  REF   2  LAST  365   41,3314  0 3307 0  MONDO   TC      B15MONCK    CHECK FOR KILLER BIT
1952  REF  31  LAST  332   41,3315  0 5205 0          TC      ENDOFJOB    IN CASE TERMINATE CAME SINCE LAST MONREQ
1953  REF   4  LAST  365   41,3316  11'215 1          CCS     DSPLOCK
1954  REF   1               41,3317  0 3337 0          TC      MONBUSY     NVSUB IS BUSY
1955  REF   4  LAST  364   41,3320  3 6043 0          CAF     LOW7
1956  REF   5  LAST  365   41,3321  7 1223 1          MASK    MONSAVE
1958  REF   1               41,3322  0 2315 1          TC      UPDATNN -1  PLACE NOUN INTO NOUNREG AND DISPLAY IT
1960  REF   1               41,3323  3 4171 1          CAF     MID7
1961  REF   6  LAST  365   41,3324  7 1223 1          MASK    MONSAVE     CHANGE MONITOR VERB TO DISPLAY VERB
1962  REF   1               41,3325  6 3233 0          AD      MONREF      -DEC10, STARTING IN BIT8
```

```
1963  REF   1                  41,3326  54 023 1          TS      EDOP          RIGHT 7
1964  REF   2  LAST  366       41,3327  3 0023 0          CA      EDOP
1965  REF  19  LAST  364       41,3330  55'204 1          TS      VERBREG
1966  REF   1                  41,3331  3 2433 1          CAF     MONBACK       SET RETURN TO PASTEVB AFTER DATA DISPLAY
1967  REF   5  LAST  365       41,3332  54 136 1          TS      ENTRET
1968  REF   2  LAST  364       41,3333  4 4076 0          CS      BIT15/14
1969  REF   4  LAST  365       41,3334  7 1224 0          MASK    MONSAVE1      PUT ECADR INTO MPAC +2. INTMCTBS WILL
1970  REF 170  LAST  365       41,3335  54 156 1          TS      MPAC    +2    DISPLAY IT AND SET NOUNCADR, NOUNADD,
1971  REF   1                  41,3336  0 2050 0 ENDMONDO TC      TESTNN        EBANK.

19715 REF   2  LAST  142        4076                BIT15/14 EQUALS RELTAB11      OCT 60000
197201 REF  1                   4000                         SETLOC FFTAG8
197202                          4151                         BANK

19725 REF   2 LAST  141 TO  142:    12     12*               COUNT* $$/PIN
1973  REF   2  LAST  365       4151  3 4171 1  PASTEVB  CAF     MID7
1974  REF   2  LAST  364       4152  7 1225 1           MASK    MONSAVE2      NVMONOPT PASTE OPTION
1975                          4153  0 0006 1           EXTEND
1976                          4154  1 4156 0           BZF     +2
1977  REF   1                 4155  0 4157 0           TC      PASTEOPT      PASTE PLEASE VERB FOR NVMONOPT
1978  REF   7  LAST  365       4156  3 1223 0           CA      MONSAVE       PASTE MONITOR VERB - PASTE OPTION IS 0
19782 REF   3  LAST  366       4157  54 023 1  PASTEOPT TS      EDOP          RIGHT 7
19783 REF   4  LAST  366       4160  3 0023 0           CA      EDOP          PLACE MONITOR VERB OR PLEASE VERB INTO
197832 REF 52  LAST  350       4161  0 4636 0           TC      BANKCALL       VERBREG AND DISPLAY IT.
197833 REF  7  LAST  355       4162   62336 0           CADR    UPDATVB -1
197835 REF 72  LAST  365       4163  3 4772 1           CAF     ZERO          ZERO REQRET SO THAT PASTED VERBS CAN
197838 REF 10  LAST  339       4164  55'216 1           TS      REQRET         BE EXECUTED BY OPERATOR.
19784 REF   3  LAST  366       4165  3 1225 0           CA      MONSAVE2
19785 REF   1                 4166  0 4264 0           TC      BLANKSUB      PROCESS NVMONOPT BLANK OPTION IF ANY
19786                         4167  0 4170 0           TC      +1
19787 REF  32  LAST  365       4170  0 5205 0  ENDPASTE TC      ENDOFJOB

19788 REF   1                 4170                ENDINST  EQUALS ENDPASTE
1979                          4171   37600 0      MID7     OCT     37600


19795                         4172   00034 0      OCT34    OCT     34
1980  REF   4  LAST  364     41,2000                       SETLOC  PINBALL2
19801                       41,3337                       BANK
19805 REF   4 LAST  364 TO  366:     75    735*            COUNT* $$/PIN
1983  REF   2  LAST  326     41,3337  0 4356 0  MONBUSY  TC      RELDSPON      TURN KEY RELEASE LIGHT
1984  REF  33  LAST  366     41,3340  0 5205 0           TC      ENDOFJOB


R1985   DSPFMEM IS USED TO DISPLAY (IN OCTAL) ANY FIXED REGISTER.
R1986   IT IS USED WITH NOUN = MACHINE CADR TO BE SPECIFIED. THE FCADR OF THE
R1987   DESIRED LOCATION IS THEN PUNCHED IN. IT HANDLES F/F ( FCADR 4000-7777)

R19871  FOR BANKS L/E 27, THIS IS ENOUGH.
```

R19872 FOR BANKS G/E 30, THE THIRD COMPONENT OF NOUN 26 (PRIO, ADRES, BBCON)
R19873 MUST BE PRELOADED WITH THE DESIRED SUPERBANK BITS (BITS 5,6,7).
R19874 V23N26 SHOULD BE USED.

R19875 SUMMARY
R19876 FOR BANKS L/E 27, V27N01E(FCADR)E
R19877 FOR BANKS G/E 30, V23N26E(SUPERBITS)E V27N01E(FCADR)E

```
 1988   REF  12  LAST  352   41,3341  3 4321 0  DSPFMEM  CAF   R1D1        IF F/F, DATACALL USES BANK 02 OR 03.
 1989   REF  36  LAST  365   41,3342  55'202 1           TS    DSPCOUNT
19891   REF  13  LAST  295   41,3343  3 1252 0           CA    DSPTEM1 +2  SUPERBANK BITS WERE PRELOADED INTO
19892   REF  45  LAST  357   41,3344  54 001 1           TS    L           3RD COMPONENT OF NOUN 26.
 1990   REF   7  LAST  364   41,3345  3 1222 1           CA    NOUNCADR    ORIGINAL FCADR LOADED STILL IN NOUNCADR.
 1991   REF   1              41,3346  0 4671 0           TC    SUPDACAL    CALL WITH FCADR IN A, SUPERBITS IN L.
 1992   REF   3  LAST  342   41,3347  0 3351 0           TC    DSPOCTWD
 1993   REF  34  LAST  366   41,3350  0 5205 0  ENDSPF   TC    ENDOFJOB
```

P1994 WORD DISPLAY ROUTINES

```
 1995   REF   5  LAST  359   40,2000                          SETLOC  PINBALL1
 19951                       40,3055                          BANK
 19955  REF   5 LAST  359 TO  362:   113   557*                COUNT*  $$/PIN
 1996   REF  85  LAST  365   40,3055  56 002 0  DSPSIGN       XCH     Q
 1997   REF   1              40,3056  54 144 1                TS      DSPWDRET
 1998   REF 171  LAST  366   40,3057  10 154 0                CCS     MPAC
 1999   REF   1              40,3060  1 3070 1                TCF     TCPLON
 2000   REF   2  LAST  368   40,3061  1 3070 1                TCF     TCPLON
 2001   REF  37  LAST  363   40,3062  6 4770 0                AD      ONE
 2002   REF 172  LAST  368   40,3063  54 154 0                TS      MPAC
 2003   REF   3  LAST  331   40,3064  0 2330 0                TC      -ON
 2004   REF 173  LAST  368   40,3065  4 0155 1                CS      MPAC  +1
 2005   REF 174  LAST  368   40,3066  54 155 1                TS      MPAC    +1
 2006   REF   2  LAST  368   40,3067  0 0144 0                TC      DSPWDRET
 2007   REF   3  LAST  347   40,3070  0 2310 1  TCPLON        TC      +ON
 2008   REF   3  LAST  368   40,3071  0 0144 0                TC      DSPWDRET
```

R2018 DSPDECWD CONVERTS C(MPAC, MPAC+1) INTO A SIGN AND 5 CHAR DECIMAL
R2019 STARTING IN LOC SPECIFIED IN DSPCOUNT. IT ROUNDS BY 5 EXP-6.

```
 2020   REF  86  LAST  368   40,3072  56 002 0  DSPDECWD XCH     Q
 2021   REF   1              40,3073  54 115 0                TS      WDRET
 2022   REF   1              40,3074  0 3055 1                TC      DSPSIGN
 20222                       40,3075  0 0006 1                EXTEND                  ROUND BY 5 EXP-6
 20225  REF   1              40,3076  3 2343 1                DCA     DECROUND -1
 20227  REF 175  LAST  368   40,3077  20 155 1                DAS     MPAC
 2023                        40,3100  0 0006 1                EXTEND
 20232                       40,3101  1 3105 1                BZF     +4
 20235                       40,3102  0 0006 1                EXTEND
 20237  REF   1              40,3103  3 4750 1                DCA     DPOSMAX
 20239  REF 176  LAST  368   40,3104  52 155 1                DXCH    MPAC
 2024   REF   4  LAST  314   40,3105  3 4766 1                CAF     FOUR
 2025   REF   1              40,3106  54 137 0  DSPDCWD1      TS      WDCNT
 2026   REF   2  LAST  143   40,3107  3 4355 0                CAF     BINCON
 2027   REF   7  LAST  362   40,3110  0 7256 1                TC      SHORTMP
 2028   REF 177  LAST  368   40,3111  3 0154 1                CA      MPAC
 2029   REF   2  LAST  327   40,3112  0 4423 0                TC      CODSTOR
 2032   REF  73  LAST  366   40,3113  3 4772 1                CAF     ZERO
 2033   REF 178  LAST  368   40,3114  56 156 0                XCH     MPAC    +2
 2034   REF 179  LAST  368   40,3115  56 155 0                XCH     MPAC    +1
 2035   REF 180  LAST  368   40,3116  54 154 0                TS      MPAC
 2038   REF   3  LAST  350   40,3117  10 143 0                CCS     COUNT
 2039   REF  37  LAST  367   40,3120  55'202 1                TS      DSPCOUNT
 2040   REF   4  LAST  350   40,3121  0 3161 1                TC      DSPIN
 2041   REF   2  LAST  368   40,3122  10 137 0                CCS     WDCNT
 2042   REF   1              40,3123  0 3106 0                TC      DSPDCWD1
 2043   REF   4  LAST  356   40,3124  0 4261 0                TC      -VD1SET
 2045   REF   2  LAST  368   40,3125  0 0115 1                TC      WDRET
```

```
R2054   DSPDC2NR CONVERTS C( MPAC,MPAC+1) INTO A SIGN AND 2 CHAR DECIMAL
R2055   STARTING IN LOC SPECIFIED IN DSPCOUNT. IT DOES NOT ROUND

 2056   REF  87  LAST  368   40,3126  56 002 0  DSPDC2NR XCH   Q
 2057   REF   3  LAST  368   40,3127  54 115 0            TS    WDRET
 2058   REF   2  LAST  368   40,3130   0 3055 1           TC    DSPSIGN
 2059   REF  38  LAST  368   40,3131   3 4770 0     +3    CAF   ONE
 2060   REF   2  LAST  368   40,3132   0 3106 0           TC    DSPDCWD1

R2061   DSP2DEC CONVERTS C(MPAC) AND C(MPAC+1) INTO A SIGN AND 10 CHAR DECIMAL
R2062   STARTING IN THE LOC SPECIFIED IN DSPCOUNT.

 2063   REF  88  LAST  369   40,3133  56 002 0  DSP2DEC  XCH   Q
 2064   REF   4  LAST  369   40,3134  54 115 0            TS    WDRET
 2065   REF  74  LAST  368   40,3135   3 4772 1           CAF   ZERO
 2066   REF   5  LAST  350   40,3136  54 124 1           TS    CODE
 2067   REF  15  LAST  350   40,3137   3 6214 0           CAF   THREE
 2068   REF   3  LAST  330   40,3140   0 3247 0           TC    11DSPIN      -R2 OFF
 2069   REF   5  LAST  368   40,3141   3 4766 1           CAF   FOUR
 2070   REF   4  LAST  369   40,3142   0 3247 0           TC    11DSPIN      +R2 OFF
 2071   REF   3  LAST  369   40,3143   0 3055 1           TC    DSPSIGN
 2072   REF   4  LAST  349   40,3144   3 4322 0           CAF   R2D1
 2073   REF   3  LAST  369   40,3145   0 3106 0  END2DEC  TC    DSPDCWD1

R2074   DSPDECVN DISPLAYS C(A) UPON ENTRY AS A 2 CHAR DECIMAL BEGINNING IN THE
R2075   DSP LOC SPECIFIED IN DSPCOUNT.
R2076   C(A) SHOULD BE IN FORM N X 2EXP-14. THIS IS SCALED TO FORM N/100 BEFORE
R2077   DISPLAY CONVERSION.

 2078                        40,3146   0 0006 1  DSPDECVN EXTEND
 2079   REF   1              40,3147   7 2244 0           MP    VNDSPCON     MULT BY .01
 2080   REF 181  LAST  368   40,3150  22 154 1            LXCH  MPAC         TAKE RESULTS FROM L.(MULT BY 2EXP14).
 2081   REF  75  LAST  369   40,3151   3 4772 1           CAF   ZERO
 2082   REF 182  LAST  369   40,3152  54 155 1           TS    MPAC    +1
 2083   REF  89  LAST  369   40,3153  56 002 0           XCH   Q
 2084   REF   5  LAST  369   40,3154  54 115 0           TS    WDRET
 2085   REF   3  LAST  350   40,3155   0 3131 1           TC    DSPDC2NR +3  NO SIGN, NO ROUND, 2 CHAR

 2087   REF   3  LAST  348   40,3156   0 3146 1  GOVNUPDT TC    DSPDECVN     THIS IS NOT FOR GENERAL USE. REALLY PART
 2088   REF  23  LAST  363   40,3157   0 4655 0           TC    POSTJUMP     OF UPDATVB.
 2089   REF   2  LAST  339   40,3160    62346 1           CADR  UPDAT1  +2

 2091   REF   5  LAST  366   41,2000                      SETLOC PINBALL2
 20911                       41,3351                      BANK
 20915  REF   5 LAST  366 TO  368:    10    745*          COUNT* $$/PIN
R2092   DSPOCTWD DISPLAYS C(A) UPON ENTRY AS A 5 CHAR OCT STARTING IN THE DSP
R2093   CHAR SPECIFIED IN DSPCOUNT. IT STOPS AFTER 5 CHAR HAVE BEEN DISPLAYED.
```

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```
2094   REF  12  LAST  364   41,3351  54 022 0  DSPOCTWD TS     CYL
2095   REF  90  LAST  369   41,3352  56 002 0           XCH    Q
2096   REF   6  LAST  369   41,3353  54 115 0           TS     WDRET      MUST USE SAME RETURN AS DSP2BIT.
2097   REF  24  LAST  364   41,3354  3 4753 1           CAF    BIT14      TO BLANK SIGNS
2098   REF  38  LAST  368   41,3355  27'202 1           ADS    DSPCOUNT
2099   REF   6  LAST  369   41,3356  3 4766 1           CAF    FOUR
2100   REF   3  LAST  368   41,3357  54 137 0  WDAGAIN  TS     WDCNT
2101   REF  13  LAST  370   41,3360  4 0022 0           CS     CYL
2102   REF  14  LAST  370   41,3361  4 0022 0           CS     CYL
2103   REF  15  LAST  370   41,3362  4 0022 0           CS     CYL
2104   REF 114  LAST  364   41,3363  4 0000 0           CS     A
2105   REF   1              41,3364  7 4774 0           MASK   DSPMSK
2106   REF   3  LAST  368   41,3365  0 4423 0           TC     CODSTOR
2112   REF 115  LAST  370   41,3366  10 000 0           CCS    A          DECREMENT DSPCOUNT EXCEPT AT +0
2113   REF  39  LAST  370   41,3367  55'202 1           TS     DSPCOUNT
2114   REF  24  LAST  369   41,3370  0 4655 0           TC     POSTJUMP
2115   REF   1              41,3371   61255 1           CADR   DSPOCTIN
2116   REF   4  LAST  370   41,3372  10 137 0  OCTBACK  CCS    WDCNT
2117   REF   1              41,3373  0 3357 0           TC     WDAGAIN    +
2118   REF   5  LAST  368   41,3374  0 4261 0  DSPLV    TC     -VDISET
2120   REF   7  LAST  370   41,3375  0 0115 1           TC     WDRET

2121   REF   7  LAST  358        4774                   DSPMSK =      SEVEN
```

```
R2135   FOR DSPIN PLACE 0/25 OCT INTO COUNT, 5 BIT RELAY CODE INTO CODE. BOTH
R2136   ARE DESTROYED. IF BIT14 OF COUNT IS 1, SIGN IS BLANKED WITH LEFT CHAR.
R2137   FOR DSPIN1 PLACE 0,1 INTO BIT11 OF CODE, 2 INTO COUNT, REL ADDRESS OF
R2138   DSPTAB ENTRY INTO DSREL.

2139   REF   6  LAST  368   40,2000                    SETLOC PINBALL1
21391                       40,3161                    BANK
21395  REF   6 LAST  368 TO  369:    68    625*       COUNT* $$/PIN

2140   REF  91  LAST  370   40,3161  56 002 0  DSPIN   XCH    Q          CANT USE L FOR RETURN, SINCE MANY OF THE
2141   REF   1              40,3162  54 114 1           TS     DSEXIT     ROUTINES CALLING DSPIN USE L AS RETURN.
2142   REF   4  LAST  357   40,3163  3 4342 0           CAF    LOW5
2143   REF   4  LAST  368   40,3164  7 0143 0           MASK   COUNT
2144   REF   6  LAST  356   40,3165  54 021 0           TS     SR
2145   REF   7  LAST  370   40,3166  56 021 1           XCH    SR
2146   REF   1              40,3167  54 141 1           TS     DSREL
2147   REF  22  LAST  279   40,3170  3 4770 0           CAF    BIT1
2148   REF   5  LAST  370   40,3171  7 0143 0           MASK   COUNT
2149   REF 116  LAST  370   40,3172  10 000 0           CCS    A
2150                        40,3173  0 3175 1           TC     +2         LEFT IF COUNT IS ODD
2151   REF   1              40,3174  0 3211 0           TC     DSPIN1 -1  RIGHT IF COUNT IS EVEN
2152   REF   6  LAST  369   40,3175  56 124 0           XCH    CODE
21523                       40,3176  6 0000 1           DOUBLE             SHIFT LEFT 5 (DON'T USE CYL)
21526                       40,3177  6 0000 1           DOUBLE
2153                        40,3200  6 0000 1           DOUBLE
21533                       40,3201  6 0000 1           DOUBLE
```

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21536                          40,3202  6 0000 1          DOUBLE
2154   REF   7  LAST  370      40,3203  54 124 1          TS     CODE
2155   REF  25  LAST  370      40,3204  3 4753 1          CAF    BIT14
2156   REF   6  LAST  370      40,3205  7 0143 0          MASK   COUNT
2157   REF 117  LAST  370      40,3206  10 000 0          CCS    A
2158   REF  19  LAST  361      40,3207  3 4767 0          CAF    TWO      BIT14 = 1, BLANK SIGN
2159   REF  39  LAST  369      40,3210  6 4770 0          AD     ONE      BIT14 = 0, LEAVE SIGN ALONE
2160   REF   7  LAST  371      40,3211  54 143 0    -1    TS     COUNT    +0 INTO COUNT FOR RIGHT
A2161                                                                    +1 INTO COUNT FOR LEFT(SIGN LEFT ALONE)
A2162                                                                    +3 INTO COUNT FOR LEFT(TO BLANK SIGN)
2163                           40,3212  0 0004 0  DSPIN1  INHINT
2164   REF   2  LAST  370      40,3213  50 141 0          INDEX  DSREL
2165   REF  26  LAST  333      40,3214  11'226 1          CCS    DSPTAB
2166                           40,3215  0 3217 0          TC     +2       IF +
2167                           40,3216  00104 1   ERCON   OCT    104      CHAN 11, BITS 3,7. CANNOT GET HERE
2168   REF  40  LAST  371      40,3217  6 4770 0          AD     ONE      IF-
2169   REF   1                40,3220  54 142 1          TS     DSMAG
2170   REF   8  LAST  371      40,3221  50 143 1          INDEX  COUNT
2171   REF   1                40,3222  7 3243 0          MASK   DSMSK
2172                           40,3223  0 0006 1          EXTEND
2173   REF   8  LAST  371      40,3224  60 124 0          SU     CODE
2174                           40,3225  0 0006 1          EXTEND
2175   REF   1                40,3226  1 3241 1          BZF    DSLV     SAME
2176   REF   9  LAST  371      40,3227  50 143 1  DFRNT   INDEX  COUNT
2177   REF   2  LAST  371      40,3230  4 3243 0          CS     DSMSK    MASK WITH 77740,76037,75777, OR 74037
2178   REF   2  LAST  371      40,3231  7 0142 1          MASK   DSMAG
2179   REF   9  LAST  371      40,3232  6 0124 0          AD     CODE
2180   REF 118  LAST  371      40,3233  4 0000 0          CS     A
2181   REF   3  LAST  371      40,3234  50 141 0          INDEX  DSREL
2182   REF  27  LAST  371      40,3235  57'226 0          XCH    DSPTAB
2183                           40,3236  0 0006 1          EXTEND
2184   REF   2  LAST  371      40,3237  6 3241 0          BZMF   DSLV     DSPTAB ENTRY WAS -
2185   REF   7  LAST  333      40,3240  25'221 1          INCR   NOUT     DSPTAB ENTRY WAS +
2186                           40,3241  0 0003 1  DSLV    RELINT
2187   REF   2  LAST  370      40,3242  0 0114 0          TC     DSEXIT

2188                           40,3243   00037 0  DSMSK   OCT    37
2189                           40,3244   01740 0          OCT    1740
2190                           40,3245   02000 0          OCT    2000
2191                           40,3246   03740 1          OCT    3740

R2192  FOR 11DSPIN, PUT REL ADDRESSS OF DSPTAB ENTRY INTO A, 1 IN BIT11 OR 0 IN
R2193  BIT11 OF CODE.

2194   REF   4  LAST  371      40,3247  54 141 1  11DSPIN TS     DSREL
2195   REF  20  LAST  371      40,3250  3 4767 0          CAF    TWO
2196   REF  10  LAST  371      40,3251  54 143 0          TS     COUNT
2197   REF  92  LAST  370      40,3252  56 002 0          XCH    Q        MUST USE SAME RETURN AS DSPIN
2198   REF   3  LAST  371      40,3253  54 114 1          TS     DSEXIT
```

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 2199   REF   2  LAST  370   40,3254  0 3212 0            TC     DSPIN1


 2200   REF   5  LAST  368   40,3255  0 3161 1  DSPOCTIN  TC     DSPIN          SO DSPOCTWD DOESNT USE SWCALL
 2202   REF  25  LAST  370   40,3256  0 4655 0            TC     POSTJUMP
 2203   REF   1              40,3257   63372 1  ENDSPOCT  CADR   OCTBACK


R2204   DSPALARM FINDS TC NVSUBEND IN ENTRET FOR NVSUB INITIATED ROUTINES.
R2205   ABORT WITH 21501
R2206   DSPALARM FINDS TC ENDOFJOB IN ENTRET FOR KEYBOARD INITIATED ROUTINES.
R2207   DC TC ENTRET.

22075   REF   6  LAST  370   40,3260  0 4261 0  PREDSPAL  TC     -VD1SET
 2208   REF   1              40,3261  4 3431 0  DSPALARM  CS     NVSBENDL
 2209   REF   8  LAST  364   40,3262  6 0136 0            AD     ENTEXIT
 2210                        40,3263  0 0006 1            EXTEND
 2211   REF  16  LAST  327   40,3264  1 3277 1            BZF    CHARALRM +2
22111   REF   1              40,3265  4 2721 0            CS     MONADR         IF THIS IS A MONITOR, KILL IT
22112   REF   9  LAST  372   40,3266  6 0136 0            AD     ENTEXIT
22113                        40,3267  0 0006 1            EXTEND
22114                        40,3270  1 3272 1            BZF    +2
22115   REF  17  LAST  372   40,3271  0 3275 1            TC     CHARALRM
22116   REF   1              40,3272  0 4235 1            TC     KILMONON
22117   REF   5  LAST  257   40,3273  0 4362 1            TC     FALTON
22118   REF   3  LAST  359   40,3274  0 4151 0            TC     PASTEVB        PUT MONITOR VERB BACK IN VERBREG
 2212   REF   6  LAST  372   40,3275  0 4362 1  CHARALRM  TC     FALTON         NOT NVSUB INITIATED. TURN ON OPR ERROR
 2213   REF  35  LAST  367   40,3276  0 5205 0            TC     ENDOFJOB
 2214   REF   1              40,3277  0 5726 1  +2        TC     PODOO
 2217                        40,3300   21501 0            OCT    21501          KEYBOARD + ALARM DISPLAY DURING NVSUB.

R2219   ALMCYCLE TURNS ON CHECK FAIL LIGHT, REDISPLAYS THE ORIGINAL VERB THAT
R2220   WAS EXECUTED, AND RECYCLES TO EXECUTE THE ORIGINAL VERB/NOUN COMBINATION
R2221   THAT WAS LAST EXECUTED. USED FOR BAD DATA DURING LOAD VERBS AND BY
R2222   MCTBS. ALSO BY MMCHANG IF 2 NUMERICAL CHARACTERS WERE NOT PUNCHED IN
R2223   FOR MM CODE.

 2224   REF   2  LAST  366        4000                    SETLOC FFTAG8
22241                           4173                    BANK
22245   REF   3 LAST  366 TO  366:    18     30*         COUNT* $$/PIN
 2225   REF   7  LAST  372        4173  0 4362 1  ALMCYCLE TC     FALTON         TURN ON CHECK FAIL LIGHT.
 2228   REF   3  LAST  363        4174  4 1244 0            CS     VERBSAVE       GET ORIGINAL VERB THAT WAS EXECUTED
 2229   REF  11  LAST  366        4175  55'216 1            TS     REQRET         SET FOR ENTPAS
 2230   REF  53  LAST  366        4176  0 4636 0            TC     BANKCALL       PUTS ORIGINAL VERB INTO VERBREG AND
 2231   REF   8  LAST  366        4177   62336 0            CADR   UPDATVB -1     DISPLAYS IT IN VERB LIGHTS.
 2232   REF  26  LAST  372        4200  0 4655 0  ENTERJMP  TC     POSTJUMP
 2233   REF   1                   4201   62000 0  ENDALM    CADR   ENTER


R2234   MMCHANG USES NOUN DISPLAY UNTIL ENTER. THEN IT USES MODE DISP.
```

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R2235   IT GOES TO MODROUT WITH THE NEW M M CODE IN A, BUT NOT DISPLAYED IN
R2236   MM LIGHTS.
R2237   IT DEMANDS 2 NUMERICAL CHARACTERS BE PUNCHED IN FOR NEW MM CODE.
R2238   IF NOT, IT RECYCLES.

 2239   REF   6  LAST  369   41,2000                          SETLOC  PINBALL2
 22391                      41,3376                          BANK
 22395  REF   6 LAST  369 TO  370:     21   766*             COUNT*  $$/PIN
 2240   REF   1               41,3376   0 3417 0  MMCHANG   TC      REQMM        ENTPASHI ASSUMES THE TC REQMM AT MMCHANG
A2241                                                                             IF THIS MOVES AT ALL, MUST CHANGE
A2242                                                                             MMADREF AT ENTPASHI.
 2243   REF  16  LAST  261   41,3377   3 4764 0    +1        CAF     BIT5         OCT20 = ND2.
 2244   REF  40  LAST  370   41,3400   6 1202 0              AD      DSPCOUNT     DSPCOUNT MUST = -ND2.
 2245                       41,3401   0 0006 1              EXTEND               DEMAND THAT 2 NUM CHAR WERE PUNCHED IN.
 2246                       41,3402   1 3404 0              BZF     +2
 2247   REF  14  LAST  363   41,3403   0 4173 0              TC      ALMCYCLE     DSPCOUNT NOT= -ND2. ALARM AND RECYCLE.
 2248   REF  76  LAST  369   41,3404   3 4772 1              CAF     ZERO         DSPCOUNT = -ND2.
 2249   REF  12  LAST  364   41,3405   57'205 1              XCH     NOUNREG
 2250   REF 183  LAST  369   41,3406   54 154 0              TS      MPAC
 2251   REF   4  LAST  354   41,3407   3 4352 1              CAF     ND1
 2252   REF  41  LAST  373   41,3410   55'202 1              TS      DSPCOUNT
 2253   REF  54  LAST  372   41,3411   0 4636 0              TC      BANKCALL
 2254   REF   4  LAST  333   41,3412    60473 1              CADR    2BLANK
 2255   REF   7  LAST  372   41,3413   0 4261 0              TC      -VD1SET
 2257   REF 184  LAST  373   41,3414   3 0154 1              CA      MPAC
 2258   REF  27  LAST  372   41,3415   0 4655 0              TC      POSTJUMP
 2259   REF   1               41,3416    10007 1              CADR    MODROUTB     GO THRU STANDARD LOC.


 2260   REF   2  LAST  276   04,2007            MODROUTB =    V37
 2261   REF  93  LAST  371   41,3417   4 0002 1 REQMM    CS      Q
 2262   REF  12  LAST  372   41,3420   55'216 1              TS      REQRET
 2263   REF   5  LAST  373   41,3421   3 4352 1              CAF     ND1
 2264   REF  42  LAST  373   41,3422   55'202 1              TS      DSPCOUNT
 2265   REF  77  LAST  373   41,3423   3 4772 1              CAF     ZERO
 2266   REF  13  LAST  373   41,3424   55'205 0              TS      NOUNREG
 2267   REF  55  LAST  373   41,3425   0 4636 0              TC      BANKCALL
 2268   REF   5  LAST  373   41,3426    60473 1              CADR    2BLANK
 2269   REF   3  LAST  339   41,3427   0 4360 0              TC      FLASHON
 2270   REF  41  LAST  371   41,3430   3 4770 0              CAF     ONE
 2271   REF  18  LAST  362   41,3431   55'203 0              TS      DECBRNCH     SET FOR DEC
 2272   REF  10  LAST  372   41,3432   0 0136 0              TC      ENTEXIT


R2273   VBRQEXEC ENTERS REQUEST TO EXEC     FOR ANY ADDRESS WITH ANY PRIORITY.
R2274   IT DOES ENDOFJOB AFTER ENTERING REQUEST. DISPLAY SYST IS RELEASED.
R2275   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2276   COMPONENT 1  PRIORITY(BITS 10-14) BIT1=0 FOR NOVAC, BIT1=1 FOR FINDVAC.
R2277   COMPONENT 2  JOB ADRES (12 BIT )
R2278   COMPONENT 3  BBCON
```

```
2279   REF  23  LAST  370   41,3433  3 4770 0  VBRQEXEC CAF   BIT1
2280   REF   2  LAST  283   41,3434  7 1016 0           MASK  N26/PRI
2281   REF 119  LAST  371   41,3435  10 000 0           CCS   A
2282   REF   1               41,3436  0 3460 0           TC    SETVAC          IF BIT1 = 1, FINDVAC
2283   REF   1               41,3437  3 3277 0           CAF   TCNOVAC         IF BIT1 = 0, NOVAC
2284   REF 185  LAST  373   41,3440  54 154 0  REQEX1    TS    MPAC            TC NOVAC  OR  TC FINDVAC INTO MPAC
2285   REF   2  LAST  205   41,3441  3 7660 0           CA    PRIO37
2286   REF   3  LAST  374   41,3442  7 1016 0           MASK  N26/PRI
2287   REF 186  LAST  374   41,3443  54 160 1    -1    TS    MPAC +4         PRIO INTO MPAC +4 AS A TEMP
2288   REF   7  LAST  356   41,3444  0 4432 0  REQUESTC TC    RELDSP
22881  REF   4  LAST  374   41,3445  3 1016 1           CA    N26/PRI
22882                        41,3446  0 0006 1           EXTEND
22883  REF  17  LAST  343   41,3447  1 2350 1           BZF   GODSPALM        OP ERROR AND EOJ IF R1 OF N26 =
2289   REF   5  LAST  364   41,3450  3 4170 0           CA    ENDINST
2290   REF 187  LAST  374   41,3451  54 157 0           TS    MPAC    +3      TC ENDOFJOB INTO MPAC+3
2291                         41,3452  0 0006 1           EXTEND
2292   REF   1               41,3453  3 1020 1           DCA   N26/2CAD        JOB ADRES INTO MPAC +1
2293   REF 188  LAST  374   41,3454  52 156 1           DXCH  MPAC    +1      BBCON INTO MPAC+2
2294   REF 189  LAST  374   41,3455  3 0160 0           CA    MPAC    +4      PRIO IN A
2295                         41,3456  0 0004 0           INHINT
2296   REF 190  LAST  374   41,3457  0 0154 1           TC    MPAC

2297   REF   1               41,3460  3 4345 1  SETVAC   CAF   TCFINDVC
2298   REF   1               41,3461  0 3440 1           TC    REQEX1
```

```
R2299  VBRQWAIT ENTERS REQUEST TO WAITLIST FOR ANY ADDRESS WITH ANY DELAY.
R2300  IT DOES ENDOFJOB AFTER ENTERING REQUEST.DISPLAY SYST IS RELEASED.
R2301  IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2302  COMPONENT 1  DELAY (LOW BITS)
R2303  COMPONENT 2  TASK ADRES (12 BIT)
R2304  COMPONENT 3  BBCON

2305   REF   1               41,3462  3 3273 1  VBRQWAIT CAF   TCWAIT
2306   REF 191  LAST  374   41,3463  54 154 0           TS    MPAC            TC WAITLIST INTO MPAC
2307   REF   5  LAST  374   41,3464  3 1016 1           CA    N26/PRI         TIME DELAY
2308   REF   1               41,3465  0 3443 1  ENDRQWT  TC    REQUESTC -1

R2309  REQUESTC WILL PUT TASK ADRES INTO MPAC+1, BBCON INTO MPAC+2,
R2310  TC ENDOFJOB INTO MPAC+3. IT WILL TAKE TIME DELAY OUT OF MPAC+4 AND
R2311  LEAVE IT IN A, INHINT AND TC MPAC.

2312   REF   7  LAST  370   40,2000                     SETLOC PINBALL1
23121                        40,3301                     BANK
23125  REF   7 LAST  370 TO  372:    80    705*         COUNT* $$/PIN
2313   REF  42  LAST  373   40,3301  4 4770 1  VBPROC   CS    ONE
2314   REF   2  LAST  356   40,3302  55'217 0    +1     TS    LOADSTAT
2315   REF   2  LAST  372   40,3303  0 4235 1           TC    KILMONON        TURN ON KILL MONITOR BIT
2316   REF   8  LAST  374   40,3304  0 4432 0           TC    RELDSP
2317   REF   3  LAST  334   40,3305  0 4417 1           TC    FLASHOFF
```

```
 2318   REF   2  LAST  356   40,3306  0 3412 0          TC      RECALTST        SEE IF THERE IS ANY RECALL FROM ENDIDLE

 2319   REF  21  LAST  371   40,3307  4 4767 1  VBTERM  CS      TWO
 2320   REF   2  LAST  337   40,3310  0 3302 0          TC      VBPROC  +1      TERM VERB SETS LOADSTAT NEG

R23201  PROCKEY PERFORMS THE SAME FUNCTION AS VBPROC.  IT MUST BE CALLED UNDER
R23202  EXECUTIVE CONTROL, WITH CHRPRIO.
232033 REF  20  LAST  366   40,3311  4 1204 1  PROCKEY  CS      VERBREG         DONT ALLOW PROCEED DURING LOAD.
232036 REF   3  LAST  355   40,3312  6 4354 1           AD      VBSP2LD
23204                       40,3313  0 0006 1           EXTEND
232043 REF 120  LAST  374   40,3314  26 000 0           DIM     A
232046                      40,3315  0 0006 1           EXTEND
23205  REF  18  LAST  372   40,3316  1 3275 0           BZF     CHARALRM
232053 REF  78  LAST  373   40,3317  3 4772 1  PROCKEY1 CAF     ZERO            SET REQRET FOR ENTER PASS .
23206  REF  13  LAST  373   40,3320  55'216 1           TS      REQRET
23207  REF   8  LAST  373   40,3321  0 4261 0           TC      -VDISET
23209  REF   3  LAST  375   40,3322  0 3301 0           TC      VBPROC

R2321   VBRESEQ WAKES ENDIDLE AT SAME LINE AS FINAL ENTER OF LOAD (L+3).
R2322   (MAIN USE IS INTENDED AS RESPONSE TO INTERNALLY INITIATED FLASHING
R2323    DISPLAYS IN ENDIDLE. SHOULD NOT BE USED WITH LOAD VERBS,PLEASE PERFORM,
R2324    OR PLEASE MARK VERBS BECAUSE THEY ALREADY USE L+3 IN ANOTHER CONTEXT.)

 2325   REF  79  LAST  375   40,3323  4 4772 0  VBRESEQ  CS      ZERO            MAKE IT LOOK LIKE DATA IN.
 2326   REF   4  LAST  375   40,3324  0 3302 0           TC      VBPROC +1

R2327   FLASH IS TURNED OFF BY PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE,
R2328   END OF LOAD.
```

```
P2329   KEY RELEASE ROUTINE

R2330   THIS ROUTINE ALWAYS TURNS OFF THE UPACT LIGHT AND ALWAYS CLEARS DSPLOCK.

R2331   THE HIGHEST PRIORITY FUNCTION OF THE KEY RELEASE BUTTON IS THE
R2332   UNSUSPENDING OF A SUSPENDED MONITOR WHICH WAS EXTERNALLY INITIATED.
R2333   THIS FUNCTION IS ACCOMPLISHED BY CLEARING DSPLOCK AND TURNING OFF
R2334   THE KEY RELEASE LIGHT IF BOTH DSPLIST AND CADRSTOR ARE EMPTY.

R2335   IF NO SUCH MONITOR EXISTS, THEN RELDSP IS EXECUTED TO CLEAR DSPLOCK
R2336   AND THE EXTERNAL MONITOR BIT (FREEING THE DISPLAY SYSTEM FOR INTERNAL
R2337   USE), TURN OFF THE KEY RELEASE LIGHT, AND WAKE UP ANY JOB IN DSPLIST.

R2338   IN ADDITION IF THERE IS A JOB IN ENDIDLE, THEN CONTROL IS TRANSFERRED
R2339   TO PINBRNCH (IN DISPLAY INTERFACE ROUTINE) TO RE-EXECUTE THE SERIES OF
R23391  NVSUB CALLS ETC. THAT PRECEDED THE ENDIDLE CALL STILL AWAITING RESPONSE.
R2340   THIS FEATURE IS INTENDED FOR USE WHEN THE OPERATOR HAS BEEN REQUESTED TO
R2341   RESPOND TO SOME INTERNAL ACTION THAT USED ENDIDLE, BUT HE HAS WRITTEN
R2342   OVER THE INFORMATION ON THE DISPLAY PANEL BY SOME DISPLAYS OF HIS OWN
R2343   INITIATION WHICH DO NOT SERVE AS RESPONSES. HITTING KEY RLSE WILL
R2344   RE-ESTABLISH THE DISPLAYS TO THE STATE THEY WERE IN BEFORE HE OBSCURED
R2345   THEM, SO THAT HE CAN SEE THE WAITING REQUEST.  THIS WORKS ONLY FOR
R2346   INTERNAL PROGRAMS THAT USED ENDIDLE THROUGH MARGARETS DISPLAY
R2347   SUBROUTINES.

2348    REF  19  LAST  351  40,3325  4 4766 0  VBRELDSP  CS      BIT3
2349                        40,3326  0 0006 1            EXTEND
2350    REF   9  LAST  202  40,3327  03 011 1            WAND    DSALMOUT    TURN OFF UPACT LITE
2351    REF   2  LAST  326  40,3330  10 115 0            CCS     21/22REG    OLD DSPLOCK
2352    REF  26  LAST  371  40,3331  3 4753 1            CAF     BIT14
2353    REF   5  LAST  366  40,3332  7 1224 0            MASK    MONSAVE1    EXTERNAL MONITOR BIT (EMB)
2354    REF 121  LAST  375  40,3333  10 000 0            CCS     A
2355    REF   1             40,3334  0 3343 0            TC      UNSUSPEN    OLD DSPLOCK AND EMB BOTH 1, UNSUSPEND.
2356    REF   9  LAST  374  40,3335  0 4432 0  TSTLTS4   TC      RELDSP      NOT UNSUSPENDING EXTERNAL MONITOR,
2357    REF   5  LAST  365  40,3336  11'245 1            CCS     CADRSTOR     RELEASE DISPLAY SYSTEM AND
2358                        40,3337  0 3341 1            TC      +2           DO RE-ESTABLISH IF CADRSTOR IS FULL.
2359    REF  36  LAST  372  40,3340  0 5205 0            TC      ENDOFJOB
2360    REF  28  LAST  373  40,3341  0 4655 0            TC      POSTJUMP
2361    REF   4  LAST  274  40,3342  21275 1            CADR    PINBRNCH
2362    REF  80  LAST  375  40,3343  3 4772 1  UNSUSPEN  CAF     ZERO        EXTERNAL MONITOR IS SUSPENDED,
2363    REF   5  LAST  365  40,3344  55'215 1            TS      DSPLOCK      JUST UNSUSPEND IT BY CLEARING DSPLOCK.
2364    REF   6  LAST  376  40,3345  11'245 1            CCS     CADRSTOR     TURN KEY RELEASE LIGHT OFF IF BOTH
2365    REF  37  LAST  376  40,3346  0 5205 0            TC      ENDOFJOB     CADRSTOR AND DSPLIST ARE EMPTY.
2366    REF   2  LAST  365  40,3347  0 4455 1            TC      RELDSP1
23661   REF  38  LAST  376  40,3350  0 5205 0            TC      ENDOFJOB
```

```
P2368   NVSUB IS USED FOR SUB ROUTINE CALLS FROM WITHIN COMPUTER. IT CAN BE
R2369   USED TO CALL THE COMBINATION OF ANY DISPLAY, LOAD, OR MONITOR VERB
R2370   TOGETHER WITH ANY NOUN AVAILABLE TO THE KEYBOARD.
R23701  PLACE OVVVVVVVNNNNNNN INTO A.
R23702  V-S ARE THE 7 BIT VERB CODE.  N-S ARE THE 7 BIT NOUN CODE.

R23703  IF NVSUB IS CALLED WITH THE FOLLOWING NEGATIVE NUMBERS (RATHER THAN THE
R23704  VERB-NOUN CODE) IN A, THEN THE DISPLAY IS BLANKED AS FOLLOWS-
R23705   -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

R2371   NVSUB CAN BE USED WITH MACH CADR TO BE SPEC BY PLACING THE CADR INTO
R2372   MPAC+2 BEFORE THE STANDARD NVSUB CALL.

R2373    NVSUB RETURNS TO 2+ CALLING LOC AFTER PERFORMING TASK, IF DISPLAY
R2374   SYSTEM IS AVAILABLE. THE NEW NOUN AND VERB CODES ARE DISPLAYED.
R2375   IF V:S =0, THE NEW NOUN CODE IS DISPLAYED ONLY(RETURN WITH NO FURTHER
R2376   ACTION). IF N-S =0, THE NEW VERB CODE IS DISPLAYED ONLY(RETURN WITH NO
R2377   FURTHER ACTION).

R2378   IT RETURNS TO 1+ CALLING LOC WITHOUT PERFORMING TASK, IF DISPLAY
R2379   SYSTEM IS BLOCKED (NOTHING IS DISPLAYED IN THIS CASE).
R2380   IT DOES TC ABORT (WITH OCT 01501) IF IT ENCOUNTERS A DISPLAY PROGRAM
R2381   ALARM CONDITION BEFORE RETURN TO CALLER.

R2382   THE DISPLAY SYSTEM IS BLOCKED BY THE DEPRESSION OF ANY
R2383   KEY, EXCEPT ERROR LIGHT RESET
R2384   IT IS RELEASED BY THE KEY RELEASE BUTTON, ALL EXTENDED VERBS,
R2385   PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE, INITIALIZE EXECUTIVE,
R2386   RECALL PART OF RECALTST IF ENDIDLE WAS USED,
R2387   VE = REQUEST EXECUTIVE, VB = REQUEST WAITLIST,
R2388   MONITOR SET UP.

R23881  THE DISPLAY SYSTEM IS ALSO BLOCKED BY THE EXTERNAL MONITOR BIT, WHICH
R23882  INDICATES AN EXTERNALLY INITIATED MONITOR IS RUNNING (SEE MONITOR)

R2389   A NVSUB CALL THAT PASSES DSPLOCK AND THE EXTERNAL MONITOR BIT ENDS OLD
R23891  MONITOR.

R2390   DSPLOCK IS THE INTERLOCK FOR USE OF KEYBOARD AND DISPLAY SYSTEM WHICH
R2391   LOCKS OUT INTERNAL USE WHENEVER THERE IS EXTERNAL KEYBOARD ACTION.

R23911  NVSUB SHOULD BE USED TWICE IN SUCCESSION FOR :PLEASE PERFORM: SITUATIONS
R23912  (SIMILARLY FOR PLEASE MARK). FIRST PLACE THE CODED NUMBER FOR WHAT
R23913  ACTION IS DESIRED OF OPERATOR INTO THE REGISTERS REFERRED TO BY THE
R23914  :CHECKLIST: NOUN. GO TO NVSUB WITH A DISPLAY VERB AND THE :CHECKLIST:
R23915  NOUN. GO TO NVSUB AGAIN WITH THE :PLEASE PERFORM: VERB AND ZEROS IN THE
R23916  LOW 7 BITS. THIS :PASTES UP: THE :PLEASE PERFORM: VERB INTO THE VERB
R23917  LIGHTS.

R23918  NVMONOPT IS AN ENTRY SIMILAR TO NVSUB, BUT REQUIRING AN ADDITIONAL
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R239181 PARAMETER IN L. IT SHOULD BE USED ONLY WITH A MONITOR VERB-NOUN CODE IN
R239182 A. AFTER EACH MONITOR DISPLAY A *PLEASE* VERB WILL BE PASTED IN THE VERB
R239183 LIGHTS OR DATA WILL BE BLANKED (OR BOTH) ACCORDING TO THE OPTIONS
R239184 SPECIFIED IN L. IF BITS 8-14 OF L ARE OTHER THAN ZERO, THEN THEY WILL
R239185 BE INTERPRETED AS A VERB CODE AND PASTED IN THE VERB LIGHTS. (THIS VERB
R239186 CODE SHOULD DESIGNATE ONE OF THE *PLEASE* VERBS.) IF BITS 1-3 OF L ARE
R239187 OTHER THAN ZERO, THEN THEY WILL BE USED TO BLANK DATA BY BEING FED TO
R239188 BLANKSUB. IF NVMONOPT IS USED WITH A VERB OTHER THAN A MONITOR VERB,
R239189 THE PARAMETER IN L HAS NO EFFECT.

R2392   NVSUB IN FIXED-FIXED PLACES 2+CALLING LOC INTO NVQTEM, TC NVSUBEND INTO
R2393   ENTRET. (THIS WILL RESTORE OLD CALLING BANK BITS)

 2394   REF   3 LAST  372      4000                        SETLOC  FFTAG8
 23941                         4202                        BANK
 23945  REF   4 LAST  372 TO  373:     7    37*            COUNT*  $$/PIN
 2395                  4202  22 007 0  NVSUB    LXCH    7           ZERO NVMONOPT OPTIONS
 2396   REF   1        4203  54 123 0  NVMONOPT TS      NVTEMP
 2397   REF   1        4204  23'242 1            LXCH    NVQTEM
 2398   REF  94 LAST  373    4205  22 002 0            LXCH    Q
 2399   REF   1        4206  0 4226 0            TC      EMBDSPCK    CHECK FOR DSP SYST AVAILABLE
 2400   REF   2 LAST  378    4207  23'242 1            LXCH    NVQTEM      2+ CALLING LOC INTO NVQTEM
 24005  REF   4 LAST  366    4210  23'225 0            LXCH    MONSAVE2    STORE NVMONOPT OPTIONS
 2401   REF   3 LAST  374    4211  0 4235 1            TC      KILMONON    TURN ON KILL MONITOR BIT
 2402   REF   1        4212  3 4223 0  NVSUBCOM CAF     NVSBBBNK

 2403   REF   9 LAST  140    4213  56 006 1            XCH     BBANK
 24031                 4214  0 0006 1            EXTEND              SAVE OLD SUPERBITS
 24032  REF   3 LAST  257    4215  04 007 1            ROR     SUPERBNK
 2404   REF   1        4216  55'243 1            TS      NVBNKTEM
 24041  REF   2 LAST  257    4217  3 4223 0            CAF     PINSUPBT
 24042                 4220  0 0006 1            EXTEND
 24043  REF   4 LAST  378    4221  01 007 1            WRITE   SUPERBNK

 2405   REF   1        4222  0 3513 0            TC      NVSUBB      GO TO NVSUB1 THRU STANDARD LOC
 2406   REF  43 LAST  373    1202                       EBANK=  DSPCOUNT
 2407   REF   2 LAST  334    4223   62102 0  NVSBBBNK BBCON   NVSUB1

 24071  REF   2 LAST  378    4223              PINSUPBT =      NVSBBBNK    CONTAINS THE PINBALL SUPERBITS.

 2412   REF   3 LAST  378    4224  53'243 1  NVSUBEND DXCH    NVQTEM      NVBNKTEM MUST = NVQTEM+1
 2413   REF   1        4225  0 5214 0            TC      SUPDXCHZ    DTCB WITH SUPERBIT SWITCHING

 24131  REF  27 LAST  376    4226  3 4753 1  EMBDSPCK CAF     BIT14
 24132  REF   6 LAST  376    4227  7 1224 0            MASK    MONSAVE1    EXTERNAL MONITOR BIT
 24133  REF   6 LAST  376    4230  6 1215 0            AD      DSPLOCK
 24134  REF 122 LAST  376    4231  10 000 0            CCS     A
 24135  REF  46 LAST  367    4232  0 0001 0            TC      L           DSP SYST BLOCKED. RET TO 1+ CALLING LOC
 24136  REF  47 LAST  378    4233  24 001 0            INCR    L           DSP SYST OK. SET RET TO 2+ CALLING LOC
 24137  REF  95 LAST  378    4234  0 0002 0            TC      Q
 2414   REF   7 LAST  373  41,2000                      SETLOC  PINBALL2
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 241405 REF   7 LAST  373 TO  374:    56   822*          COUNT* $$/PIN
 24141                        41,3466                    BANK
R241412 BLANKDSP BLANKS DISPLAY ACCORDING TO OPTION NUMBER IN NVTEMP AS FOLLOWS
R241415  -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

 241419 REF   8 LAST  370   41,3466  6 4774 1  BLANKDSP AD      SEVEN          7,8,9,OR 10 (A HAD 0,1,2,OR 3)
 241422                     41,3467  0 0004 0            INHINT
 241425 REF  10 LAST  371   41,3470  54 124 1     +2     TS      CODE           BLANK SPECIFIED DSPTABS
 241429 REF  20 LAST  360   41,3471  4 4755 0            CS      BIT12
 241432 REF  11 LAST  379   41,3472  50 124 0            INDEX   CODE
 241435 REF  28 LAST  371   41,3473  57'226 0            XCH     DSPTAB
 241439 REF 123 LAST  378   41,3474  10 000 0            CCS     A
 241442 REF   8 LAST  371   41,3475  25'221 1            INCR    NOUT
 241445                     41,3476  0 3477 0            TC      +1
 241449 REF  12 LAST  379   41,3477  10 124 1            CCS     CODE
 241452 REF   1             41,3500  0 3470 1            TC      BLANKDSP +2
 241455                     41,3501  0 0003 1            RELINT
 241459 REF   2 LAST  378   41,3502  50 123 1            INDEX   NVTEMP
 241462                     41,3503  0 3510 0            TC      +5
 241465                     41,3504  0 3505 1            TC      +1             NVTEMP HAS -4 (NEVER TOUCH MODREG)
 241469 REF  21 LAST  375   41,3505  55'204 1            TS      VERBREG                -3
 241472 REF  14 LAST  373   41,3506  55'205 0            TS      NOUNREG                -2
 241475 REF  12 LAST  355   41,3507  55'220 1            TS      CLPASS                 -1
 241479 REF   9 LAST  375   41,3510  0 4261 0            TC      -VD1SET
 241485 REF   4 LAST  374   41,3511  0 4417 1            TC      FLASHOFF       PROTECT AGAINST INVISIBLE FLASH
 241489 REF   1             41,3512  0 3534 0            TC      ENTSET -2      ZEROS REQRET

  2415  REF   2 LAST  379   41,3513  3 3536 1  NVSUB1    CAF     ENTSET         IN BANK
  2416  REF   6 LAST  366   41,3514  54 136 1            TS      ENTRET         SET RETURN TO NVSUBEND
 24161  REF   3 LAST  379   41,3515  10 123 0            CCS     NVTEMP         WHAT NOW
 24162                      41,3516  0 3522 1            TC      +4             NORMAL NVSUB CALL (EXECUTE VN OR PASTE)
 24163  REF  18 LAST  374   41,3517  0 2350 0            TC      GODSPALM
 24164  REF   2 LAST  379   41,3520  0 3466 0            TC      BLANKDSP       BLANK DISPLAY AS SPECIFIED
 24165  REF  19 LAST  379   41,3521  0 2350 0            TC      GODSPALM
  2417  REF   5 LAST  365   41,3522  3 6043 0            CAF     LOW7
  2418  REF   4 LAST  379   41,3523  7 0123 0            MASK    NVTEMP
  2419  REF 192 LAST  374   41,3524  54 157 0            TS      MPAC    +3     TEMP FOR NOUN (CANT USE MPAC. DSPDECVN
  2420  REF   5 LAST  379   41,3525  3 0123 1            CA      NVTEMP                 USES MPAC, +1, +2
  2422  REF   5 LAST  366   41,3526  54 023 1            TS      EDOP           RIGHT 7
  2423  REF   6 LAST  379   41,3527  3 0023 0            CA      EDOP
  2424  REF 193 LAST  379   41,3530  54 160 1            TS      MPAC    +4     TEMP FOR VERB (CANT USE MPAC+1. DSPDECVN
A 2425                                                                         USES MPAC, +1, +2)
  2426  REF 194 LAST  379   41,3531  10 157 0            CCS     MPAC    +3     TEST NOUN
  2427  REF   1             41,3532  0 3537 0            TC      NVSUB2         IF NOUN NOT +0, GO ON
  2429  REF   9 LAST  372   41,3533  0 2335 0            TC      UPDATVB -2     IF NOUN=+0, DISPLAY VERB, THEN RETURN
 24291  REF  81 LAST  376   41,3534  3 4772 1     -2     CAF     ZERO           ZERO REQRET SO THAT PASTED VERBS CAN
 24292  REF  14 LAST  375   41,3535  55'216 1            TS      REQRET         BE EXECUTED BY OPERATOR.
  2430  REF   1             41,3536  0 4224 1  ENTSET    TC      NVSUBEND
  2431  REF 195 LAST  379   41,3537  10 160 1  NVSUB2    CCS     MPAC +4        TEST VERB
  2432                      41,3540  1 3543 1            TCF     +3             IF VERB NOT +0, GO ON
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 2434   REF   2 LAST  365    41,3541  0 2314 0          TC     UPDATNN -2      IF VERB=+0, DISPLAY NOUN, THEN RETURN
 2435   REF   2 LAST  379    41,3542  0 4224 1          TC     NVSUBEND
 2436   REF 196 LAST  379    41,3543  3 0156 0          CA     MPAC    +2      TEMP FOR MACH CADR TO BE SPEC. (DSPDECVN
 2437   REF 197 LAST  380    41,3544  54 161 0          TS     MPAC    +5                  USES MPAC, +1, +2)
 2440   REF  10 LAST  379    41,3545  0 2335 0          TC     UPDATVB -2      IF BOTH NOUN AND VERB NOT +0, DISPLAY
 2441   REF   3 LAST  380    41,3546  0 2314 0          TC     UPDATNN -2      BOTH AND GO TO ENTPASO
 2442   REF  82 LAST  379    41,3547  3 4772 1          CAF    ZERO
 2443   REF   3 LAST  374    41,3550  55'217 0          TS     LOADSTAT        SET FOR WAITING FOR DATA CONDITION
 2444   REF  13 LAST  379    41,3551  55'220 1          TS     CLPASS
 2445   REF  15 LAST  379    41,3552  55'216 1          TS     REQRET          SET REQRET FOR PASS 0.
 2446   REF 198 LAST  380    41,3553  3 0161 1          CA     MPAC    +5      RESTORES MACH CADR TO BE SPEC TO MPAC+2
 2447   REF 199 LAST  380    41,3554  54 156 1          TS     MPAC    +2      FOR USE IN INTMCTBS (IN ENTPASO).
 2448   REF   3 LAST  334    41,3555  0 2040 1 ENDNVSB1 TC     ENTPASO

R2449   IF INTERNAL MACH CADR TO BE SPECIFIED, MPAC+2 WILL BE PLACED INTO
R2450   NOUNCADR IN ENTPASO (INTMCTBS ).

 2451   REF   4 LAST  378       4000                   SETLOC FFTAG8
 24511                          4235                   BANK
 24515  REF   5 LAST  378 TO 379:    27     64*        COUNT* $$/PIN
A2452                                                  FORCE BIT 15 OF MONSAVE1 TO 1.
 2453   REF  29 LAST  355       4235  3 4752 0 KILMONON CAF    BIT15             THIS IS THE KILL MONITOR BIT.
 2454   REF   7 LAST  378       4236  55'224 0          TS     MONSAVE1        TURN OFF BIT 14, THE EXTERNAL
A2455                                                   MONITOR BIT.
 2458   REF  96 LAST  378       4237  0 0002 0          TC     Q

R2459   LOADSTAT  +0 INACTIVE(WAITING FOR DATA). SET BY NVSUB
R2460             -1 PROCEED NO DATA SET BY V33 OR PROCEED
R2461             -2 TERMINATE SET BY V34
R2462            -0    DATA IN      SET BY END OF LOAD ROUTINE
R2463               OR RESEQUENCE   SET BY VERB 32


R2464   L  TC ENDIDLE  (FIXED FIXED)
R2465   ROUTINES THAT REQUEST LOADS THROUGH NVSUB SHOULD USE ENDIDLE WHILE
R2466   WAITING FOR THE DATA TO BE LOADED. ENDIDLE PUTS CURRENT JOB TO SLEEP.
R2467   ENDIDLE CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2468   SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.
R2469   RECALTST TESTS LOADSTAT AND WAKES JOB UP TO,
R2470   L+1 FOR TERMINATE ,PROCEED WITHOUT DATA, DATA IN , OR RESEQUENCE
R2473   IT DOES NOTHING IF LOADSTAT INDICATES WAITING FOR DATA.


R2474   ENDIDLE ABORTS (WITH CODE 21206) IF A SECOND JOB ATTEMPTS TO GO TO SLEEP
R2475   IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO ENDIDLE WHEN
R2476   1) CADRSTOR NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF ENDIDLE IS
R2477   EXCEEDED. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)
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R2478   2) DSPLIST NOT= +0. THIS INDICATES A JOB IS ALREADY ASLEEP DUE TO
R2479   NVSUBUSY.

R2488   ENDIDLE MOVED TO DISPLAY INTERFACE ROUTINES
 2489   REF   7  LAST  376     4240  11'245 1  ISCADR+0 CCS    CADRSTOR      ABORTS (CODE 01206) IF CADRSTOR NOT= +0.
 2490   REF   1                4241  0 4245 0           TC     DSPABORT      RETURNS IF CADRSTOR = +0.
 2493   REF   2  LAST  204     4242  11'246 1           CCS    DSPLIST       ABORT (CODE 01206) IF DSPLIST NOT = +0.
 2494   REF   2  LAST  381     4243  0 4245 0           TC     DSPABORT      RETURNS IF DSPLIST = +0.
 2495   REF  97  LAST  380     4244  0 0002 0           TC     Q
 2496   REF   2  LAST  372     4245  0 5726 1  DSPABORT TC     PODOOO
 2497                          4246   21206 0           OCT    21206         SECOND JOB TRYING TO GO TO SLEEP

R2498   JAMTERM ALLOWS PROGRAMS TO PERFORM THE TERMINATE FUNCTION.
R2499   IT DOES ENDOFJOB.

 2500   REF   3  LAST  378     4247  3 4223 0  JAMTERM  CAF    PINSUPBT
 2501                          4250  0 0006 1           EXTEND
 25011  REF   5  LAST  378     4251  01 007 1           WRITE  SUPERBNK
 25012  REF   2  LAST  215     4252  3 4260 1           CAF    34DEC
 25013  REF  16  LAST  380     4253  55'216 1           TS     REQRET        LEAVE ENTER SET FOR ENTPASS0.
 25014  REF  22  LAST  379     4254  55'204 1           TS     VERBREG
 2502   REF  10  LAST  379     4255  0 4261 0           TC     -VD1SET
 2504   REF  29  LAST  376     4256  0 4655 0           TC     POSTJUMP
 2505   REF   2  LAST  337     4257   61307 1           CADR   VBTERM
 2506                          4260   00042 1  34DEC    DEC    34

 2507   REF   4  LAST  339     4261  4 4351 0  -VD1SET  CS     VD1
 2508   REF  44  LAST  378     4262  55'202 1           TS     DSPCOUNT
 2509   REF  98  LAST  381     4263  0 0002 0           TC     Q
R2532   BLANKSUB BLANKS ANY COMBINATION OF R1, R2, R3.
R2533   CALL WITH BLANKING CODE IN A.
R2534   BIT1=1 BLANKS R1, BIT2=1 BLANKS R2, BIT3=1 BLANKS R3.
R2535   ANY COMBINATION OF THESE BITS IS ACCEPTED.

R2536   DSPCOUNT IS RESTORED TO STATE IT WAS IN BEFORE BLANKSUB WAS EXECUTED.

 2538   REF   9  LAST  379     4264  7 4774 0  BLANKSUB MASK   SEVEN
 25381  REF   6  LAST  379     4265  54 123 0           TS     NVTEMP        STORE BLANKING CODE IN NVTEMP.
 2539   REF  99  LAST  381     4266  22 002 0           LXCH   Q
 2540   REF   2  LAST  378     4267  0 4226 0           TC     EMBDSPCK      CHECK FOR DSP SYST AVAILABLE
 25411  REF   7  LAST  381     4270  10 123 0           CCS    NVTEMP
 25412                          4271  1 4273 1           TCF    +2
 25413  REF  48  LAST  378     4272  0 0001 0           TC     L             NOTHING TO BLANK. RET TO 2+ CALLING LOC
 2544   REF   1                4273  3 4304 1           CAF    BLNKBBNK
 2545   REF  10  LAST  378     4274  56 006 1           XCH    BBANK
 25451                          4275  0 0006 1           EXTEND
 25452  REF   6  LAST  381     4276  04 007 1           ROR    SUPERBNK      SAVE OLD SUPERBITS.
 2546   REF  40  LAST  342     4277  52 131 0           DXCH   BUF
```

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25461  REF   4  LAST  381      4300  3 4223 0          CAF     PINSUPBT
25462                          4301  0 0006 1          EXTEND
25463  REF   7  LAST  381      4302  01 007 1          WRITE   SUPERBNK
2547   REF   1                 4303  0 3351 0          TC      BLNKSUB1

2548   REF  45  LAST  381      1202                    EBANK=  DSPCOUNT
25481  REF   2  LAST  382      4304   60102 1  BLNKBBNK BBCON   BLNKSUB1
2549                           4305            ENDBLFF EQUALS

2550   REF   8  LAST  374   40,2000                    SETLOC  PINBALL1
25501                        40,3351                    BANK
25505  REF   8 LAST  374 TO  378:    40   745*         COUNT*  $$/PIN
2551   REF  46  LAST  382   40,3351  3 1202 0 BLNKSUB1 CA      DSPCOUNT     SAVE OLD DSPCOUNT FOR LATER RESTORATION
25511  REF  41  LAST  381   40,3352  54 132 0           TS      BUF     +2
25512  REF  24  LAST  374   40,3353  3 4770 0           CAF     BIT1         TEST BIT1. SEE IF R1 TO BE BLANKED.
2552   REF   1              40,3354  0 3373 0           TC      TESTBIT
2553   REF  13  LAST  367   40,3355  3 4321 0           CAF     R1D1
2554   REF   4  LAST  347   40,3356  0 2430 1           TC      5BLANK -1
2555   REF  19  LAST  242   40,3357  3 4767 0           CAF     BIT2         TEST BIT 2. SEE IF R2 TO BE BLANKED.
2556   REF   2  LAST  382   40,3360  0 3373 0           TC      TESTBIT
2557   REF   5  LAST  369   40,3361  3 4322 0           CAF     R2D1
2558   REF   5  LAST  382   40,3362  0 2430 1           TC      5BLANK -1
2559   REF  20  LAST  376   40,3363  3 4766 1           CAF     BIT3         TEST BIT3. SEE IF R3 TO BE BLANKED.
2560   REF   3  LAST  382   40,3364  0 3373 0           TC      TESTBIT
2561   REF   5  LAST  348   40,3365  3 4323 1           CAF     R3D1
2562   REF   6  LAST  382   40,3366  0 2430 1           TC      5BLANK -1
2563   REF  42  LAST  382   40,3367  3 0132 1           CA      BUF     +2   RESTORE DSPCOUNT TO STATE IT HAD
2564   REF  47  LAST  382   40,3370  55'202 1           TS      DSPCOUNT          BEFORE BLANKSUB.
2565   REF  43  LAST  382   40,3371  52 131 0           DXCH    BUF          CALL L+2 DIRECTLY.
2566   REF   2  LAST  378   40,3372  0 5215 1           TC      SUPDXCHZ +1  DTCB WITH SUPERBIT SWITCHING

2567   REF   8  LAST  381   40,3373  7 0123 0 TESTBIT   MASK    NVTEMP       NVTEMP CONTAINS BLANKING CODE.
2568   REF 124  LAST  379   40,3374  10 000 0           CCS     A
2569   REF 100  LAST  381   40,3375  0 0002 0           TC      Q            IF CURRENT BIT = 1, RETURN TO L+1.
2570   REF   1              40,3376  1 6710 0           TCF     Q+2          IF CURRENT BIT = 0, RETURN TO L+3
2574   REF   1              40,3377  3 4353 0 DSPMMJB   CAF     MD1          GETS HERE THRU DSPMM
2575   REF  48  LAST  382   40,3400  57'202 0           XCH     DSPCOUNT
2576   REF   1              40,3401  54 140 0           TS      DSPMMTEM     SAVE DSPCOUNT
2579   REF   6  LAST  271   40,3402  11'214 0           CCS     MODREG
2580   REF  43  LAST  374   40,3403  6 4770 0           AD      ONE
25801  REF   4  LAST  369   40,3404  0 3146 1           TC      DSPDECVN     IF MODREG IS + OR +0, DISPLAY MODREG
25802                        40,3405  0 3407 1           TC      +2           IF MODREG IS -NZ, DO NOTHING
25803  REF   6  LAST  373   40,3406  0 2473 0           TC      2BLANK       IF MODREG IS -0, BLANK MM
2581   REF   2  LAST  382   40,3407  56 140 1           XCH     DSPMMTEM     RESTORE DSPCOUNT
2582   REF  49  LAST  382   40,3410  55'202 1           TS      DSPCOUNT
2583   REF  39  LAST  376   40,3411  0 5205 0           TC      ENDOFJOB


R2584  RECALTST IS ENTERED DIRECTLY AFTER DATA IS LOADED (OR RESEQUENCE VERB IS
R2585  EXECUTED), TERMINATE VERB IS EXECUTED, OR PROCEED WITHOUT DATA VERB IS
```

R2586 EXECUTED. IT WAKES UP JOB THAT DID TC ENDIDLE.

R2587 IF CADRSTOR NOT= +0, IT PUTS +0 INTO DSPLOCK, AND TURNS OFF KEY RLSE
R2588 LIGHT IF DSPLIST IS EMPTY (LEAVES KEY RLSE LIGHT ALONE IF NOT EMPTY).

```
 2589  REF   8  LAST  381   40,3412  11'245 1  RECALTST CCS    CADRSTOR
 2590  REF   1               40,3413  0 3415 1           TC     RECAL1
 2591  REF  40  LAST  382   40,3414  0 5205 0           TC     ENDOFJOB      NORMAL EXIT IF KEYBOARD INITIATED
 2592  REF  83  LAST  380   40,3415  3 4772 1  RECAL1   CAF    ZERO
 2593  REF   9  LAST  383   40,3416  57'245 0           XCH    CADRSTOR
 2594                       40,3417  0 0004 0           INHINT
 2595  REF   1               40,3420  0 5167 1           TC     JOBWAKE
26041  REF  15  LAST  379   40,3421  3 1205 1           CA     NOUNREG       SAVE VERB IN MPAC, NOUN IN MPAC+1 AT
26042  REF  49  LAST  381   40,3422  54 001 1           TS     L             TIME OF RESPONSE TO ENDIDLE FOR
26043  REF  23  LAST  381   40,3423  3 1204 0           CA     VERBREG       POSSIBLE LATER TESTING BY JOB THAT HAS
26044  REF   1               40,3424  50 064 0           INDEX  LOCCTR        BEEN WAKED UP.
26045  REF 200  LAST  380   40,3425  52 155 1           DXCH   MPAC
 2605                       40,3426  0 0003 1           RELINT
 2606  REF  10  LAST  376   40,3427  0 4432 0  RECAL3   TC     RELDSP
 2607  REF  41  LAST  383   40,3430  0 5205 0           TC     ENDOFJOB

 2608  REF   3  LAST  380   40,3431  0 4224 1  NVSBENDL TC     NVSUBEND
26115  REF   4  LAST  296   30,2000                    SBANK= LOWSUPER
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P2612 MISCELLANEOUS SERVICE ROUTINES IN FIXED/FIXED

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 2613   REF   5  LAST  380      4000                          SETLOC FFTAG8
 26131                          4305                          BANK
 26135  REF   6 LAST  380 TO  382:    40    104*              COUNT* $$/PIN
R2614   SETNCADR          E CADR ARRIVES IN A. IT IS STORED IN NOUNCADR. EBANK BITS
R2615                     ARE SET. E ADRES IS DERIVED AND PUT INTO NOUNADD.

 2616   REF   8  LAST  367      4305  55'222 0  SETNCADR TS      NOUNCADR      STORE ECADR
 2617   REF  10  LAST  312      4306  54 003 0     +1    TS      EBANK         SET EBANK BITS
 2618   REF   1                4307  7 4350 1           MASK    LOW8
 2619   REF   2  LAST  211      4310  6 5024 1           AD      OCT1400
 2620   REF  25  LAST  363      4311  54 145 0           TS      NOUNADD       PUT E ADRES INTO NOUNADD
 2621   REF 101  LAST  382      4312  0 0002 0           TC      Q

R2622   SETNADD           GETS E CADR FROM NOUNCADR, SETS EBANK BITS, DERIVES
R2623                     E ADRES AND PUTS IT INTO NOUNADD.

 2624   REF   9  LAST  384      4313  3 1222 1  SETNADD  CA      NOUNCADR
 2625   REF   7  LAST  357      4314  1 4306 1           TCF     SETNCADR +1

R2626   SETEBANK          E CADR ARRIVES IN A. EBANK BITS ARE SET. E ADRES IS
R2627                     DERIVED AND LEFT IN A.

 2628   REF  11  LAST  384      4315  54 003 0  SETEBANK TS      EBANK         SET EBANK BITS
 2629   REF   2  LAST  384      4316  7 4350 1           MASK    LOW8
 2630   REF   3  LAST  384      4317  6 5024 1           AD      OCT1400       E ADRES LEFT IN A
 2631   REF 102  LAST  384      4320  0 0002 0           TC      Q

 2632                           4321   00016 0  R1D1     OCT     16            THESE 3 CONSTANTS FORM A PACKED TABLE.
 2633                           4322   00011 1  R2D1     OCT     11            DONT SEPARATE.
 2634                           4323   00004 0  R3D1     OCT     4

 2635   REF   1                4324  54 020 1  RIGHT5   TS      CYR
 2636   REF   2  LAST  384      4325  4 0020 1           CS      CYR
 2637   REF   3  LAST  384      4326  4 0020 1           CS      CYR
 2638   REF   4  LAST  384      4327  4 0020 1           CS      CYR
 2639   REF   5  LAST  384      4330  4 0020 1           CS      CYR
 2640   REF   6  LAST  384      4331  56 020 0           XCH     CYR
 2641   REF 103  LAST  384      4332  0 0002 0           TC      Q

 2642   REF  16  LAST  370      4333  54 022 0  LEFT5    TS      CYL
 2643   REF  17  LAST  384      4334  4 0022 0           CS      CYL
 2644   REF  18  LAST  384      4335  4 0022 0           CS      CYL
 2645   REF  19  LAST  384      4336  4 0022 0           CS      CYL
 2646   REF  20  LAST  384      4337  4 0022 0           CS      CYL
```

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2647   REF  21  LAST  384      4340  56 022 1                XCH   CYL
2648   REF 104  LAST  384      4341  0 0002 0                TC    Q

2655                           4342  00037 0   LOW5    OCT   37      THESE 3 CONSTANTS FORM A PACKED TABLE.
2656                           4343  01740 0   MID5    OCT   1740    DONT SEPARATE.
2657                           4344  76000 0   HI5     OCT   76000   MUST STAY HERE

2660   REF   1                 5313            TCTSKOVR EQUALS TSKOVCDR
2661   REF  15  LAST  276      4345  0 5135 0  TCFINDVC TC     FINDVAC

2662                           4346  30000 1   CHRPRIO OCT   30000   EXEC PRIORITY OF CHARIN

2663                           4347  03777 0   LOW11   OCT   3777
2665                           4350  00377 1   LOW8    OCT   377

2667                           4351  00023 0   VD1     OCT   23      THESE 3 CONSTANTS FORM A PACKED TABLE.
2668                           4352  00021 1   ND1     OCT   21      DONT SEPARATE.
2669                           4353  00025 0   MD1     OCT   25

26692  REF   2  LAST  382      4353            VBSP1LD EQUALS MD1    VB21 = ALOAD
26694                          4354  00026 0   VBSP2LD DEC   22      VB22 = BLOAD
26696  REF   2  LAST  258      4615            VBSP3LD EQUALS DEC23  VB23 = CLOAD
2670                           4355   00012 1  BINCON  DEC   10

26706  REF  17  LAST  373      4356  3 4764 0  RELDSPON CAF  BIT5
26707                          4357  1 4363 1           TCF   +4
26708  REF  23  LAST  308      4360  3 4763 1  FLASHON  CAF  BIT6
26709                          4361  1 4363 1           TCF   +2
2671   REF  20  LAST  332      4362  3 4762 0  FALTON   CA   BIT7    TURN ON OPERATOR ERROR LIGHT
2672                           4363  0 0006 1           EXTEND
2673   REF  10  LAST  376      4364  05 011 1           WOR  DSALMOUT BIT 7 OF CHANNEL 11
2674   REF 105  LAST  385      4365  0 0002 0           TC   Q

2683                           4366  0 0006 1  LODSAMPT EXTEND
2684   REF  11  LAST  284      4367  3 0025 0           DCA  TIME2
2685   REF   5  LAST  293      4370  52 014 0           DXCH SAMPTIME
2686   REF 106  LAST  385      4371  0 0002 0           TC   Q

2687                           4372  0 0006 1  TPSL1    EXTEND          SHIFTS MPAC, +1, +2 LEFT 1
2688   REF 201  LAST  383      4373  3 0156 0           DCA  MPAC  +1   LEAVES OVFIND SET TO +/- 1 FOR OF/UF
2689   REF 202  LAST  385      4374  20 156 1           DAS  MPAC  +1
2690   REF 203  LAST  385      4375  6 0154 1           AD   MPAC
2691   REF 204  LAST  385      4376  26 154 0     +4    ADS  MPAC
2692                           4377  54 007 1           TS   7          TS A DOES NOT CHANGE A ON OF/UF.
2693   REF 107  LAST  385      4400  0 0002 0           TC   Q          NO NET OF/UF
2694   REF   6  LAST  362      4401  54 162 0           TS   MPAC+6     MPAC +6 SET TO +/-1 FOR OF/UF
```

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 2695   REF 108  LAST  385      4402  0 0002 0          TC     Q


R2696   IF MPAC, +1 ARE EACH +NZ OR +0 AND C(A)=-0, SHORTMP WRONGLY GIVES +0.
R2697   IF MPAC, +1 ARE EACH -NZ OR -0 AND C(A)=+0, SHORTMP WRONGLY GIVES +0.
R2698   PRSHRTMP FIXES FIRST CASE ONLY, BY MERELY TESTING C(A) AND IF IT = -0,
R2699   SETTING RESULT TO -0.
R2700    (DO NOT USE PRSHRTMP UNLESS MPAC, +1 ARE EACH +NZ OR +0, AS THEY ARE
R2701    WHEN THEY CONTAIN TH E SF CONSTANTS.)

 2702   REF   1                 4403  54 135 1  PRSHRTMP TS     MPTEMP
 2703   REF 125  LAST  382      4404  10 000 0           CCS    A
 2704   REF   2  LAST  386      4405  3 0135 0           CA     MPTEMP          C(A) +, DO REGULAR SHORTMP
 2705   REF   8  LAST  368      4406  1 7257 1           TCF    SHORTMP +1      C(A) +0, DO REGULAR SHORTMP
 2706                           4407  1 4405 0           TCF    -2              C(A) -, DO REGULAR SHORTMP
 2707   REF  84  LAST  383      4410  4 4772 0           CS     ZERO            C(A) -0, FORCE RESULT TO -0 AND RETURN.
 2708   REF 205  LAST  385      4411  54 154 0           TS     MPAC
 2709   REF 206  LAST  386      4412  54 155 1           TS     MPAC    +1
 2710   REF 207  LAST  386      4413  54 156 1           TS     MPAC    +2
 2711   REF 109  LAST  386      4414  0 0002 0           TC     Q


 2714   REF  21  LAST  382      4415  4 4766 0  UPACTOFF CS     BIT3            TURN OFF UPLINK ACTIVITY
 2715                           4416  1 4420 1           TCF    +2

 2716   REF  24  LAST  385      4417  4 4763 0  FLASHOFF CS     BIT6            TURN OFF V/N FLASH
 2717                           4420  0 0006 1           EXTEND
 2718   REF  11  LAST  385      4421  03 011 1           WAND   DSALMOUT        BIT 6 OF CHANNEL 11
 2719   REF 110  LAST  386      4422  0 0002 0           TC     Q


27191   REF 126  LAST  386      4423  50 000 1  CODSTOR  INDEX  A
27192   REF   2  LAST  143      4424  3 4063 0           CAF    RELTAB
27193   REF   5  LAST  370      4425  7 4342 1           MASK   LOW5
27194   REF  13  LAST  379      4426  54 124 1           TS     CODE
27195   REF  50  LAST  382      4427  3 1202 0           CA     DSPCOUNT
27196   REF  11  LAST  371      4430  54 143 0           TS     COUNT
27197   REF 111  LAST  386      4431  0 0002 0           TC     Q
```

P2720 INTERNAL USE OF KEYBOARD AND DISPLAY PROGRAM

R2721 USER MUST SCHEDULE CALLS TO NVSUB SO THAT THERE IS NO CONFLICT OF USE OR
R2722 CONFUSION TO OPERATOR. THE OLD GRABLOCK (INTERNAL/INTERNAL INTERLOCK)
R2723 HAS BEEN REMOVED AND THE INTERNAL USER NO LONGER HAS THE PROTECTION THIS
R2724 OFFERED.

R2725 THERE ARE TWO WAYS A JOB CAN BE PUT TO SLEEP BY THE KEYBOARD + DISPLAY
R2726 PROGRAM. 1) BY ENDIDLE
R2727 2) BY NVSUBUSY
R2728 THE BASIC CONVENTION IS THAT ONLY ONE JOB WILL BE PERMITTED ASLEEP VIA
R2729 THE KEYBOARD + DISPLAY PROGRAM AT A TIME. IF A JOB ATTEMPTS TO GO TO
R2730 SLEEP BY MEANS OF (1) OR (2) AND THERE IS ALREADY A JOB ASLEEP THAT WAS
R2731 PUT TO SLEEP BY (1) OR (2), THEN AN ABORT IS CAUSED.

R2732 THE CALLING SEQUENCE FOR NVSUB IS
R2733 CAF V/N
R2734 L TC NVSUB
R2735 L+1 RETURN HERE IF OPERATOR HAS INTERVENED
R2736 L+2 RETURN HERE AFTER EXECUTION

R2737 A ROUTINE CALLED NVSUBUSY IS PROVIDED (USE IS OPTIONAL) TO PUT
R2738 YOUR JOB TO SLEEP UNTIL THE OPERATOR RELEASES THE KEYBOARD + DISPLAY
R2739 SYSTEM. NVSUBUSY ALSO TURNS ON THE KEY RELEASE LIGHT.
R2740 NVSUBUSY CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2741 SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.

R2742 THE CALLING SEQUENCE IS
R2743 CAF WAKEFCADR
R2744 TC NVSUBUSY

R2745 .

R2746 NVSUBUSY IS INTENDED FOR USE WHEN AN INTERNAL PROGRAM FINDS THE OPERATOR
R2747 IS USING THE KEYBOARD + DISPLAY PROGRAM (BY HIS OWN INITIATION). IT IS
R2748 NOT INTENDED FOR USE WHEN ONE INTERNAL PROGRAM FINDS ANOTHER INTERNAL
R2749 PROGRAM USING THE KEYBOARD + DISPLAY PROGRAM.

R2750 NVSUBUSY ABORTS (WITH CODE 21206) IF A SECOND JOB ATTEMPTS TO GO TO
R2751 SLEEP IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO NVSUBUSY
R2752 WHEN
R2753 1) DSPLIST NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF THE DSPLIST
R2754 IS EXCEEDED.
R2755 2) CADRSTOR NOT= +0. THIS INDICATES THAT A JOB IS ALREADY USING

```
R2756   ENDIDLE. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)
R2757   NVSUBUSY MOVED TO DISPLAY INTERFACE ROUTINES


R2788   RELDSP IS USED BY VBPROC, VBTERM, VBRQEXEC, VBRQWAIT, VBRELDSP, EXTENDED
R2789   VERB DISPATCHER, VBRESEQ, RECALTST.
R2790   RELDSP1 IS USED BY MONITOR SET UP, VBRELDSP.
 2791   REF 112  LAST  386     4432  56 002 0  RELDSP   XCH   Q          SET DSPLOCK TO +0, TURN RELDSP LIGHT
 2792   REF   1                4433  54 144 1           TS    RELRET     OFF,  SEARCH DSPLIST
27921   REF  28  LAST  378     4434  4 4753 0           CS    BIT14
27922                          4435  0 0004 0           INHINT
27923   REF   8  LAST  380     4436  7 1224 0           MASK  MONSAVE1
27924   REF   9  LAST  388     4437  55'224 0           TS    MONSAVE1   TURN OFF EXTERNAL MONITOR BIT
 2793   REF   3  LAST  381     4440  11'246 1           CCS   DSPLIST
 2794                          4441  0 4443 0           TC    +2
 2795   REF   1                4442  0 4446 0           TC    RELDSP2    LIST EMPTY
 2796   REF  85  LAST  386     4443  3 4772 1           CAF   ZERO
 2797   REF   4  LAST  388     4444  57'246 0           XCH   DSPLIST
 2799   REF   2  LAST  383     4445  0 5167 1           TC    JOBWAKE
 2800                          4446  0 0003 1  RELDSP2  RELINT
 2801   REF  18  LAST  385     4447  4 4764 1           CS    BIT5       TURN OFF KEY RELEASE LIGHT
 2802                          4450  0 0006 1           EXTEND           (BIT 5 OF CHANNEL 11)
 2803   REF  12  LAST  386     4451  03 011 1           WAND  DSALMOUT
 2804   REF  86  LAST  388     4452  3 4772 1    +4     CAF   ZERO
 2805   REF   7  LAST  378     4453  55'215 1           TS    DSPLOCK
 2807   REF   2  LAST  388     4454  0 0144 0           TC    RELRET
 2808   REF 113  LAST  388     4455  56 002 0  RELDSP1  XCH   Q          SET DSPLOCK TO +0. NO DSPLIST SEARCH.
 2809   REF   3  LAST  388     4456  54 144 1           TS    RELRET     TURN KEY RLSE LIGHT OFF IF DSPLIST IS
A2810                                                                   EMPTY. LEAVE KEY RLSE LIGHT ALONE IF
A2811                                                                   DSPLIST IS NOT EMPTY.
 2812   REF   5  LAST  388     4457  11'246 1           CCS   DSPLIST
 2813                          4460  0 4462 0           TC    +2         +  NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2814   REF   2  LAST  388     4461  0 4446 0           TC    RELDSP2    +0 EMPTY. TURN OFF KEY RLSE LIGHT
 2815   REF   3  LAST  388     4462  1 4452 1           TCF   RELDSP2 +4 - NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2818                          4463                ENDPINBF EQUALS
```

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P28181 PINTEST IS NEEDED FOR AUTO CHECK OF PINBALL.

28182 REF 2 LAST 249 43,2002 PINTEST EQUALS LST2FAN

L PINBALL GAME BUTTONS AND LIGHTS

P2819 VBTSTLTS TURNS ON ALL DISPLAY PANEL LIGHTS. AFTER 5 SEC, IT TURNS
R2820 OFF THE CAUTION AND STATUS LIGHTS.

```
 2821   REF   9  LAST  382   40,2000                        SETLOC  PINBALL1
 28211                       40,3432                        BANK
 28215  REF   9 LAST  382 TO  384:    49   794*             COUNT*  $$/PIN
 2822   REF  56  LAST  373   40,3432  0 4636 0  VBTSTLTS    TC      BANKCALL
 28224  REF   6  LAST  273   40,3433   66714 0              CADR    CHKPOOH

 28226                       40,3434  0 0004 0              INHINT
 2823   REF  21  LAST  199   40,3435  4 1334 0              CS      IMODES33        SET BIT  1 OF IMODES33, SO IMUMON WONT
 2824   REF   4  LAST  173   40,3436  7 4770 1              MASK    LMPTSTBT        TURN OUT ANY LAMPS
 2825   REF  22  LAST  390   40,3437  27'334 0              ADS     IMODES33
 2827   REF   1               40,3440  3 3550 1              CAF     TSTCON1         TURN ON UPLINK ACTIVITY, TEMP, KEY RLSE,
 2828                        40,3441  0 0006 1              EXTEND                  V/N FLASH, OPERATOR ERROR.
 2829   REF  13  LAST  388   40,3442  05 011 1              WOR     DSALMOUT
 2830   REF   1               40,3443  3 3551 0              CAF     TSTCON2         TURN ON NO ATT, GIMBAL LOCK, TRACKER,
 2831   REF  29  LAST  379   40,3444  55'241 0              TS      DSPTAB  +11D    PROG ALM.
 2832   REF  17  LAST  315   40,3445  3 4757 0              CAF     BIT10           TURN ON TEST ALARM OUTBIT
 2833                        40,3446  0 0006 1              EXTEND
 2834   REF   3  LAST  202   40,3447  05 013 0              WOR     CHAN13
 2835   REF   3  LAST  328   40,3450  3 4355 0              CAF     TEN
 2836   REF   1               40,3451  54 117 1  TSTLTS1     TS      ERCNT
 2837   REF   1               40,3452  4 3546 1              CS      FULLDSP
 2838   REF   2  LAST  390   40,3453  50 117 0              INDEX   ERCNT
 2839   REF  30  LAST  390   40,3454  55'226 1              TS      DSPTAB
 2840   REF   3  LAST  390   40,3455  10 117 1              CCS     ERCNT
 2841   REF   1               40,3456  0 3451 1              TC      TSTLTS1
 2842   REF   1               40,3457  4 3547 0              CS      FULLDSP1
 2843   REF  31  LAST  390   40,3460  55'227 0              TS      DSPTAB  +1      TURN ON 3 PLUS SIGNS
 2844   REF  32  LAST  390   40,3461  55'232 1              TS      DSPTAB  +4
 2845   REF  33  LAST  390   40,3462  55'234 1              TS      DSPTAB  +6
 2846   REF   4  LAST  223   40,3463  3 4775 0              CAF     ELEVEN
 2847   REF   9  LAST  379   40,3464  55'221 0              TS      NOUT
 2849   REF   1               40,3465  3 7704 0              CAF     SHOLTS
 2851   REF  57  LAST  390   40,3466  0 4636 0              TC      BANKCALL
 2852   REF   2  LAST  209   40,3467   01731 0              CADR    DELAYJOB
A2854                                                                       DSPLOCK IS LEFT BUSY (FROM KEYBOARD
A2855                                                                       ACTION) UNTIL TSTLTS3 TO INSURE THAT
A2856                                                                       LIGHTS TEST WILL BE SEEN.

 2866   REF   1                 7704                SHOLTS    =       DEC500          5 SEC
 2872   REF   1               40,3470  4 3552 1  TSTLTS3    CS      TSTCON3         CALLED BY EXECUTIVE
 2873                        40,3471  0 0004 0              INHINT
 2874                        40,3472  0 0006 1              EXTEND                  TURN OFF  UPLINK ACTIVITY, TEMP,
 2875   REF  14  LAST  390   40,3473  03 011 1              WAND    DSALMOUT        OPERATOR ERROR.
 2876   REF  18  LAST  390   40,3474  4 4757 1              CS      BIT10           TURN OFF TEST ALARM OUTBIT
 2877                        40,3475  0 0006 1              EXTEND
 2878   REF   4  LAST  390   40,3476  03 013 0              WAND    CHAN13
```

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28781  REF  22  LAST  313   40,3477  3 4765 1        CAF     BIT4          MAKE NO ATT FOLLOW BIT 4 OF CHANNEL 12
28782                       40,3500  0 0006 1        EXTEND                  (NO ATT LIGHT ON IF IN COARSE ALIGN)
28783  REF  27  LAST  262   40,3501  02 012 0        RAND    CHAN12
2879   REF  30  LAST  380   40,3502  6 4752 0        AD      BIT15         TURN OFF AUTO, HOLD, FREE, SPARE,
2880   REF  34  LAST  390   40,3503  55'241 0        TS      DSPTAB +11D   GIMBAL LOCK, SPARE, TRACKER, PROG ALM
2881   REF   5  LAST  390   40,3504  4 4770 1        CS      LMPTSTBT
28813  REF  23  LAST  390   40,3505  7 1334 0        MASK    IMODES33
28816  REF  24  LAST  391   40,3506  55'334 0        TS      IMODES33
2882                        40,3507  4 0000 0        COM
28823  REF   2  LAST  154   40,3510  7 4754 1        MASK    PIP2FLBT
28826  REF  25  LAST  391   40,3511  27'334 0        ADS     IMODES33
2883                        40,3512  4 0000 0        COM
28833  REF   1               40,3513  7 4755 0        MASK    DNLKFAIL
28836  REF  26  LAST  391   40,3514  27'334 0        ADS     IMODES33
2884                        40,3515  4 0000 0        COM
28843  REF   1               40,3516  7 4756 0        MASK    UPLKFAIL
28846  REF  27  LAST  391   40,3517  27'334 0        ADS     IMODES33
2885   REF   2  LAST  157   40,3520  4 4752 1        CS      ILIMBIT
28853  REF  39  LAST  209   40,3521  7 1333 1        MASK    IMODES30
28856  REF  40  LAST  391   40,3522  55'333 1        TS      IMODES30
2886                        40,3523  4 0000 0        COM
28863  REF   1               40,3524  7 4754 1        MASK    IMUFLBIT
28866  REF  41  LAST  391   40,3525  27'333 1        ADS     IMODES30
2887                        40,3526  4 0000 0        COM
28873  REF   1               40,3527  7 4755 0        MASK    ICDUFLBT
28876  REF  42  LAST  391   40,3530  27'333 1        ADS     IMODES30
2888                        40,3531  4 0000 0        COM
28883  REF   2  LAST  164   40,3532  7 4757 1        MASK    PIPAFLBT
28886  REF  43  LAST  391   40,3533  27'333 1        ADS     IMODES30
2889   REF  28  LAST  199   40,3534  4 1337 0        CS      CPTMODES
2890   REF   3  LAST  199   40,3535  7 4762 1        MASK    CCDUFBIT
2891   REF  29  LAST  391   40,3536  27'337 0        ADS     CPTMODES
2893                        40,3537  0 0003 1        RELINT

2894   REF   2  LAST  144   40,3540  0 5120 1        TC      NOVAC30
2895   REF  51  LAST  386     1202                   EBANK=  DSPCOUNT
28955  REF   1               40,3541    03377 1      2CADR   DSPMMJOB
28955  REF   1               40,3542    60102 1
2896   REF   4  LAST  378   40,3543  0 4235 1        TC      KILMONON      TURN ON KILL MONITOR BIT.
2897   REF   5  LAST  379   40,3544  0 4417 1        TC      FLASHOFF      TURN OFF V/N FLASH.
2898   REF   1               40,3545  1 3335 0        TCF     TSTLTS4
2899                        40,3546    05675 0  FULLDSP  OCT     05675      DISPLAY ALL 8:S
2900                        40,3547    07675 1  FULLDSP1 OCT     07675      DISPLAY ALL 8:S AND +
29005                       40,3550    00175 1  TSTCON1  OCT     00175
A2901                                                                      UPLINK ACTIVITY, TEMP, KEY RLSE,
A29015                                                                     V/N FLASH, OPERATOR ERROR.
2902                        40,3551    40650 0  TSTCON2  OCT     40650      DSPTAB+11D  BITS 4,6,8,9.
A29025                                                                     NO ATT, GIMBAL LOCK, TRACKER, PROG ALM.
2903                        40,3552    00115 1  TSTCON3  OCT     00115      CHAN 11  BITS 1, 3, 4, 7.
A29035                                                                     UPLINK ACTIVITY, TEMP, OPERATOR ERROR.
```

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P2905 ERROR LIGHT RESET (RSET) TURNS OFF,
R2906 UPLINK ACTIVITY, AUTO, HOLD, FREE, OPERATOR ERROR,
R2907 PROG ALM, TRACKER FAIL.
R2908 LEAVES GIMBAL LOCK AND NO ATT ALONE.
R2909 IT ALSO ZEROES THE :TEST ALARM: OUT BIT, WHICH TURNS OFF STBY,RESTART.
R2910 IT ALSO SETS :CAUTION RESET: TO 1.
R2911 IT ALSO FORCES BIT 12 OF ALL DSPTAB ENTRIES TO 1.

```
 2912   REF  10  LAST  390   40,2000                          SETLOC PINBALL1
 29121                       40,3553                          BANK
 29125  REF  10 LAST  390 TO  392:     81   875*             COUNT* $$/PIN
 2913   REF   3  LAST  376   40,3553  56 115 1   ERROR       XCH    21/22REG      RESTORE ORIGINAL C(DSPLOCK). THUS ERROR
 2914   REF   8  LAST  388   40,3554  55'215 1               TS     DSPLOCK       LIGHT RESET LEAVES DSPLOCK UNCHANGED.
 2915                       40,3555  0 0004 0               INHINT
 2916   REF  19  LAST  390   40,3556  3 4757 0               CAF    BIT10         TURN ON :CAUTION RESET: OUTBIT
 2917                       40,3557  0 0006 1               EXTEND
 2918   REF  15  LAST  390   40,3560  05 011 1               WOR    DSALMOUT      BIT10 CHAN 11
 2919   REF   1              40,3561  3 5004 0               CAF    GL+NOATT      LEAVE GIMBAL LOCK AND NO ATT INTACT,
 2920   REF  35  LAST  391   40,3562  7 1241 0               MASK   DSPTAB +11D   TURNING OFF AUTO, HOLD, FREE,
 2921   REF  31  LAST  391   40,3563  6 4752 0               AD     BIT15         PROG ALARM, AND TRACKER.
 2922   REF  36  LAST  392   40,3564  55'241 0               TS     DSPTAB +11D
 2923   REF  28  LAST  391   40,3565  4 1334 0               CS     IMODES33      RESET FAIL BITS WHICH GENERATE PROG
 2924   REF   6  LAST  268   40,3566  7 5055 0               MASK   PRIO16        ALARM SO THAT IF THE FAILURE STILL
 2925   REF  29  LAST  392   40,3567  27'334 0               ADS    IMODES33      EXISTS, THE ALARM WILL COME BACK ON
 2926   REF  44  LAST  391   40,3570  4 1333 1               CS     IMODES30
 2927   REF   3  LAST  391   40,3571  7 4757 1               MASK   PIPAFLBT
 2928   REF  45  LAST  392   40,3572  27'333 1               ADS    IMODES30

 2931   REF  30  LAST  391   40,3573  4 1337 0               CS     CPTMODES
 2932   REF   4  LAST  391   40,3574  7 4762 1               MASK   OCDUFBIT
 2933   REF  31  LAST  392   40,3575  27'337 0               ADS    CPTMODES
 29335  REF   1              40,3576  0 4542 0               TC     C13STALL
 2935   REF  20  LAST  392   40,3577  4 4757 1               CS     BIT10         TURN OFF :TEST ALARM: OUTBIT.
 2936                       40,3600  0 0006 1               EXTEND
 2937   REF   5  LAST  390   40,3601  03 013 0               WAND   CHAN13
 2938   REF   1              40,3602  4 3216 0               CS     ERCON         TURN OFF UPLINK ACTIVITY,
 2939                       40,3603  0 0006 1               EXTEND                 OPERATOR ERROR.
 2940   REF  16  LAST  392   40,3604  03 011 1               WAND   DSALMOUT
 2941   REF   3  LAST  368   40,3605  3 4355 0   TSTAB       CAF    BINCON        (DEC 10)
 2942   REF   4  LAST  390   40,3606  54 117 1   +1          TS     ERCNT         ERCNT = COUNT
 2943                       40,3607  0 0004 0               INHINT
 2944   REF   5  LAST  392   40,3610  50 117 0               INDEX  ERCNT
 2945   REF  37  LAST  392   40,3611  11'226 1               CCS    DSPTAB
 2946   REF  44  LAST  382   40,3612  6 4770 0               AD     ONE
 2947   REF   1              40,3613  0 3620 0               TC     ERPLUS
 2948   REF  45  LAST  392   40,3614  6 4770 0               AD     ONE
 2949   REF 127  LAST  386   40,3615  4 0000 0   ERMINUS     CS     A
 2950   REF   1              40,3616  7 7674 1               MASK   NOTBIT12
 2951   REF   1              40,3617  0 3623 0               TC     ERCOM
 2952   REF 128  LAST  392   40,3620  4 0000 0   ERPLUS      CS     A
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S PAGE NO. 76 EQ S4

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2953   REF   2  LAST  392   40,3621  7 7674 1          MASK    NOTBIT12
2954   REF 129  LAST  392   40,3622  4 0000 0          CS      A          MIGHT WANT TO RESET CLPASS, DECBRNCH,
2955   REF   6  LAST  392   40,3623  50 117 0  ERCOM   INDEX   ERCNT      ETC.
2956   REF  38  LAST  392   40,3624  55'226 1          TS      DSPTAB
2957                        40,3625  0 0003 1          RELINT
2958   REF   7  LAST  393   40,3626  10 117 1          CCS     ERCNT
2959   REF   1               40,3627  0 3606 1          TC      TSTAB   +1
2961   REF   7  LAST  283   40,3630  54 375 1          TS      FAILREG
29611  REF   8  LAST  393   40,3631  54 376 1          TS      FAILREG +1
2962   REF   2  LAST   87   40,3632  55'357 0          TS      SFAIL
2963   REF  42  LAST  383   40,3633  0 5205 0          TC      ENDOFJOB

2964                        40,3634    55000 1  OCT55000 OCT     55000
29645                       40,3635    16001 1  13-11,1  OCT     16001
29665  REF   5  LAST  336      5004             GL+NOATT EQUALS  OCT50      NO ATT AND GIMBAL LOCK LAMPS
2967   REF   1                7674             NOTBIT12 EQUALS  -1/8
2968                        40,3636             ENDPINS1 EQUALS


3000   REF   5  LAST  383   30,2000                      SBANK=  LOWSUPER
```

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```
1501   REF   1              27,2000                    SETLOC MANUVER
1502                        27,2074                    BANK

1503   REF   1                1004                     EBANK= TEMPR60

1504   REF   1                                         COUNT* $$/R60
R15041

R150411 R60CSM
R150413 REV 13   CONFORMS TO GSOP CHAPTER FOUR REVISION LOGIC  09  JAN 18,1968
R150415


1505   REF   2  LAST  241    27,2074  0 4665 0  R60CSM   TC     MAKECADR
1506   REF   2  LAST  394    27,2075  55'004 0           TS     TEMPR60

1510   REF  12  LAST  303    27,2076  0 6006 1  REDOMANN TC     INTPRET
1511                        27,2077   45014 0            BON    CALL            IS 3-AXIS FLAG SET
1512   REF   1              27,2100   02711 1                   3AXISFLG
1513   REF   1              27,2101   56104 1                   TOBALL1         YES
1514   REF   1              27,2102   56225 1                   VECPOINT        NO CALL VECPOINT
1515   REF   1              27,2103   01310 1            STORE  CPHI
1518                        27,2104   77776 1  TOBALL1   EXIT

1519   REF   1              27,2105  3 5031 0  TOBALL    CAF    V06N18
1520   REF  58  LAST  390    27,2106  0 4636 0           TC     BANKCALL
1521   REF   1              27,2107    21154 1           CADR   GOPERF2R         DISPLAY PLEASE PERFORM AUTO MANEUVER
1522   REF   1              27,2110  0 2215 0           TC     R61TEST
1523   REF   1              27,2111  0 2115 0           TC     REDOMANC -1
1524   REF   1              27,2112  1 2150 0           TCF    ENDMANU1        ENTER I.E. FINISHED WITH R60

1525   REF   1              27,2113  0 2152 0           TC     CHKLINUS        TO CHECK FOR PRIORITY DISPLAYS
1526   REF  43  LAST  393    27,2114  0 5205 0           TC     ENDOFJOB

1527   REF  13  LAST  394    27,2115  0 6006 1    -1     TC     INTPRET
1529                        27,2116   45014 0  REDOMANC  BON    CALL            IS 3-AXIS FLAG SET
1530   REF   2  LAST  394    27,2117   02711 1                   3AXISFLG
1531                        27,2120   56123 1                   +3              YES
1532   REF   2  LAST  394    27,2121   56225 1                   VECPOINT        NO CALL VECPOINT
1533   REF   2  LAST  394    27,2122   01310 1            STORE  CPHI            STORE ANGLES
1534                        27,2123   77776 1            EXIT

1535   REF   1              27,2124  3 7673 1  TOBALLC   CAF    FURST3          BITS 15,14,13 OF CHAN31 = 011
1536   REF   1              27,2125  0 5654 0           TC     C31BTCHK        FOR AUTO AND G&N CONTROL
1537                        27,2126  1 2127 0           TCF    +1
1538   REF   1              27,2127  6 7671 0           AD     NEG30000
1539                        27,2130  0 0006 1           EXTEND
1540                        27,2131  1 2133 0           BZF    +2              AUTO, NON-FLASH N18
1541   REF   1              27,2132  1 2105 0           TCF    TOBALL          NOT AUTO
```

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```
1542  REF   2  LAST  394   27,2133  3 5031 0          CAF     V06N18      SET UP NON-FLASHING V06 N18
1543  REF  59  LAST  394   27,2134  0 4636 0          TC      BANKCALL
1544  REF   1              27,2135  20710 0           CADR    GODSPR
1545  REF   2  LAST  394   27,2136  0 2152 0          TC      CHKLINUS

1546  REF  30  LAST  381   27,2137  0 4655 0 STARTMNV TC      POSTJUMP
1547  REF   1              27,2140  44000 1           CADR    KALCMAN3

1548  REF  14  LAST  394   27,2141  0 6006 1 ENDMANUV TC      INTPRET
1549                       27,2142  43014 0           BOFF    BOFF
1550  REF   7  LAST  270   27,2143  05350 1                   AUTOSEQ
1551  REF   2  LAST  394   27,2144  56104 1                   TOBALL1
1552  REF   4  LAST  270   27,2145  00752 1                   TRACKFLG
1553  REF   3  LAST  395   27,2146  56104 1                   TOBALL1
1554                       27,2147  77776 1           EXIT

1555  REF   3  LAST  394   27,2150  3 1004 1 ENDMANU1 CA      TEMPR60
1558  REF   5  LAST  359   27,2151  0 4660 0          TC      BANKJUMP                                  -

1559  REF   3  LAST  250   27,2152  4 0100 1 CHKLINUS CS      FLAGWRD4
1560  REF   1              27,2153  7 4755 0          MASK    PDSPFBIT    IS PRIORITY DISPLAY FLAG SET
1561  REF 130  LAST  393   27,2154  10 000 0          CCS     A                                         -
1562  REF 114  LAST  388   27,2155  0 0002 0          TC      Q           NO - EXIT
1563  REF 115  LAST  395   27,2156  3 0002 0          CA      Q
1564  REF 208  LAST  386   27,2157  54 156 1          TS      MPAC +2     SAVE RETURN
1565  REF  16  LAST  369   27,2160  4 6214 1          CS      THREE       OBTAIN LOCATION FOR RESTART.
1566  REF   2  LAST   72   27,2161  6 0133 0          AD      BUF2        HOLDS Q OF LAST DISPALY
1567  REF   2  LAST  238   27,2162  55'257 1          TS      TBASE1

1568  REF   9  LAST  275   27,2163  0 5402 1          TC      PHASCHNG
1569                       27,2164  00071 1           OCT     71          1.7SPOT FOR RELINUS

15695 REF   1              01,2022                1P7SPT1   =       1.7SPOT
1570  REF  21  LAST  385   27,2165  3 4762 0          CAF     BIT7
1571  REF   1              27,2166  0 5516 0          TC      LINUS       GO SET BITS FOR PRIORITY DISPLAY  -
1572  REF 209  LAST  395   27,2167  0 0156 0          TC      MPAC +2

1573  REF   6  LAST  268   27,2170  3 4764 0 RELINUS  CAF     TRACKBIT    IS TRACK FLAG ON
1574  REF  20  LAST  268   27,2171  7 0075 1          MASK    FLAGWRD1
1575                       27,2172  0 0006 1          EXTEND
1576  REF   1              27,2173  1 2213 1          BZF     GOREDO20    NO

1577  REF  25  LAST  279   27,2174  0 5547 1          TC      UPFLAG
1578  REF   1              27,2175  00077 1           ADRES   PDSPFLAG    R60 PRIODSP FLAG

1579  REF  13  LAST  215   27,2176  3 0104 1          CA      FLAGWRD8
1580  REF   7  LAST  215   27,2177  7 4760 0          MASK    UTBIT
1581  REF 131  LAST  395   27,2200  10 000 0          CCS     A
1582  REF   1              27,2201  0 2210 0          TC      RELINUSX    UTFLAG SET,DO NOT SET TARG1FLG,OPTIND
```

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1583  REF  26  LAST  395   27,2202  0 5547 1          TC      UPFLAG
1584  REF   1              27,2203   00024 1          ADRES   TARG1FLG      FOR R52

1585  REF  87  LAST  388   27,2204  3 4772 1          CAF     ZERO          RESET TO ZERO, SINCE
1586  REF  19  LAST  255   27,2205  55'323 0          TS      OPTIND        OPTIND WAS SET TO -1 BY V379

1587  REF  27  LAST  396   27,2206  0 5547 1          TC      UPFLAG
1588  REF   3  LAST  270   27,2207   00037 0          ADRES   R21MARK       ALLOW OPTICS MARKING DURING P2

1589  REF   1              27,2210  3 5053 1 RELINUSX CAF     PRIO14        RESTORE ORIGINAL PRIORITY
1590  REF   3  LAST  267   27,2211  0 5176 1          TC      PRIOCHNG

1591  REF   3  LAST  395   27,2212  0 1257 0          TC      TBASE1

1592  REF  31  LAST  395   27,2213  0 4655 0 GOREDO20 TC      POSTJUMP      RESTORE R03 DEADBAND, DO STOPRATE,
1593  REF   1              27,2214   74416 1          CADR    FIXDB          SET UP 1.11 RESTART, EOJ.
1595  REF   7  LAST  382   27,2215  3 1214 1 R61TEST  CA      MODREG        ARE WE IN P00.  IF YES THIS MUST BE
1596                       27,2216  0 0006 1          EXTEND                    VERB49 OR VERB89 SO DO ENDEXT.
1597  REF   2  LAST  394   27,2217  1 2150 0          BZF     ENDMANU1      RESET 3-AXIS & RUTURN.  USER DOES ENDEXT
1598  REF   4  LAST  395   27,2220  3 0100 0          CA      FLAGWRD4      ARE WE IN R61 (P20)
1599  REF   2  LAST  395   27,2221  7 4755 0          MASK    PDSPFBIT
1600                       27,2222  0 0006 1          EXTEND
1601  REF   4  LAST  241   27,2223  1 4103 0          BZF     GOTOPOOH      NO
1602  REF   1              27,2224  0 4546 1          TC      GOTOV56       YES
```

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P1604 PROGRAM DESCRIPTION - VECPOINT

R1605 THIS INTERPRETIVE SUBROUTINE MAY BE USED TO POINT A SPACECRAFT AXIS IN A DESIRED DIRECTION. THE AXIS
R1607 TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN SUCCESSIVE LOCATIONS OF ERASABLE MEMORY
R1609 BEGINNING WITH THE LOCATION CALLED SCAXIS. THE COMPONENTS OF THIS VECTOR ARE GIVEN IN SPACECRAFT COORDINATES.
R1611 THE DIRECTION IN WHICH THIS AXIS IS TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN
R1613 SUCCESSIVE LOCATIONS OF ERASABLE MEMORY BEGINNING WITH THE ADDRESS CALLED POINTVSM. THE COMPONENTS OF THIS
R1615 VECTOR ARE GIVEN IN STABLE MEMBER COORDINATES. WITH THIS INFORMATION VECPOINT COMPUTES A SET OF THREE GIMBAL
R1617 ANGLES (2S COMPLEMENT) CORRESPONDING TO THE CROSS-PRODUCT ROTATION BETWEEN SCAXIS AND POINTVSM AND STORES THEM
R1619 IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R1620 THIS ROTATION, HOWEVER, MAY BRING THE S/C INTO GIMBAL LOCK. WHEN POINTING A VECTOR IN THE Y-Z PLANE,
R1622 THE TRANSPONDER AXIS, OR THE AOT FOR THE LEM, THE PROGRAM WILL CORRECT THIS PROBLEM BY ROTATING THE CROSS-
R1624 PRODUCT ATTITUDE ABOUT POINTVSM BY A FIXED AMOUNT SUFFICIENT TO ROTATE THE DESIRED S/C ATTITUDE OUT OF GIMBAL
R1626 LOCK. IF THE AXIS TO BE POINTED IS MORE THAN 40.6 DEGREES BUT LESS THAN 60.5 DEG FROM THE +X (OR-X) AXIS,
R1628 THE ADDITIONAL ROTATION TO AVOID GIMAL LOCK IS 35 DEGREES. IF THE AXIS IS MORE THAN 60.5 DEGEES FROM +X (OR -X)
R1630 THE ADDITIONAL ROTATION IS 35 DEGREES. THE GIMBAL ANGLES CORRESPONDING TO THIS ATTITUDE ARE THEN COMPUTED AND
R1632 STORED AS 2S COMPLIMENT ANGLES IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R1634 WHEN POINTING THE X-AXIS, OR THE THRUST VECTOR, OR ANY VECTOR WITHIN 40.6 DEG OF THE X-AXIS, VECPOINT
R1636 CANNOT CORRECT FOR A CROSS-PRODUCT ROTATION INTO GIMBAL LOCK. IN THIS CASE A PLATFORM REALIGNMENT WOULD BE
R1638 REQUIRED TO POINT THE VECTOR IN THE DESIRED DIRECTION. AT PRESENT NO INDICATION IS GIVEN FOR THIS SITUATION
R1640 EXCEPT THAT THE FINAL MIDDLE GIMBAL ANGLE IN MPAC +2 IS GREATER THAN 59 DEGREES.

R1642 CALLING SEQUENCE -
R1643 1) LOAD SCAXIS, POINTVSM
R1644 2) CALL
R1645 VECPOINT

R1646 RETURNS WITH

R1647 1) DESIRED OUTER GIMBAL ANGLE IN MPAC
R1648 2) DESIRED INNER GIMBAL ANGLE IN MPAC +1
R1649 3) DESIRED MIDDLE GIMBAL ANGLE IN MPAC +2

R1650 ERASABLES USED -

R1651	1) SCAXIS	6
R1652	2) POINTVSM	6
R1653	3) MIS	18
R1654	4) DEL	18
R1655	5) COF	6
R1656	6) VECQTEMP	1
R1657	7) ALL OF VAC AREA	43
R1658	TOTAL	99

1659 REF 1 27,2000 SETLOC VECPT
1660 27,2225 BANK

```
 1661   REF   4  LAST  118   E6,1661                          EBANK=  ECDU

 1662   REF   1                                               COUNT*  $$/VECPT
 1663                        27,2225  40020 1  VECPOINT STQ     BOV          SAVE RETURN ADDRESS
 1664   REF   1              27,2226  03310 0                  VECQTEMP
 1665   REF   1              27,2227  56230 0                  VECLEAR      AND CLEAR OVFIND
 1666                        27,2230  47164 1  VECLEAR  AXC,2  RTB
 1667   REF   2  LAST  118   27,2231  03320 0                  MIS          READ THE PRESENT CDU ANGLES AND
 1668   REF   1              27,2232  44370 0                  READCDUK     STORE THEM IN PD25, 26, 27
 1669                        27,2233  34032 1          STCALL  25D
 1670   REF   1              27,2234  44377 1                  CDUTODCM     S/C AXES TO STABLE MEMBER AXES (MIS)
 1671                        27,2235  61375 1          VLOAD   VXM
 1672   REF   3  LAST  118   27,2236  03357 0                  POINTVSM     RESOLVE THE POINTING DIRECTION VF INTO
 1673   REF   3  LAST  398   27,2237  03321 1                  MIS          INITIAL S/C AXES ( VF = POINTVSM)
 1674                        27,2240  77656 1          UNIT
 1675                        27,2241  00035 1          STORE   28D
A1676                                                                      PD 28 29 30 31 32 33
 1677                        27,2242  53435 0          VXV     UNIT         TAKE THE CROSS PRODUCT VF X VI
 1678   REF   3  LAST  118   27,2243  03351 0                  SCAXIS       WHERE VI = SCAXIS
 1679                        27,2244  57400 1          BOV     VCOMP
 1680   REF   1              27,2245  56355 1                  PICKAXIS
 1681   REF   2  LAST  118   27,2246  17343 0          STODL   COF          CHECK MAGNITUDE
 1682                        27,2247  00045 0                  36D          OF CROSS PRODUCT
 1683                        27,2250  50025 0          DSU     BMN          VECTOR, IF LESS
 1684   REF   1              27,2251  16426 0                  DPB-14       THAN B-14 ASSUME
 1685   REF   2  LAST  398   27,2252  56355 1                  PICKAXIS     UNIT OPERATION
 1686                        27,2253  50375 0          VLOAD   DOT                  INVALID.
 1687   REF   4  LAST  398   27,2254  03351 0                  SCAXIS
 1688                        27,2255  00035 1                  28D
 1689                        27,2256  65552 0          SL1     ARCCOS
 1690                        27,2257  77624 1  COMPMATX CALL                NOW COMPUTE THE TRANSFORMATION FROM
 1691   REF   1              27,2260  44522 1                  DELCOMP      FINAL S/C AXES TO INITIAL S/C AXES  MFI
 1692                        27,2261  75160 1          AXC,1   AXC,2
 1693   REF   4  LAST  398   27,2262  03320 0                  MIS          COMPUTE THE TRANSFORMATION FROM FINAL
 1694   REF   1              27,2263  03425 1                  DEL          S/C AXES TO STABLE MEMBER AXES
 1695                        27,2264  77624 1          CALL                 MFS = MIS MFI
 1696   REF   1              27,2265  44304 0                  MXM3         (IN PD LIST)

 1697                        27,2266  51545 1          DLOAD   ABS
 1698                        27,2267  00007 0                  6            MFS6 = SIN(CPSI)                    $2
 1699                        27,2270  50025 0          DSU     BMN
 1700   REF   1              27,2271  16413 0                  SINGIMLC     = SIN(59 DEGS)                      $2
 1701   REF   1              27,2272  56345 0                  FINDGIMB     /CPSI/ LESS THAN 59 DEGS
A1702                                                                      I.E. DESIRED ATTITUDE NOT IN GIMBAL LOCK

 1703                        27,2273  51545 1          DLOAD   ABS          CHECK TO SEE IF WE ARE POINTING
 1704   REF   5  LAST  398   27,2274  03351 0                  SCAXIS       THE THRUST AXIS
 1705                        27,2275  51025 1          DSU     BPL
 1706   REF   1              27,2276  16415 0                  SINVEC1      SIN 49.4 DEGS                       $2
 1707   REF   2  LAST  398   27,2277  56345 0                  FINDGIMB     IF SO, WE ARE TRYING TO POINT IT INTO
```

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1708                        27,2300  77775 1          VLOAD                GIMBAL LOCK, ABORT COULD GO HERE
1709                        27,2301  77626 0          STADR
1710  REF  5 LAST 398       27,2302  50442 0          STOVL   MIS +12D
1711                        27,2303  77626 0          STADR                STORE MFS (IN PD LIST) IN MIS
1712  REF  6 LAST 399       27,2304  50450 0          STOVL   MIS +6
1713                        27,2305  77626 0          STADR
1714  REF  7 LAST 399       27,2306  50456 0          STOVL   MIS
1715  REF  8 LAST 399       27,2307  03327 1                  MIS +6       INNER GIMBAL AXIS IN FINAL S/C AXES
1716                        27,2310  57444 1          BPL     VCOMP        LOCATE THE IG AXIS DIRECTION CLOSEST TO
1717  REF  1                27,2311  56312 1                  IGSAMEX      FINAL X S/C AXIS

1718                        27,2312  50035 1 IGSAMEX  VXV     BMN          FIND THE SHORTEST WAY OF ROTATING THE
1719  REF  6 LAST 398       27,2313  03351 0                  SCAXIS       S/C OUT OF GIMBAL LOCK BY A ROTATION
1720  REF  1                27,2314  56321 1                  U=SCAXIS     ABOUT +- SCAXIS, I.E. IF (IG (SGN MFS3)
A1721                                                                      X SCAXIS . XF) LESS THAN 0, U = SCAXIS
A1722                                                                      OTHERWISE U = -SCAXIS

1723                        27,2315  57575 1          VLOAD   VCOMP
1724  REF  7 LAST 399       27,2316  03351 0                  SCAXIS
1725  REF  3 LAST 398       27,2317  37343 1          STCALL  COF          ROTATE ABOUT -SCAXIS
1726  REF  1                27,2320  56324 1                  CHEKAXIS
1727                        27,2321  77775 1 U=SCAXIS VLOAD
1728  REF  8 LAST 399       27,2322  03351 0                  SCAXIS
1729  REF  4 LAST 399       27,2323  03343 0          STORE   COF          ROTATE ABOUT + SCAXIS
1730                        27,2324  51545 1 CHEKAXIS DLOAD   ABS
1731  REF  9 LAST 399       27,2325  03351 0                  SCAXIS       SEE IF WE ARE POINTING THE AOT
1732                        27,2326  51025 1          DSU     BPL
1733  REF  1                27,2327  16417 1                  SINVEC2      SIN 29.5 DEGS                          $2
1734  REF  1                27,2330  56334 0                  PICKANG1     IF SO, ROTATE 50 DEGS ABOUT +- SCAXIS
1735                        27,2331  52145 0          DLOAD   GOTO         IF NOT, MUST BE POINTING THE TRANSPONDER
1736  REF  1                27,2332  16423 0                  VECANG2      OR SOME VECTOR IN THE Y, OR Z PLANE
1737  REF  1                27,2333  56336 1                  COMPMFSN     IN THIS CASE ROTATE 35 DEGS TO GET OUT
A1738                                                                     OF GIMBAL LOCK (VECANG2  $360)
1739                        27,2334  77745 1 PICKANG1 DLOAD
1740  REF  1                27,2335  16421 1                  VECANG1      = 50 DEGS                          $ 360
1741                        27,2336  77624 1 COMPMFSN CALL
1742  REF  2 LAST 398       27,2337  44522 1                  DELCOMP      COMPUTE THE ROTATION ABOUT SCAXIS TO
1743                        27,2340  75160 1          AXC,1   AXC,2        BRING MFS OUT OF GIMBAL LOCK
1744  REF  9 LAST 399       27,2341  03320 0                  MIS
1745  REF  2 LAST 398       27,2342  03425 1                  DEL
1746                        27,2343  77624 1          CALL
1747  REF  2 LAST 398       27,2344  44304 0                  MXM3         DESIRED S/C AXES TO STABLE MEMBER AXES
A1748                                                                     WHICH WILL ALIGN VI WITH VF AND AVOID
A1749                                                                     GIMBAL LOCK
1750                        27,2345  45160 1 FINDGIMB AXC,1   CALL
1751                        27,2346  00000 1                  0            EXTRACT THE COMMANDED CDU ANGLES FROM
1752  REF  1                27,2347  44647 1                  DCMTOCDU     THIS MATRIX
1753                        27,2350  77634 0          RTB
1754  REF  1                27,2351  45644 0                  V1STO2S      CONVERT TO 2:S COMPLEMENT
1755                        27,2352  52001 1 VECPTRET SETPD   GOTO
```

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```
1756                          27,2353  00001 0                        0
1757  REF   2 LAST  398       27,2354  03310 0                        VECQTEMP        RETURN TO CALLER

1758                          27,2355  50375 0  PICKAXIS VLOAD        DOT             IF VF X VI = 0,  FIND VF . VI
1759                          27,2356  00035 1                         28D
1760  REF  10 LAST  399       27,2357  03351 0                         SCAXIS
1761                          27,2360  72240 1           BMN           TLOAD
1762  REF   1                 27,2361  56365 1                         ROT180
1763                          27,2362  00032 0                         25D
1764                          27,2363  77650 1           GOTO
1765  REF   1                 27,2364  56352 0                         VECPTRET        PRESENT CDU ANGLES
1766                          27,2365  47375 0  ROT180   VLOAD         VXV             IF VF, VI ANTIPARALLEL, 180 DEG ROTATION
1767  REF  10 LAST  399       27,2366  03327 1                         MIS +6          IS REQUIRED. Y STABLE MEMBER AXIS IN
1768  REF   2 LAST  298       27,2367  15334 1                         HIUNITX         INITIAL S/C AXIS.
1769                          27,2370  47256 0           UNIT          VXV             FIND Y(SM) X X(I)
1770  REF  11 LAST  400       27,2371  03351 0                         SCAXIS          FIND UNIT(VI X UNIT(Y(SM) X X(I)))
1771                          27,2372  40056 0           UNIT          BOV             I.E. PICK A VECTOR IN THE PLANE OF X(I),
1772  REF   1                 27,2373  56407 1                         PICKX           Y(SM) PERPENDICULAR TO VI
1773  REF   5 LAST  399       27,2374  17343 0           STODL         COF
1774                          27,2375  00045 0                         36D             CHECK MAGNITUDE
1775                          27,2376  50025 0           DSU           BMN             OF THIS VECTOR.
1776  REF   2 LAST  398       27,2377  16426 0                         DPB-14          IF LESS THAN B-14,
1777  REF   2 LAST  400       27,2400  56407 1                         PICKX           PICK X-AXIS.
1778                          27,2401  77775 1           VLOAD
1779  REF   6 LAST  400       27,2402  03343 0                         COF
1780  REF   7 LAST  400       27,2403  17343 0  XROT     STODL         COF
1781  REF   2 LAST  305       27,2404  15334 1                         HIDPHALF
1782                          27,2405  77650 1           GOTO
1783  REF   1                 27,2406  56257 1                         COMPMATX
1784                          27,2407  52175 0  PICKX    VLOAD         GOTO            PICK THE XAXIS IN THIS CASE
1785  REF   3 LAST  400       27,2410  15334 1                         HIUNITX
1786  REF   1                 27,2411  56403 0                         XROT
1788  REF   1                 27,2000                   SETLOC        MANUVER1
1789                          27,2412                   BANK

17895 REF   2 LAST  398 TO  400:   117   117*          COUNT*        $$/VECPT
1790                          27,2412  15555 0  SINGIMLC 2DEC        .4285836003     =SIN(59)                $2
1790                          27,2413  35172 0
1791                          27,2414  14113 1  SINVEC1  2DEC        .3796356537     =SIN(49.4)              $2
1791                          27,2415  36326 0
1792                          27,2416  07701 0  SINVEC2  2DEC        .2462117800     =SIN(29.5)              $2
1792                          27,2417  35703 0
1793                          27,2420  04343 1  VECANG1  2DEC        .1388888889     = 50 DEGREES                    $360
1793                          27,2421  21616 0
1794                          27,2422  03070 0  VECANG2  2DEC        .09722222222    = 35 DEGREES                    $360
1794                          27,2423  34344 0
1795                          27,2424  00000 1  1BITDP   OCT         0               KEEP THIS BEFORE DPB(-14)       *********
1796                          27,2425  00001 0  DPB-14   OCT         00001
1797                          27,2426  00000 1           OCT         00000
1799  REF   2 LAST  394       27,2000                   SETLOC        MANUVER
```

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L       R60,R62                                          USER'S PAGE NO.  8      E6 S3

1800                    27,2427                 BANK
```

L R60,R62 USER'S PAGE NO. 9 E6 S3

P1801 ROUTINE FOR INITIATING AUTOMATIC MANEUVER VIA KEYBOARD (V49)

```
 1802   REF   3  LAST  394      1307                          EBANK=  CPHI

 1803   REF   1                                              COUNT*  $$/R62
 1804   REF   1                 27,2427  3 5025 0  R62DISP  CAF     V06N22      DISPLAY COMMAND ICDUS CPHI, CTHETA, CPHI
 1805   REF  60  LAST  395      27,2430  0 4636 0          TC      BANKCALL
 1806   REF   1                 27,2431    20743 0         CADR    GOFLASH
 1807   REF  18  LAST  279      27,2432  1 5524 0          TCF     ENDEXT
 1808   REF   1                 27,2433  1 2435 0          TCF     GOMOVE      PROCEED
 1809   REF   2  LAST  264      27,2434  1 2427 0          TCF     R62DISP     ENTER

A1810                                                                         ASTRONAUT MAY LOAD NEW ICDUS AT THIS
A1811                                                                         POINT
 1812   REF  28  LAST  396      27,2435  0 5547 1  GOMOVE   TC      UPFLAG      SET 3-AXIS FLAG
 1813   REF   3  LAST  394      27,2436    00124 0         ADRES   3AXISFLG    BIT 6  FLAG 5
 1814   REF  61  LAST  402      27,2437  0 4636 0          TC      BANKCALL
 1815   REF   1                 27,2440    56074 1         CADR    R60CSM

 1816   REF  19  LAST  402      27,2441  1 5524 0          TCF     ENDEXT
```

L ANGLFIND USER'S PAGE NO. 1 E0 S3

```
050001 REF   1                22,2000                        SETLOC  KALCMON1
050002                        22,2000                        BANK

0501   REF   5  LAST  398     E6,1661                        EBANK=  BCDU

05015  REF   1                                              COUNT*  $$/KALC
0502   REF  15  LAST  395     22,2000   0 6006 1  KALCMAN3  TC      INTPRET
0503                          22,2001   77634 0     +1      RTB
0504   REF   2  LAST  398     22,2002   44370 0             READCDUK        PICK UP CURRENT CDU ANGLES
0505   REF   6  LAST  403     22,2003   03262 1             STORE   BCDU   STORE THE INITIAL S/C ANGLES
0516                          22,2004   72364 0             AXC,2   TLOAD   COMPUTE THE TRANSFORMATION FROM
0517   REF  11  LAST  400     22,2005   03320 0                     MIS     INITIAL S/C AXES TO STABLE MEMBER AXES
0518   REF   7  LAST  403     22,2006   03262 1                     BCDU    (MIS)
0519                          22,2007   77624 1             CALL
0520   REF   2  LAST  398     22,2010   44377 1                     CDUTODCM
0521                          22,2011   72364 0             AXC,2   TLOAD   COMPUTE THE TRANSFORMATION FROM
0522   REF   4  LAST  125     22,2012   03425 1                     MFS     FINAL S/C AXES TO STABLE MEMBER AXES
0523   REF   4  LAST  402     22,2013   01310 1                     CPHI    (MFS)
0524                          22,2014   77624 1             CALL
0525   REF   3  LAST  403     22,2015   44377 1                     CDUTODCM
0526                          22,2016   45160 1  SECAD      AXC,1   CALL    MIS AND MFS ARRAYS CALCULATED        $2
0527   REF  12  LAST  403     22,2017   03320 0                     MIS
0528   REF   1                22,2020   44334 0                     TRANSPOS
0529                          22,2021   77775 1             VLOAD
0530                          22,2022   77626 0             STADR
0531   REF   8  LAST  118     22,2023   50474 0             STOVL   TMIS +12D
0532                          22,2024   77626 0             STADR
0533   REF   9  LAST  403     22,2025   50502 0             STOVL   TMIS +6
0534                          22,2026   77626 0             STADR
0535   REF  10  LAST  403     22,2027   74510 0             STORE   TMIS    TMIS = TRANSPOSE(MIS) SCALED BY 2
0536                          22,2030   75160 1             AXC,1   AXC,2
0537   REF  11  LAST  403     22,2031   03266 0                     TMIS
0538   REF   5  LAST  403     22,2032   03425 1                     MFS
0539                          22,2033   77624 1             CALL
0540   REF   3  LAST  399     22,2034   44304 0                     MXM3
0541                          22,2035   45575 1             VLOAD   STADR
0542   REF   1                22,2036   50335 1             STOVL   MFI +12D
0543                          22,2037   77626 0             STADR
0544   REF   2  LAST  403     22,2040   50343 0             STOVL   MFI +6
0545                          22,2041   77626 0             STADR
0546   REF   3  LAST  403     22,2042   74351 0             STORE   MFI     MFI = TMIS MFS (SCALED BY 4)
0547                          22,2043   45001 1             SETPD   CALL    TRANSPOSE MFI IN PD LIST
0548                          22,2044   00023 0                     18D
0549   REF   1                22,2045   44343 0                     TRNSPSPD
0550                          22,2046   45575 1             VLOAD   STADR
0551   REF   1                22,2047   50474 0             STOVL   TMFI +12D
0552                          22,2050   77626 0             STADR
0553   REF   2  LAST  403     22,2051   50502 0             STOVL   TMFI +6
0554                          22,2052   77626 0             STADR
0555   REF   3  LAST  403     22,2053   74510 0             STORE   TMFI    TMFI = TRANSPOSE (MFI)  SCALED BY 4
```

L ANGLFIND

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R0556
R0557   CALCULATE COFSKEW AND MFISYM
R0558
 0559                          22,2054  45345 1   DLOAD   DSU
 0560   REF   4  LAST  403     22,2055  03271 0           TMFI +2
 0561   REF   4  LAST  403     22,2056  03430 0           MFI +2
 0562                          22,2057  45325 1   PDDL    DSU             CALCULATE COF SCALED BY 2/SIN(AM)
 0563   REF   5  LAST  404     22,2060  03432 1           MFI +4
 0564   REF   5  LAST  404     22,2061  03273 1           TMFI +4
 0565                          22,2062  45325 1   PDDL    DSU
 0566   REF   6  LAST  404     22,2063  03301 0           TMFI +10D
 0567   REF   6  LAST  404     22,2064  03440 1           MFI +10D
 0568                          22,2065  77666 1   VDEF
 0569   REF   4  LAST  118     22,2066  03311 1   STORE   COFSKEW         EQUALS MFISKEW
R0570
R0571   CALCULATE AM AND PROCEED ACCORDING TO ITS MAGNITUDE
R0572
 0573                          22,2067  43345 1   DLOAD   DAD
 0574   REF   7  LAST  404     22,2070  03426 1           MFI
 0575   REF   8  LAST  404     22,2071  03446 1           MFI +16D
 0576                          22,2072  43225 0   DSU     DAD
 0577   REF   2  LAST   34     22,2073  15326 1           DP1/4TH
 0578   REF   9  LAST  404     22,2074  03436 0           MFI +8D
 0579   REF   3  LAST  118     22,2075  03317 1   STORE   CAM             CAM = (MFI0+MFI4+MFI8-1)/2 HALF SCALE
 0580                          22,2076  77726 1   ARCCOS
 0581   REF   2  LAST  118     22,2077  03365 1   STORE   AM              AM=ARCCOS(CAM)  (AM SCALED BY 2)
 0582                          22,2100  51025 1   DSU     BPL
 0583   REF   1                22,2101  04367 1           MINANG
 0584   REF   1                22,2102  44111 0           CHECKMAX
 0585                          22,2103  77776 1   EXIT                    MANEUVER LESS THAN 0.25 DEG
 0586                          22,2104  0 0004 0  INHINT                  GO DIRECTLY INTO ATTITUDE HOLD
 0587   REF  46  LAST  392     22,2105  4 4770 1  CS      ONE             ABOUT COMMANDED ANGLES
 0588   REF   4  LAST  262     22,2106  55'340 0  TS      HOLDFLAG        NOGO WILL STOP ANY RATE AND SET UP FOR A
 0589   REF   1                22,2107  0 3163 0  TC      LOADCDUD        GOOD RETURN
 0590   REF   1                22,2110  1 2723 1  TCF     NOGO

 0597                          22,2111  45345 1 CHECKMAX DLOAD  DSU
 0598   REF   3  LAST  404     22,2112  03365 1           AM
 0599   REF   1                22,2113  04370 1           MAXANG
 0600                          22,2114  77244 0   BPL     VLOAD
 0601   REF   1                22,2115  44123 1           ALTCALC         UNIT
 0602   REF   5  LAST  404     22,2116  03311 1           COFSKEW         COFSKEW
 0603                          22,2117  77656 1   UNIT
 0604   REF   8  LAST  400     22,2120  03343 0   STORE   COF             COF IS THE MANEUVER AXIS
 0605                          22,2121  77650 1   GOTO    LOCSKIRT        SEE IF MANEUVER GOES THRU GIMBAL LOCK
 0606   REF   1                22,2122  44745 1
 0607                          22,2123  53375 0 ALTCALC VLOAD   VAD       IF AM GREATER THAN 170 DEGREES
 0608   REF  10  LAST  404     22,2124  03426 1           MFI
 0609   REF   7  LAST  404     22,2125  03267 1           TMFI
 0610                          22,2126  77762 1   VSR1
```

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0611  REF   1                  22,2127  27267 1          STOVL   MFISYM
0612  REF  11  LAST  404       22,2130  03434 1                  MFI +6
0613                           22,2131  74455 0          VAD     VSR1
0614  REF   8  LAST  404       22,2132  03275 1                  TMFI +6
0615  REF   2  LAST  405       22,2133  27275 1          STOVL   MFISYM +6
0616  REF  12  LAST  405       22,2134  03442 0                  MFI +12D
0617                           22,2135  74455 0          VAD     VSR1
0618  REF   9  LAST  405       22,2136  03303 1                  TMFI +12D
0619  REF   3  LAST  405       22,2137  03303 1          STORE   MFISYM +12D     MFISYM=(MFI+TMFI)/2  SCALED BY 4
R0620
R0621
R0622  CALCULATE COF
R0623
0624                           22,2140  70545 1          DLOAD   SR1
0625  REF   4  LAST  404       22,2141  03317 1                  CAM
0626                           22,2142  45325 1          PDDL    DSU             PD0 CAM                          $4
0627  REF   1                  22,2143  15334 1                  DPHALF
0628  REF   5  LAST  405       22,2144  03317 1                  CAM
0629                           22,2145  65204 1          BOVB    PDDL            PD2 1 - CAM                      $2
0630  REF   1                  22,2146  45761 0                  SIGNMPAC
0631  REF   4  LAST  405       22,2147  03307 0                  MFISYM +16D
0632                           22,2150  56225 1          DSU     DDV
0633                           22,2151  00001 0                  0
0634                           22,2152  00003 1                  2
0635                           22,2153  65366 1          SQRT    PDDL            COFZ = SQRT(MFISYM8-CAM)/1-CAM)
0636  REF   5  LAST  405       22,2154  03277 0                  MFISYM +8D                          $ ROOT 2
0637                           22,2155  56225 1          DSU     DDV
0638                           22,2156  00001 0                  0
0639                           22,2157  00003 1                  2
0640                           22,2160  65366 1          SQRT    PDDL            COFY = SQRT(MFISYM4-CAM)/(1-CAM)  $ROOT2
0641  REF   6  LAST  405       22,2161  03267 1                  MFISYM
0642                           22,2162  56225 1          DSU     DDV
0643                           22,2163  00001 0                  0
0644                           22,2164  00003 1                  2
0645                           22,2165  55566 1          SQRT    VDEF            COFX = SQRT(MFISYM-CAM)/(1-CAM)  $ROOT 2
0646                           22,2166  77656 1          UNIT
0647  REF   9  LAST  404       22,2167  03343 0          STORE   COF
R0648
R0649  DETERMINE  LARGEST COF AND ADJUST ACCORDINGLY
R0650
0651                           22,2170  45345 1  COFMAXGO DLOAD   DSU
0652  REF  10  LAST  405       22,2171  03343 0                  COF
0653  REF  11  LAST  405       22,2172  03345 0                  COF +2
0654                           22,2173  71240 1          BMN     DLOAD           COFY G COFX
0655  REF   1                  22,2174  44203 0                  COMP12
0656  REF  12  LAST  405       22,2175  03343 0                  COF
0657                           22,2176  50025 0          DSU     BMN
0658  REF  13  LAST  405       22,2177  03347 1                  COF +4
0659  REF   1                  22,2200  44260 0                  METHOD3         COFZ G COFX OR COFY
0660                           22,2201  77650 1          GOTO
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0661   REF   1                    22,2202  44234 1                    METHOD1          COFX G COFY OR COFZ
0662                              22,2203  45345 1  COMP12    DLOAD   DSU
0663   REF  14  LAST  405         22,2204  03345 0                    COF +2
0664   REF  15  LAST  406         22,2205  03347 1                    COF +4
0665                              22,2206  77640 0           BMN
0666   REF   2  LAST  405         22,2207  44260 0                    METHOD3          COFZ G COFY OR COFX

0667                              22,2210  51145 0  METHOD2   DLOAD   BPL              COFY MAX
0668   REF   6  LAST  404         22,2211  03313 0                    COFSKEW +2       UY
0669   REF   1                    22,2212  44216 1                    U2POS
0670                              22,2213  57575 1           VLOAD   VCOMP
0671   REF  16  LAST  406         22,2214  03343 0                    COF
0672   REF  17  LAST  406         22,2215  03343 0           STORE   COF
0673                              22,2216  51145 0  U2POS     DLOAD   BPL
0674   REF   7  LAST  405         22,2217  03271 0                    MFISYM +2        UX UY
0675   REF   1                    22,2220  44224 0                    OKU21
0676                              22,2221  57545 1           DLOAD   DCOMP            SIGN OF UX OPPOSITE TO UY
0677   REF  18  LAST  406         22,2222  03343 0                    COF
0678   REF  19  LAST  406         22,2223  03343 0           STORE   COF
0679                              22,2224  51145 0  OKU21     DLOAD   BPL
0680   REF   8  LAST  406         22,2225  03301 0                    MFISYM +10D      UY UZ
0681   REF   2  LAST  404         22,2226  44745 1                    LOCSKIRT
0682                              22,2227  57545 1           DLOAD   DCOMP            SIGN OF UZ OPPOSITE TO UY
0683   REF  20  LAST  406         22,2230  03347 1                    COF +4
0684   REF  21  LAST  406         22,2231  03347 1           STORE   COF +4
0685                              22,2232  77650 1           GOTO
0686   REF   3  LAST  406         22,2233  44745 1                    LOCSKIRT
0687                              22,2234  51145 0  METHOD1   DLOAD   BPL              COFX MAX
0688   REF   7  LAST  406         22,2235  03311 1                    COFSKEW          UX
0689   REF   1                    22,2236  44242 0                    U1POS
0690                              22,2237  57575 1           VLOAD   VCOMP
0691   REF  22  LAST  406         22,2240  03343 0                    COF
0692   REF  23  LAST  406         22,2241  03343 0           STORE   COF
0693                              22,2242  51145 0  U1POS     DLOAD   BPL
0694   REF   9  LAST  406         22,2243  03271 0                    MFISYM +2        UX UY
0695   REF   1                    22,2244  44250 0                    OKU12
0696                              22,2245  57545 1           DLOAD   DCOMP
0697   REF  24  LAST  406         22,2246  03345 0                    COF +2           SIGN OF UY OPPOSITE TO UX
0698   REF  25  LAST  406         22,2247  03345 0           STORE   COF +2
0699                              22,2250  51145 0  OKU12     DLOAD   BPL
0700   REF  10  LAST  406         22,2251  03273 1                    MFISYM +4        UX UZ
0701   REF   4  LAST  406         22,2252  44745 1                    LOCSKIRT
0702                              22,2253  57545 1           DLOAD   DCOMP            SIGN OF UZ OPPOSITE TO UY
0703   REF  26  LAST  406         22,2254  03347 1                    COF +4
0704   REF  27  LAST  406         22,2255  03347 1           STORE   COF +4
0705                              22,2256  77650 1           GOTO
0706   REF   5  LAST  406         22,2257  44745 1                    LOCSKIRT
0707                              22,2260  51145 0  METHOD3   DLOAD   BPL              COFZ MAX
0708   REF   8  LAST  406         22,2261  03315 0                    COFSKEW +4       UZ
0709   REF   1                    22,2262  44266 0                    U3POS
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0710                                  22,2263  57575 1          VLOAD   VCOMP
0711   REF  28  LAST  406             22,2264  03343 0                  COF
0712   REF  29  LAST  407             22,2265  03343 0          STORE   COF
0713                                  22,2266  51145 0  U3POS   DLOAD   BPL
0714   REF  11  LAST  406             22,2267  03273 1                  MFISYM +4       UX UZ
0715   REF   1                        22,2270  44274 0                  OKU31
0716                                  22,2271  57545 1          DLOAD   DCOMP
0717   REF  30  LAST  407             22,2272  03343 0                  COF             SIGN OF UX OPPOSITE TO UZ
0718   REF  31  LAST  407             22,2273  03343 0          STORE   COF
0719                                  22,2274  51145 0  OKU31   DLOAD   BPL
0720   REF  12  LAST  407             22,2275  03301 0                  MFISYM +10D     UY UZ
0721   REF   6  LAST  406             22,2276  44745 1                  LOCSKIRT
0722                                  22,2277  57545 1          DLOAD   DCOMP
0723   REF  32  LAST  407             22,2300  03345 0                  COF +2          SIGN OF UY OPPOSITE TO UZ
0724   REF  33  LAST  407             22,2301  03345 0          STORE   COF +2
0725                                  22,2302  77650 1          GOTO
0726   REF   7  LAST  407             22,2303  44745 1                  LOCSKIRT
```

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RC727
RC728   MATRIX OPERATIONS
RC729
 C730                  22,2304  77601 0  MXM3     SETPD                  MXM3 MULTIPLIES 2 3X3 MATRICES
 C731                  22,2305  00001 0                    0             AND LEAVES RESULT IN PD LIST
 C732                  22,2306  64743 0           DLOAD*   PDDL*         ADDRESS OF 1ST MATRIX IN XR1
 C733                  22,2307  77762 1                    12D,2         ADDRESS OF 2ND MATRIX IN XR2
 C734                  22,2310  77770 1                    6,2
 C735                  22,2311  55523 0           PDDL*    VDEF          DEFINE VECTOR M2(COL 1)
 C736                  22,2312  77776 1                    0,2
 C737                  22,2313  64717 1           MXV*     PDDL*         M1XM2(COL 1) IN PD
 C738                  22,2314  00001 0                    0,1
 C739                  22,2315  77760 0                    14D,2
 C740                  22,2316  64723 0           PDDL*    PDDL*
 C741                  22,2317  77766 0                    8D,2
 C742                  22,2320  77774 0                    2,2
 C743                  22,2321  63666 1           VDEF     MXV*          DEFINE VECTOR M2(COL 2)
 C744                  22,2322  00001 0                    0,1
 C745                  22,2323  64723 0           PDDL*    PDDL*         M1XM2(COL 2) IN PD
 C746                  22,2324  77756 0                    16D,2
 C747                  22,2325  77764 1                    10D,2
 C748                  22,2326  55523 0           PDDL*    VDEF          DEFINE VECTOR M2(COL 3)
 C749                  22,2327  77772 0                    4,2
 C750                  22,2330  41517 1           MXV*     PUSH          M1XM2(COL 3) IN PD
 C751                  22,2331  00001 0                    0,1
 C752                  22,2332  77650 1                    GOTO
 C753  REF  2 LAST 403 22,2333  44343 0                    TRNSPSPD      REVERSE ROWS AND COLS IN PD AND
RC754                                  RETURN WITH M1XM2 IN PD LIST
RC755
 C756                  22,2334  76601 1  TRANSPOS SETPD     VLOAD*        TRANSPOS TRANSPOSES A 3X3 MATRIX
 C757                  22,2335  00001 0                    0              AND LEAVES RESULT IN PD LIST
 C758                  22,2336  00001 0                    0,1           MATRIX ADDRESS IN XR1
 C759                  22,2337  62713 0           PDVL*    PDVL*
 C760                  22,2340  00007 0                    6,1
 C761                  22,2341  00015 0                    12D,1
 C762                  22,2342  77606 1           PUSH                   MATRIX IN PD
 C763                  22,2343  65345 0  TRNSPSPD DLOAD    PDDL          ENTER WITH MATRIX IN PD LIST
 C764                  22,2344  00003 1                    2
 C765                  22,2345  00007 0                    6
 C766                  22,2346  14003 1           STODL    2
 C767                  22,2347  77626 0           STADR
 C768                  22,2350  63770 1           STODL    6
 C769                  22,2351  00005 1                    4
 C770                  22,2352  77725 1           PDDL
 C771                  22,2353  00015 0                    12D
 C772                  22,2354  14005 1           STODL    4
 C773                  22,2355  77626 0           STADR
 C774                  22,2356  63762 1           STODL    12D
 C775                  22,2357  00013 0                    10D
 C776                  22,2360  77725 1           PDDL
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0777                    22,2361  00017 1                 140
0778                    22,2362  14013 0          STODL  140
0779                    22,2363  77626 0          STADR
0780                    22,2364  77760 0          STORE  140
0781                    22,2365  77616 0          RVQ              RETURN WITH TRANSPOSED MATRIX IN PD LIST
0782                    22,2366  00013 0  MINANG  DEC    .00069375
0783                    22,2367  17071 1  MAXANG  DEC    .472222
0794                    22,2370  0 0004 0 READCDUK INHINT          LOAD T(MPAC) WITH THE CURRENT CDU ANGLES
0795  REF   6 LAST 257  22,2371  3 0034 0         CA     CDUZ
0796  REF 210 LAST 395  22,2372  54 156 1         TS     MPAC +2
0797                    22,2373  0 0006 1         EXTEND
0798  REF   7 LAST 283  22,2374  3 0033 1         DCA    CDUX
0799                    22,2375  0 0003 1         RELINT
0800  REF   1           22,2376  1 6445 0         TCF    TLOAD +6
080101 REF  1           22,2000                  SETLOC KALCMON2
080102                  22,2377                  BANK

080105 REF    2 LAST  403 TO  409:    255   255*        COUNT* $$/KALC

0802                    22,2377  66370 0 CDUTODCM AXT,1  SSP      SUBROUTINE TO COMPUTE  DIRECTION COSINE
0803                    22,2400  00003 1         OCT    3        MATRIX RELATING S/C AXES TO STABLE
0804  REF   1           22,2401  00051 0                S1       MEMBER AXES FROM 3 CDU ANGLES IN T(MPAC)
0805                    22,2402  00001 0         OCT    1        SET XR1, S1 AND PD FOR LOOP
0806                    22,2403  00010 0         STORE  7
0807                    22,2404  77601 0         SETPD
0808                    22,2405  00001 0                0
0809                    22,2406  47133 0 LOOPSIN SLOAD* RTB
0810                    22,2407  00013 0                10D,1
0811  REF   3 LAST 297  22,2410  51754 0                CDULOGIC
0812                    22,2411  00013 0         STORE  10D      LOAD PD WITH  0 SIN(PHI)
0813                    22,2412  65356 1         SIN    PDDL                   2 COS(PHI)
0814                    22,2413  00013 0                10D                    4 SIN(THETA)
0815                    22,2414  41546 0         COS    PUSH                   6 COS(THETA)
0816                    22,2415  71300 1         TIX,1  DLOAD                  8 SIN(PSI)
0817  REF   1           22,2416  44406 0                LOOPSIN                10 COS(PSI)
0818                    22,2417  00007 0                6
0819                    22,2420  72405 0         DMP    SL1
0820                    22,2421  00013 0                10D
0821                    22,2422  10001 1         STORE  0,2
0822                    22,2423  77745 1         DLOAD
0823                    22,2424  00005 1                4
0824                    22,2425  65205 0         DMP    PDDL
0825                    22,2426  00001 0                0        (PD6 SIN(THETA)SIN(PHI))
0826                    22,2427  00007 0                6
0827                    22,2430  41205 0         DMP    DMP
0828                    22,2431  00011 1                8D
0829                    22,2432  00003 1                2
0830                    22,2433  44352 0         SL1    BDSU
0831                    22,2434  00015 0                12D
0832                    22,2435  77752 1         SL1
```

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```
0833  22,2436  10003 0  STORE  2,2
0834  22,2437  77745 1  DLOAD
0835  22,2440  00003 1         2
0836  22,2441  65205 0  DMP    PDDL     (PD7 COS(PHI)SIN(THETA)) SCALED 4
0837  22,2442  00005 1         4
0838  22,2443  00007 0         6
0839  22,2444  41205 0  DMP    DMP
0840  22,2445  00011 1         8D
0841  22,2446  00001 0         0
0842  22,2447  77752 1  SL1
0843  22,2450  72415 1  DAD    SL1
0844  22,2451  00017 1         14D
0845  22,2452  10005 0  STORE  4,2
0846  22,2453  77745 1  DLOAD
0847  22,2454  00011 1         8D
0848  22,2455  10007 1  STORE  6,2
0849  22,2456  77745 1  DLOAD
0850  22,2457  00013 0         10D
0851  22,2460  72405 0  DMP    SL1
0852  22,2461  00003 1         2
0853  22,2462  10011 0  STORE  8D,2
0854  22,2463  77745 1  DLOAD
0855  22,2464  00013 0         10D
0856  22,2465  57405 1  DMP    DCOMP
0857  22,2466  00001 0         0
0858  22,2467  77752 1  SL1
0859  22,2470  10013 1  STORE  10D,2
0860  22,2471  77745 1  DLOAD
0861  22,2472  00005 1         4
0862  22,2473  57405 1  DMP    DCOMP
0863  22,2474  00013 0         10D
0864  22,2475  77752 1  SL1
0865  22,2476  10015 1  STORE  12D,2
0866  22,2477  77745 1  DLOAD
0867  22,2500  72405 0  DMP    SL1      (PUSH UP 7)
0868  22,2501  00011 1         8D
0869  22,2502  41325 0  PDDL   DMP      (PD7 COS(PHI)SIN(THETA)SIN(PSI)) SCALE4
0870  22,2503  00007 0         6
0871  22,2504  00001 0         0
0872  22,2505  72415 1  DAD    SL1      (PUSH UP 7)
0873  22,2506  77626 0  STADR           C7=COS(PHI)SIN(THETA)SIN(PSI)
0874  22,2507  67760 1  STORE  14D,2
0875  22,2510  77745 1  DLOAD
0876  22,2511  72405 0  DMP    SL1      (PUSH UP 6)
0877  22,2512  00011 1         8D
0878  22,2513  41325 0  PDDL   DMP      (PD6 SIN(THETA)SIN(PHI)SIN(PSI)) SCALE4
0879  22,2514  00007 0         6
0880  22,2515  00003 1         2
0881  22,2516  72425 1  DSU    SL1      (PUSH UP 6)
0882  22,2517  77626 0  STADR
```

```
C883                        22,2520  67756 1          STORE  16D,2        C8=-SIN(THETA)SIN(PHI)SIN(PSI)
C884                        22,2521  77616 0          RVQ                   +COS(THETA)COS(PHI)
C885                        22,2522           ENDDCM   EQUALS

C88601 REF   2 LAST  403    22,2000                    SETLOC KALCMON1
C88602                      22,2522                    BANK

RC887   CALCULATION OF THE MATRIX DEL.....

RC888           *     *                --T          *
RC889           DEL = (IDMATRIX)COS(A)+UU (1-COS(A))+UX SIN(A)          SCALED 1

RC890            -
RC891           WHERE U IS A UNIT VECTOR (DP SCALED 2) ALONG THE AXIS OF ROTATION.
RC893           A IS THE ANGLE OF ROTATION (DP SCALED 2)
RC894                                    -
RC895           UPON ENTRY THE STARTING ADDRESS OF U IS COF, AND A IS IN MPAC

C8955  REF   3 LAST  409 TO  411:    83   338*          COUNT* $$/KALC
C896                        22,2522  41401 1  DELCOMP   SETPD  PUSH          MPAC CONTAINS THE ANGLE A
C897                        22,2523  00001 0                 0
C898                        22,2524  65356 1            SIN    PDDL          PD0 = SIN(A)
C899                        22,2525  41546 0            COS    PUSH          PD2 = COS(A)
C8995                       22,2526  65302 0            SR2    PDDL          PD2 = COS(A)                    $8
C900                        22,2527  41021 1            BDSU   BOVB          PD4 = 1-COS(A)                  $2
C901   REF   2 LAST  405    22,2530  15334 1                   DPHALF
C9014  REF   2 LAST  405    22,2531  45761 0                   SIGNMPAC

R0902   COMPUTE THE DIAGONAL COMPONENTS OF DEL

C9024                       22,2532  77725 1            PDDL
C903   REF  34 LAST  407    22,2533  03343 0                   COF
C904                        22,2534  41316 0            DSQ    DMP
C905                        22,2535  00005 1                   4
C906                        22,2536  52415 0            DAD    SL3
C907                        22,2537  00003 1                   2
C908                        22,2540  77604 0            BOVB
C909   REF   3 LAST  411    22,2541  45761 0                   SIGNMPAC
C910   REF   3 LAST  399    22,2542  17426 1            STODL  DEL           UX UX(U-COS(A)) +COS(A)         $1
C911   REF  35 LAST  411    22,2543  03345 0                   COF +2
C912                        22,2544  41316 0            DSQ    DMP
C913                        22,2545  00005 1                   4
C914                        22,2546  52415 0            DAD    SL3
C915                        22,2547  00003 1                   2
C916                        22,2550  77604 0            BOVB
C917   REF   4 LAST  411    22,2551  45761 0                   SIGNMPAC
C918   REF   4 LAST  411    22,2552  17436 0            STODL  DEL +8D       UY UY(1-COS(A)) +COS(A)         $1
C919   REF  36 LAST  411    22,2553  03347 1                   COF +4
C920                        22,2554  41316 0            DSQ    DMP
```

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```
0921                          22,2555  00005 1                4
0922                          22,2556  52415 0      DAD       SL3
0923                          22,2557  00003 1                2
0924                          22,2560  77604 0      BOVB
0925  REF   5 LAST  411       22,2561  45761 0                SIGNMPAC
0926  REF   5 LAST  411       22,2562  03446 1      STORE     DEL +16D      UZ UZ(1-COS(A)) +COS(A)          $1

R0927 COMPUTE THE OFF DIAGONAL TERMS OF DEL

0928                          22,2563  41345 0      DLOAD     DMP
0929  REF  37 LAST  411       22,2564  03343 0                COF
0930  REF  38 LAST  412       22,2565  03345 0                COF +2
0931                          22,2566  72405 0      DMP       SL1
0932                          22,2567  00005 1                4
0933                          22,2570  41325 0      PDDL      DMP           D6  UX UY (1-COS A)              $ 4
0934  REF  39 LAST  412       22,2571  03347 1                COF +4
0935                          22,2572  00001 0                0
0936                          22,2573  43206 1      PUSH      DAD           D8  UZ SIN A                     $ 4
0937                          22,2574  00007 0                6
0938                          22,2575  41112 0      SL2       BOVB
0939  REF   6 LAST  412       22,2576  45761 0                SIGNMPAC
0940  REF   6 LAST  412       22,2577  17434 1      STODL     DEL +6
0941                          22,2600  62421 1      BDSU      SL2
0942                          22,2601  77604 0      BOVB
0943  REF   7 LAST  412       22,2602  45761 0                SIGNMPAC
0944  REF   7 LAST  412       22,2603  17430 0      STODL     DEL +2
0945  REF  40 LAST  412       22,2604  03343 0                COF
0946                          22,2605  41205 0      DMP       DMP
0947  REF  41 LAST  412       22,2606  03347 1                COF +4
0948                          22,2607  00005 1                4
0949                          22,2610  65352 0      SL1       PDDL          D6  UX UZ (1-COS A )             $ 4
0950  REF  42 LAST  412       22,2611  03345 0                COF +2
0951                          22,2612  41405 0      DMP       PUSH          D8  UY SIN(A)
0952                          22,2613  00001 0                0
0953                          22,2614  62415 0      DAD       SL2
0954                          22,2615  00007 0                6
0955                          22,2616  77604 0      BOVB
0956  REF   8 LAST  412       22,2617  45761 0                SIGNMPAC
0957  REF   8 LAST  412       22,2620  17432 1      STODL     DEL +4        UX UZ (1-COS(A))+UY SIN(A)
0958                          22,2621  62421 1      BDSU      SL2
0959                          22,2622  77604 0      BOVB
0960  REF   9 LAST  412       22,2623  45761 0                SIGNMPAC
0961  REF   9 LAST  412       22,2624  17442 0      STODL     DEL +12D      UX UZ (U-COS(A))-UY SIN(A)
0962  REF  43 LAST  412       22,2625  03345 0                COF +2
0963                          22,2626  41205 0      DMP       DMP
0964  REF  44 LAST  412       22,2627  03347 1                COF +4
0965                          22,2630  00005 1                4
0966                          22,2631  65352 0      SL1       PDDL          D6  UY UZ (1-COS(A))             $ 4
0967  REF  45 LAST  412       22,2632  03343 0                COF
0968                          22,2633  41405 0      DMP       PUSH          D8  UX SIN(A)
```

```
0969                        22,2634  00001 0                 0
0970                        22,2635  62415 0        DAD      SL2
0971                        22,2636  00007 0                 6
0972                        22,2637  77604 0        BOVB
0973  REF  10  LAST  412    22,2640  45761 0                 SIGNMPAC
0974  REF  10  LAST  412    22,2641  17444 0        STODL    DEL +14D      UY UZ(1-COS(A)) +UX SIN(A)
0975                        22,2642  62421 1        BDSU     SL2
0976                        22,2643  77604 0        BOVB
0977  REF  11  LAST  413    22,2644  45761 0                 SIGNMPAC
0978  REF  11  LAST  413    22,2645  03440 1        STORE    DEL +10D      UY UZ (1-COS(A)) -UX SIN(A)
0979                        22,2646  77616 0        RVQ


R0980   DIRECTION COSINE MATRIX TO CDU ANGLE ROUTINE
R0981   X1 CONTAINS THE COMPLEMENT OF THE STARTING ADDRESS FOR MATRIX (SCALED 2)
R0982   LEAVES CDU ANGLES SCALED 2PI IN V(MPAC)
R0983   COS(MGA) WILL BE LEFT IN S1 (SCALED 1)

R0984   THE DIRECTION COSINE MATRIX RELATING S/C AXES TO STABLE MEMBER AXES CAN BE WRITTEN AS***

R0986           C =COS(THETA)COS(PSI)
R0987            0
R0988           C =-COS(THETA)SIN(PSI)COS(PHI)+SI (THETA)SIN(PHI)
R0989            1
R0990           C =COS(THETA)SIN(PSI)SIN(PHI) + S N(THETA)COS(PHI)
R0991            2
R0992           C =SIN(PSI)
R0993            3
R0994           C =COS(PSI)COS(PHI)
R0995            4
R0996           C =-COS(PSI)SIN(PHI)
R0997            5
R0998           C =-SIN(THETA)COS(PSI)
R0999            6
R1000           C =SIN(THETA)SIN(PSI)COS(PHI)+COS THETA)SIN(PHI)
R1001            7
R1002           C =-SIN(THETA)SIN(PSI)SIN(PHI)+CO (THETA)COS(PHI)
R1003            8

R1004           WHERE PHI = OGA
R1005                 THETA = IGA
R1006                 PSI = MGA

1007                        22,2647  67543 1  DCMTOCDU DLOAD*  ARCSIN
1008                        22,2650  00007 0                   6,1
1009                        22,2651  71406 0           PUSH     COS           PD +0    PSI
1010                        22,2652  41152 1           SL1      BOVB
1011  REF  12  LAST  413    22,2653  45761 0                    SIGNMPAC
1012  REF   2  LAST  409    22,2654  00051 0           STORE    S1
1013                        22,2655  57543 1           DLOAD*   DCOMP
```

```
1014                          22,2656  00015 0                 12D,1
1015                          22,2657  67471 1          DDV    ARCSIN
1016  REF  3 LAST  413        22,2660  00051 0                 S1
1017                          22,2661  51123 0          PDDL*  BPL              PD +2  THETA
1018                          22,2662  00001 0                 0,1              MUST CHECK THE SIGN OF COS(THETA)
1019  REF  1                  22,2663  44675 0                 OKTHETA          TO DETERMINE THE PROPER QUADRANT
1020                          22,2664  57545 1          DLOAD  DCOMP
1021                          22,2665  43244 1          BPL    DAD
1022  REF  1                  22,2666  44672 1                 SUHALFA
1023  REF  3 LAST  411        22,2667  15334 1                 DPHALF
1024                          22,2670  77650 1          GOTO
1025  REF  1                  22,2671  44674 1                 CALCPHI
1026                          22,2672  77625 0  SUHALFA DSU
1027  REF  4 LAST  414        22,2673  15334 1                 DPHALF
1028                          22,2674  77606 1  CALCPHI PUSH
1029                          22,2675  57543 1  OKTHETA DLOAD* DCOMP
1030                          22,2676  00013 0                 10D,1
1031                          22,2677  67471 1          DDV    ARCSIN
1032  REF  4 LAST  414        22,2700  00051 0                 S1
1033                          22,2701  51123 0          PDDL*  BPL              PUSH DOWN PHI
1034                          22,2702  00011 1                 8D,1
1035  REF  1                  22,2703  44715 1                 OKPHI
1036                          22,2704  57545 1          DLOAD  DCOMP            PUSH UP PHI
1037                          22,2705  43244 1          BPL    DAD
1038  REF  1                  22,2706  44712 0                 SUHALFAP
1039  REF  5 LAST  414        22,2707  15334 1                 DPHALF
1040                          22,2710  77650 1          GOTO
1041  REF  1                  22,2711  44716 1                 VECOFANG
1042                          22,2712  52025 1  SUHALFAP DSU   GOTO
1043  REF  6 LAST  414        22,2713  15334 1                 DPHALF
1044  REF  2 LAST  414        22,2714  44716 1                 VECOFANG
1045                          22,2715  77745 1  OKPHI   DLOAD                  PUSH UP PHI
1046                          22,2716  43466 1  VECOFANG VDEF  RVQ
```

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P1047 ROUTINE FOR TERMINATING AUTOMATIC MANEUVERS

```
10511                          22,2717   77776 1  NOGOM3   EXIT
10512                          22,2720   0 0004 0  NOGOM2   INHINT                THIS LOCATION ACCESSED BY A BZMF NOGO -2
10513  REF  62  LAST  402      22,2721   0 4636 0           TC       BANKCALL
105131 REF   1                22,2722    40203 1           CADR     ZEROERUR

10514                          22,2723   0 0004 0  NOGO     INHINT
10515  REF   3  LAST  222      22,2724   0 4463 1           TC       STOPRATE

105151 REF   2  LAST  212      22,2725   3 4767 0           CAF      R67BIT
105152 REF  14  LAST  395      22,2726   7 0104 0           MASK     FLAGWRD8
105153                         22,2727   0 0006 1           EXTEND
105154 REF   1                22,2730   1 2740 1           BZF      NOTR67ND

105155 REF   2  LAST  365      22,2731   3 5016 0           CAF      1SEC          WAITLIST TASK IN 1 SECON:
105156 REF   8  LAST  365      22,2732   0 5233 0           TC       WAITLIST      RETURN TO UPDTCALL
105157 REF   8  LAST  403      E6,1661                      EBANK=   BCDU
105158 REF   1                22,2733    02320 1           2CADR    R67
105158 REF   1                22,2734    74066 1
105159 REF  10  LAST  395      22,2735   0 5402 1           TC       PHASCHNG
1052                           22,2736    00111 0           OCT      00111

10522  REF   1                01,2025                      1P11SPT2 =        1.11SPOT
10525  REF  44  LAST  394      22,2737   0 5205 0           TC       ENDOFJOB

1053   REF  22  LAST  375      22,2740   3 4767 0  NOTR67ND CAF      TWO           RETURN VIA
1054   REF   9  LAST  415      22,2741   0 5233 0           TC       WAITLIST      GOODEND
1055   REF   9  LAST  415      E6,1661                      EBANK=   BCDU
1056   REF   1                22,2742    02311 0           2CADR    ENDMANU
1056   REF   1                22,2743    20066 0
1058   REF  45  LAST  415      22,2744   1 5205 1           TCF      ENDOFJOB
```

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```
 0002   REF   3 LAST  411   22,2000                    SETLOC KALCMON1
 0003                       22,2745                    BANK

 00035  REF   4 LAST  411 TO  416:   147   485*        COUNT* $$/KALC
 0004   REF  10 LAST  415   E6,1661                    EBANK= BCDU
R0005   DETECTING GIMBAL LOCK
 0006   REF   1             22,2745          LOCSKIRT EQUALS WCALC
 0009                       22,2745   70740 0 WCALC    LXC,1   DLOAD*
 0010   REF   1             22,2746   00774 0                 RATEINDX
 0011   REF   1             22,2747   05002 0                 ARATE,1
 0012                       22,2750   45002 1         SR4     CALL        COMPUTE THE INCREMENTAL ROTATION MATRIX
 0013   REF   3 LAST  399   22,2751   44522 1                 DELCOMP     DEL CORRESPONDING TO A 1 SEC ROTATION
A0014                                                                     ABOUT COF
 0015                       22,2752   74343 0         DLOAD*  VXSC
 0016   REF   2 LAST  416   22,2753   05002 0                 ARATE,1
 0017   REF  46 LAST  412   22,2754   03343 0                 COF
 0018                       22,2755   77721 0         MXV
 0019   REF   1             22,2756   05014 1                 QUADROT
 0020   REF   1             22,2757   17311 1         STODL   BRATE
 0021   REF   4 LAST  404   22,2760   03365 1                 AM
 0022                       22,2761   55605 1         DMP     DDV*
 0023   REF   1             22,2762   05012 1                 ANGLTIME
 0024   REF   3 LAST  416   22,2763   05002 0                 ARATE,1
 0025                       22,2764   77661 0         SR
 0026                       22,2765   20606 0                 5
 00265  REF   1             22,2766   03317 1         STORE   TM
 0027                       22,2767   77214 0         BON     VLOAD
 00273  REF   1             22,2770   00313 0                 CYC61FLG
 0027?  REF   1             22,2771   71747 0                 RCYCLR61
 0028   REF   2 LAST  416   22,2772   03311 1                 BRATE
 0029                       22,2773   77761 1         VXSC
 0030   REF   1             22,2774   05036 1                 BIASCALE
 0031   REF   1             22,2775   03275 1         STORE   BIASTEMP    ATTITUDE ERROR BIAS TO PREVENT OVERSHOOT
A0032                                                                    IN SYSTEM
 0033                       22,2776   77614 1         SETGO               STATE SWITCH CALCMAN2 (43D)
 0034   REF   1             22,2777   01035 0                 CALCMAN2    0(OFF) = BYPASS STARTING PROCEDURE
 0035   REF   1             22,3000   45053 0                 NEWANGL +1  1(ON) = START MANEUVER


 0036                       22,3001   00044 1 ARATE   2DEC    .0022222222 = .05 DEG/SEC
 0036                       22,3002   15053 0
 0037                       22,3003   00221 0         2DEC    .0088888889 = .2 DEG/SEC
 0037                       22,3004   24255 0
 0038                       22,3005   00554 0         2DEC    .0222222222 = .5 DEG/SEC
 0038                       22,3006   02660 0
 0039                       22,3007   02660 0         2DEC    .0888888889 = 2 DEG/SEC          $22.5 DEG/SEC
 0039                       22,3010   13301 1
 0040                       22,3011   00003 1 ANGLTIME 2DEC   .000190735  = 100B - 19
 0040                       22,3012   04000 0
A0041                                                                    MANEUVER ANGLE TO MANEUVER TIME
```

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```
0042                22,3013  03146 1  QUADROT  2DEC    .1              ROTATION MATRIX FROM S/C AXES TO CONTROL
0042                22,3014  14632 0
0043                22,3015  00000 1           2DEC    0               AXES  (X ROT = -7.25 DEG)
0043                22,3016  00000 1
0044                22,3017  00000 1           2DEC    0
0044                22,3020  00000 1
0045                22,3021  00000 1           2DEC    0
0045                22,3022  00000 1
0046                22,3023  03131 1           2DEC    .099200         =(.1)COS7.25
0046                22,3024  11275 1
0047                22,3025  77461 1           2DEC    -.012620        =-(.1)SIN7.25
0047                22,3026  47370 0
0048                22,3027  00000 1           2DEC    0
0048                22,3030  00000 1
0049                22,3031  00316 0           2DEC    .012620         (.1)SIN7.25
0049                22,3032  30407 1
0050                22,3033  03131 1           2DEC    .099200         (.1)COS7.25
0050                22,3034  11275 1
0051                22,3035  00004 0  BIASCALE 2DEC    .0002543132     = (450/180)(1/0.6)(1/16384)
0051                22,3036  05253 0
```

L KALCMANU STEERING USER'S PAGE NO. 1 E0 S3

R 001 GENERATION OF STEERING COMMANDS FOR DIGITAL AUTOPILOT FREE FALL MANEUVERS

R 003 NEW COMMANDS WILL BE GENERATED EVERY ONE SECOND DURING THE MANEUVER

```
0005  REF   4 LAST  416   22,2000                          SETLOC KALCMON1
0006                      22,3037                          BANK

0007  REF  11 LAST  416   E6,1661                          EBANK= BCDU

0008  REF   5 LAST  416 TO  418:     58   543*            COUNT* $$/KALC
0009  REF   3 LAST  415   22,3037  3 4767 0  NEWDELHI     CAF    R67BIT
000902 REF 15 LAST  415   22,3040  7 0104 0                 MASK   FLAGWRD8
000904                    22,3041  0 0006 1                 EXTEND
000906 REF   2 LAST  416   22,3042  1 3047 0                 BZF    NEWANGL -3      NON-R67 SEQUENCE

000908 REF   7 LAST  395   22,3043  3 4764 0                 CAF    TRACKBIT
00091  REF  21 LAST  395   22,3044  7 0075 1                 MASK   FLAGWRD1
00092                     22,3045  0 0006 1                 EXTEND                 CHECK TRACKFLAG
00093  REF   1            22,3046  1 3161 0                 BZF    MYSTEND         IF OFF DO MYSTEND

00094  REF   5 LAST  404  22,3047  4 1340 0    -3           CS     HOLDFLAG
0010                      22,3050  0 0006 1                 EXTEND                 CHECK HOLDFLAG
0011   REF   1            22,3051  6 2720 0                 BZMF   NOGOM2          IF POS, DO STOPRATE

0012  REF  16 LAST  403   22,3052  0 6006 1  NEWANGL        TC     INTPRET
0013                      22,3053   75160 1    +1          AXC,1  AXC,2
0014  REF  13 LAST  403   22,3054   03320 0                 MIS                    COMPUTE THE NEW MATRIX FROM S/C TO
0015  REF  12 LAST  413   22,3055   03425 1                 DEL                    STABLE MEMBER AXES
0016                      22,3056   77624 1                 CALL
0017  REF   4 LAST  403   22,3057   44304 0                 MXM3
0018                      22,3060   45575 1                 VLOAD  STADR
0019  REF  14 LAST  418   22,3061   50442 0                 STOVL  MIS +12D        CALCULATE NEW DESIRED CDU ANGLES
0020                      22,3062   77626 0                 STADR
0021  REF  15 LAST  418   22,3063   50450 0                 STOVL  MIS +6D
0022                      22,3064   77626 0                 STADR
0023  REF  16 LAST  418   22,3065   74456 0                 STORE  MIS
0024                      22,3066   45160 1                 AXC,1  CALL
0025  REF  17 LAST  418   22,3067   03320 0                 MIS
0026  REF   2 LAST  399   22,3070   44647 1                 DCMTOCDU               PICK UP THE NEW CDU ANGLES FROM MATRIX
0027                      22,3071   77634 0                 RTB
0028  REF   2 LAST  399   22,3072   45644 0                 V1STO2S
0029  REF   1            22,3073   03267 1  NWNGL17D       STORE  NCDU            NEW CDU ANGLES (TAG IS USED BY EDIT)
0030                      22,3074   77414 0                 BONCLR EXIT
0031  REF   2 LAST  416   22,3075   01215 0                 CALCMAN2
0032  REF   1            22,3076   40064 1                 MANUSTAT               TO START MANEUVER
0033  REF  23 LAST  415   22,3077  3 4767 0    -1           CAF    TWO                     +0 OTHERWISE
0034  REF   2 LAST  118   22,3100  55'664 0  INCRDCDU       TS     KSPNDX
0035                      22,3101  6 0000 1                 DOUBLE
0036  REF   2 LAST  118   22,3102  55'665 1                 TS     KDPNDX
0037  REF   3 LAST  418   22,3103  51'664 1                 INDEX  KSPNDX
```

L KALCMANU STEERING USER'S PAGE NO. 2 E6 S3

```
0038  REF   2  LAST  418   22,3104  3 1666 0          CA      NCDU      NEW DESIRED CDU ANGLES
0039                       22,3105  0 0006 1          EXTEND
0040  REF   4  LAST  418   22,3106  5 1664 1          INDEX   KSPNDX
0041  REF  12  LAST  418   22,3107  21'661 0          MSU     BCDU      INITIAL S/C ANGLE OR PREVIOUS DESIRED
0042                       22,3110  0 0006 1          EXTEND            CDU ANGLES
0043  REF   2  LAST  416   22,3111  7 3013 1          MP      QUADROT
0044  REF   3  LAST  418   22,3112  51'665 0          INDEX   KDPNDX
0045  REF   2  LAST  113   22,3113  53'576 0          DXCH    DELCDUX   ANGLE INCREMENTS TO BE ADDED TO
0046  REF   5  LAST  419   22,3114  51'664 1          INDEX   KSPNDX    DCDU EVERY TENTH SEC
0047  REF   3  LAST  419   22,3115  3 1666 0          CA      NCDU      BY LEM DAP
0048  REF   6  LAST  419   22,3116  51'664 1          INDEX   KSPNDX
0049  REF  13  LAST  419   22,3117  57'661 1          XCH     BCDU
0050  REF   4  LAST  419   22,3120  51'665 0          INDEX   KDPNDX
0051  REF   2  LAST  114   22,3121  55'646 0          TS      CDUXD
0052  REF   7  LAST  419   22,3122  11'664 0          CCS     KSPNDX
0053  REF   1              22,3123  1 3100 1          TCF     INCRDCDU  LOOP FOR THREE AXES

0054                       22,3124  0 0003 1          RELINT
R0055 COMPARE PRESENT TIME WITH TIME TO TERMINATE MANEUVER

0056  REF   1              22,3125  0 3135 0  TMANUCHK TC      TIMECHK
00565 REF  32  LAST  396   22,3126  0 4655 0          TC      POSTJUMP
0057  REF   1              22,3127   40143 0          CADR    CONTMANU

0058  REF  47  LAST  404   22,3130  3 4770 0          CAF     ONE
0060  REF  10  LAST  415   22,3131  0 5233 0  MANUSTAL TC      WAITLIST
0061  REF  14  LAST  419   E6,1661                    EBANK=  BCDU
0062  REF   1              22,3132   02303 0          2CADR   MANUSTOP
0062  REF   1              22,3133   20066 0
0064  REF  46  LAST  415   22,3134  1 5205 1          TCF     ENDOFJOB


0065                       22,3135  0 0006 1  TIMECHK EXTEND
0066  REF  12  LAST  385   22,3136  4 0025 1          DCS     TIME2
0067  REF   1              22,3137  53'673 0          DXCH    TTEMP
0068                       22,3140  0 0006 1          EXTEND
0069  REF   2  LAST  416   22,3141  3 1717 1          DCA     TM
0070  REF   2  LAST  419   22,3142  21'673 0          DAS     TTEMP
0071  REF   3  LAST  419   22,3143  11'672 1          CCS     TTEMP
0072  REF 116  LAST  395   22,3144  0 0002 0          TC      Q
0073                       22,3145  1 3147 1          TCF     +2
0074  REF   1              22,3146  1 3157 0          TCF     2NDRETRN
0075  REF   4  LAST  419   22,3147  11'673 0          CCS     TTEMP +1
0076  REF 117  LAST  419   22,3150  0 0002 0          TC      Q
0077  REF   1              22,3151  1 3153 1          TCF     MANUOFF
0078                       22,3152  4 0000 0          COM
0079  REF   3  LAST  415   22,3153  6 5016 0  MANUOFF AD      1SEC
0080                       22,3154  0 0006 1          EXTEND
0081  REF   2  LAST  419   22,3155  6 3157 1          BZMF    2NDRETRN
0082  REF 118  LAST  419   22,3156  24 002 0          INCR    Q
```

```
0083   REF 119  LAST  419   22,3157  24 002 0  2NDRETRN INCR   Q
0084   REF   3  LAST  339   22,3160  1 6706 1            TCF    Q+1
00842  REF  33  LAST  419   22,3161  0 4655 0  MYSTEND   TC     POSTJUMP
0084   REF   2  LAST  396   22,3162   74416 1           CADR   FIXDB

0085   REF   1              20,2000                     SETLOC MANUSTUF
0085                        20,2064                     BANK

0085   REF   1                                          COUNT* $$/KALC
0086                        20,2064   77776 1  MANUSTAT EXIT                 INITIALIZATION ROUTINE FOR AUTO
0086   REF   4  LAST  418   20,2065  3 4767 0            CAF    R67BIT                        MANEUVERS
0086   REF  16  LAST  418   20,2066  7 0104 0            MASK   FLAGWRD8
00862                       20,2067  0 0006 1            EXTEND
0086                        20,2070  1 2075 0            BZF    +5
0086                        20,2071  0 0006 1            EXTEND                R67 RUNNING
0086   REF   2  LAST  368   20,2072  3 4750 1            DCA    DPOSMAX
0086   REF   3  LAST  419   20,2073  53'717 0            DXCH   TM
0086   REF   1              20,2074  1 2104 1            TCF    TMDON
0087                        20,2075  0 0006 1            EXTEND                NON-R67 PROGRAM
0088   REF  13  LAST  419   20,2076  3 0025 0            DCA    TIME2
0089   REF   4  LAST  420   20,2077  21'717 0            DAS    TM             TM+TO    MANEUVER COMPLETION TIME
0090   REF   4  LAST  419   20,2100  4 5016 1            CS     1SEC
0091   REF  50  LAST  383   20,2101  54 001 1            TS     L
00911  REF  88  LAST  396   20,2102  4 4772 0            CS     ZERO
0092   REF   5  LAST  420   20,2103  21'717 0            DAS    TM             (TM+TO)-1
0093                        20,2104  0 0004 0  TMDON     INHINT
0094   REF  48  LAST  419   20,2105  4 4770 1            CS     ONE            ENABLE AUTOPILOT TO PERFORM
0095   REF   6  LAST  418   20,2106  55'340 0            TS     HOLDFLAG       AUTOMATIC MANEUVERS
0096   REF   2  LAST  416   20,2107  4 0774 1            CS     RATEINDX       SEE IF MANEUVERING AT HIGH RATE
0097   REF  14  LAST  361   20,2110  6 6211 0            AD     SIX
0098                        20,2111  0 0006 1            EXTEND
0099   REF   1              20,2112  6 2114 1            BZMF   HIGHGAIN
0100                        20,2113  1 2117 0            TCF    +4
0101   REF   2  LAST  182   20,2114  4 1501 0  HIGHGAIN  CS     RCSFLAGS       IF SO, SET HIGH RATE FLAG (BIT 15 OF
0102   REF  32  LAST  392   20,2115  7 4752 1            MASK   BIT15          RCSFLAGS)
0103   REF   3  LAST  420   20,2116  27'501 0            ADS    RCSFLAGS
0104                        20,2117  0 0006 1            EXTEND
01045  REF   3  LAST  416   20,2120  3 1711 1            DCA    BRATE          X-AXIS MANEUVER RATE
0105   REF   8  LAST  187   20,2121  53'526 0            DXCH   WBODY
0106                        20,2122  0 0006 1            EXTEND
01065  REF   4  LAST  420   20,2123  3 1713 0            DCA    BRATE +2       Y-AXIS MANEUVER RATE
0107   REF   2  LAST  136   20,2124  53'530 1            DXCH   WBODY1
0108                        20,2125  0 0006 1            EXTEND
01085  REF   5  LAST  420   20,2126  3 1715 0            DCA    BRATE +4       Z-AXIS MANEUVER RATE
0109   REF   2  LAST  112   20,2127  53'532 0            DXCH   WBODY2
0110   REF   2  LAST  416   20,2130  3 1675 1            CA     BIASTEMP +1    INSERT ATTITUDE ERROR BIASES
0111   REF   2  LAST  113   20,2131  55'564 0            TS     BIAS           INTO AUTOPILOT
0112   REF   3  LAST  420   20,2132  3 1677 0            CA     BIASTEMP +3
0113   REF   2  LAST  113   20,2133  55'565 1            TS     BIAS1
0114   REF   4  LAST  420   20,2134  3 1701 0            CA     BIASTEMP +5
```

```
0115  REF   2  LAST  113   20,2135  55'566 1            TS      BIAS2
0116  REF   9  LAST  315   20,2136  3 0025 0            CA      TIME1
0117  REF   5  LAST  420   20,2137  6 5016 0            AD      1SEC
0118  REF   1              20,2140  57'671 0            XCH     NEXTIME
0119  REF  34  LAST  420   20,2141  0 4655 0            TC      POSTJUMP
0120  REF   2  LAST  419   20,2142   45077 0            CADR    INCRDCDU -1

0122                       20,2143  0 0004 0  CONTMANU  INHINT                  CONTINUE WITH UPDATE PROCESS
0123  REF  10  LAST  421   20,2144  4 0025 1            CS      TIME1
0124  REF   2  LAST  421   20,2145  6 1671 0            AD      NEXTIME
0125  REF 132  LAST  395   20,2146  10 000 0            CCS     A
0126  REF  49  LAST  420   20,2147  6 4770 0            AD      ONE
0127  REF   1              20,2150  1 2153 0            TCF     MANUCALL
0128  REF   1              20,2151  6 4752 0            AD      NEGMAX
0129                       20,2152  4 0000 0            COM
0130  REF   5  LAST  260   20,2153  0 5223 1  MANUCALL  TC      TWIDDLE
0131  REF   1              20,2154   02161 0            ADRES   UPDTCALL
0133                       20,2155  0 0003 1            RELINT
0134  REF   6  LAST  421   20,2156  3 5016 0            CAF     1SEC              INCREMENT TIME FOR NEXT UPDATE
0135  REF   3  LAST  421   20,2157  27'671 1            ADS     NEXTIME
0136  REF  47  LAST  419   20,2160  1 5205 1            TCF     ENDOFJOB

0137  REF   5  LAST  420   20,2161  3 4767 0  UPDTCALL  CAF     R67BIT
01371 REF  17  LAST  420   20,2162  7 0104 0            MASK    FLAGWRD8
01372                      20,2163  0 0006 1            EXTEND
01373                      20,2164  1 2171 0            BZF     +5

01374 REF   7  LAST  272   20,2165  11'774 0            CCS     R61CNTR
01375                      20,2166  1 2170 1            TCF     +2
01376 REF   1              20,2167  1 2176 1            TCF     DOREMIS
01377 REF   8  LAST  421   20,2170  55'774 0            TS      R61CNTR

01378 REF   1              20,2171  3 7650 0            CAF     PRIO26
0138  REF  16  LAST  385   20,2172  0 5135 0            TC      FINDVAC           OF STEERING COMMANDS
0139  REF  15  LAST  419   E6,1661                      EBANK=  BCDU
0140  REF   1              20,2173   03037 0            2CADR   NEWDELHI
0140  REF   1              20,2174   44066 1
0141  REF  13  LAST  365   20,2175  0 5314 1            TC      TASKOVER

01411 REF   2  LAST  421   20,2176  3 7650 0  DOREMIS   CAF     PRIO26
01412 REF  17  LAST  421   20,2177  0 5135 0            TC      FINDVAC
01413 REF  16  LAST  421   E6,1661                      EBANK=  BCDU
01414 REF   2  LAST  230   20,2200   02374 0            2CADR   R67RSTRT          MAKE SURE MIS DOES NOT DEGRADE
01414                      20,2201   74066 1
01415 REF  14  LAST  421   20,2202  0 5314 1            TC      TASKOVER
```

L KALCMANU STEERING USER'S PAGE NO. 5 E6 S3

P0142 ROUTINE FOR TERMINATING AUTOMATIC MANEUVERS

```
01425  REF   1                10,2000                          SETLOC KALCMON3
01426                         10,2303                          BANK

                                                               COUNT* $$/KALC
0143   REF   1                10,2303  0 4474 1   MANUSTOP     TC     STOPYZ
0144   REF  18  LAST  266     10,2304  0 4714 1                TC     IBNKCALL
01445  REF   1                10,2305   45165 1               CADR   LOADYZ

0145   REF   5  LAST  403     10,2306  3 1307 1   ENDROLL      CA     CPHI
0146   REF   3  LAST  419     10,2307  55'646 0                TS     CDUXD          SET CDUXD TO THE COMMANDED OUTER GIMBAL
0149   REF   4  LAST  415     10,2310  0 4463 1                TC     STOPRATE
0150   REF   2  LAST  396     10,2311  3 5053 1   ENDMANU      CAF    PRIO14
0151   REF  18  LAST  421     10,2312  0 5135 0                TC     FINDVAC
0152   REF   9  LAST  421     E6,1774                          EBANK= R61CNTR
0153   REF   1                10,2313   02141 1               2CADR  ENDMANUV
0153   REF   1                10,2314   56066 1
0155   REF  15  LAST  421     10,2315  0 5314 1                TC     TASKOVER

01555  REF   2  LAST  178       4000                           SETLOC STOPRAT
01556                            4463                          BANK
01557  REF   1                                                 COUNT* $$/KALC
0156   REF  89  LAST  420       4463  3 4772 1   STOPRATE     CAF    ZERO
0157   REF   3  LAST  419       4464  55'575 0                TS     DELCDUX
0158   REF   4  LAST  422       4465  55'576 0                TS     DELCDUX +1     ZERO ROLL INCREMENTAL ANGLES
0159   REF   9  LAST  420       4466  55'525 0                TS     WBODY          RATE
0160   REF  10  LAST  422       4467  55'526 0                TS     WBODY +1
0161   REF   3  LAST  420       4470  55'564 0                TS     BIAS           BIAS

01611  REF  33  LAST  420       4471  4 4752 1                CS     BIT15          MAKE SURE HIGH RATE FLAG (BIT 15 OF
01612  REF   4  LAST  420       4472  7 1501 0                MASK   RCSFLAGS       RCSFLAGS) IS RESET.
01613  REF   5  LAST  422       4473  55'501 0                TS     RCSFLAGS

0162   REF  90  LAST  422       4474  3 4772 1   STOPYZ       CAF    ZERO
0163   REF   2  LAST  113       4475  55'577 1                TS     DELCDUY        ZERO PITCH, YAW
0164   REF   3  LAST  422       4476  55'600 1                TS     DELCDUY +1     INCREMENTAL ANGLES
0165   REF   2  LAST  113       4477  55'601 0                TS     DELCDUZ
0166   REF   3  LAST  422       4500  55'602 0                TS     DELCDUZ +1
0167   REF   3  LAST  420       4501  55'527 1                TS     WBODY1         RATES
0168   REF   4  LAST  422       4502  55'530 1                TS     WBODY1 +1
0169   REF   3  LAST  420       4503  55'531 0                TS     WBODY2
0170   REF   4  LAST  422       4504  55'532 0                TS     WBODY2 +1
0171   REF   3  LAST  420       4505  55'565 1                TS     BIAS1          BIASES
0172   REF   3  LAST  421       4506  55'566 1                TS     BIAS2
0173   REF 120  LAST  420       4507  0 0002 0                TC     Q

01735  REF   2  LAST  420     20,2000                          SETLOC MANUSTUF
01736                         20,2203                          BANK
```

L KALCMANU STEERING USER'S PAGE NO. 6 E6 S3

```
C1738  REF   2 LAST  420 TO  422:    79    79*          COUNT* $$/KALC
C174   REF   8  LAST  409    20,2203  3 0032 0  ZERODERR CA     CDUX      PICK UP CDU ANGLES AND STORE IN
C175   REF   4  LAST  422    20,2204  55'646 0           TS     CDUXD     CDU DESIRED
C176   REF   3  LAST  243    20,2205  3 0033 1           CA     CDUY
C177   REF   2  LAST  114    20,2206  55'650 1           TS     CDUYD
C178   REF   7  LAST  409    20,2207  3 0034 0           CA     CDUZ
C179   REF   2  LAST  114    20,2210  55'652 0           TS     CDUZD
C180   REF 121  LAST  422    20,2211  0 0002 0           TC     Q

C1805  REF   5  LAST  418    22,2000                     SETLOC KALCMON1
C1806                       22,3163                     BANK

C1808  REF   6 LAST  418 TO  420:    84   627*          COUNT* $$/KALC
C181   REF   6  LAST  422    22,3163  3 1307 1  LOADCDUD CA     CPHI      STORE TERMINAL ANGLES INTO
C182   REF   5  LAST  423    22,3164  55'646 0           TS     CDUXD     COMMAND ANGLES
C183   REF   1               22,3165  3 1310 1  LOADYZ   CA     CTHETA
C184   REF   3  LAST  423    22,3166  55'650 1           TS     CDUYD
C185   REF   1               22,3167  3 1311 0           CA     CPSI
C186   REF   3  LAST  423    22,3170  55'652 0           TS     CDUZD
C187   REF 122  LAST  423    22,3171  0 0002 0           TC     Q
```

L SYSTEM TEST STANDARD LEAD INS USER'S PAGE NO. 1 E0 S3

```
 0001   REF  13  LAST  259   E5,1671                    EBANK= XSM

 0003   REF   1              13,2000                    SETLOC E/PROG1
 0004                        13,2036                    BANK

 0005   REF   1                                         COUNT* $$/P07

R0006           SPECIAL PROGRAMS TO EASE THE PANGS OF ERASABLE MEMORY PROGRAMS.

R0007   E/BKCALL   FOR DOING BANKCALLS FROM AND RETURNING TO ERASABLE.

R0008           THIS ROUTINE IS CALLABLE FROM ERASABLE OR FIXED.  LIKE BANKCALL, HOWEVER, SWITCHING BETWEEN S3 AND S4
R0010   IS NOT POSSIBLE.

R0011           THE CALLING SEQUENCE IS:

A0012                                                   TC      BANKCALL
A0013                                                   CADR    E/BKCALL
A0014                                                   CADR    ROUTINE         WHERE YOU WANT TO GO IN FIXED.
A0015                                                   RETURN  HERE FROM DISPLAY TERMINATE, BAD STALL OR TC Q.
A0016                                                   RETURN  HERE FROM DISPLAY PROCEED OR GOOD RETURN FROM STALL.
A0017                                                   RETURN  HERE FROM DISPLAY ENTER OR RECYCLE.

R0018           THIS ROUTINE REQUIRES TWO ERASABLES (EBUF2, +1) IN UNSWITCHED WHICH ARE UNSHARED BY INTERRUPTS AND
R0020   OTHER EMEMORY PROGRAMS.

R0021           A + L ARE PRESERVED THROUGH BANKCALL AND E/BKCALL.

 0022   REF   3  LAST  395   13,2036  52 134 0  E/BKCALL DXCH    BUF2        SAVE A,L AND GET DP RETURN.
 0023   REF   2  LAST   80   13,2037  53'115 1             DXCH    EBUF2       SAVE DP RETURN.
 0024   REF   3  LAST  424   13,2040  25'114 1             INCR    EBUF2       RETURN +1 BECAUSE DOUBLE CADR.
 0025   REF  11  LAST  381   13,2041  3 0006 1             CA      BBANK
 0026   REF   4  LAST  282   13,2042  7 5041 0             MASK    LOW10       GET CURRENT EBANK.  (SBANK SOMEDAY)
 0027   REF   4  LAST  424   13,2043  27'115 1             ADS     EBUF2 +1    FORM BBCON.  (WAS FBANK)
 0028   REF   5  LAST  424   13,2044  51'114 1             NDX     EBUF2
 0029                        13,2045  2'7777 0             CA      0 -1        GET CADR OF ROUTINE.
 0030   REF   1              13,2046  0 4642 0             TC      SWCALL      GO TO ROUTINE, SETTING Q TO SWRETURN
A0031                                                                        AND RESTORING A + L.
 0032                        13,2047  0 2053 0             TC      +4          TX Q, V34, OR BAD STALL RETURN.
 0033                        13,2050  0 2052 1             TC      +2          PROCEED OR GOOD STALL RETURN.
 0034   REF   6  LAST  424   13,2051  25'114 1             INCR    EBUF2       ENTER OR RECYCLE RETURN.
 0035   REF   7  LAST  424   13,2052  25'114 1             INCR    EBUF2
 0036   REF   8  LAST  424   13,2053  53'115 1  E/SWITCH DXCH    EBUF2
 0037                        13,2054  52 006 0             DTCB
```

L SYSTEM TEST STANDARD LEAD INS USER'S PAGE NO. 2 E5 S3

P0038 E/CALL FOR CALLING A FIXED MEMORY INTERPRETIVE SUBROUTINE FROM ERASABLE AND RETURNING TO ERASABLE.

R0040 THE CALLING SEQUENCE IS...

```
A0041                                                   RTB
A0042                                                           E/CALL
A0043                                                   CADR    ROUTINE         THE INTERPRETIVE SUBROUTINE YOU WANT.
A0044                                                                           RETURNS HERE IN INTERPRETIVE.

 0045  REF   2  LAST  223  13,2055  22 164 1  E/CALL   LXCH    LOC             ADRES -1 OF CADR.
 0046  REF  51  LAST  420  13,2056  50 001 0           INDEX   L
 0047  REF  52  LAST  425  13,2057  3 0001 0           CA      L               CADR IN A.
 0048  REF  53  LAST  425  13,2060  24 001 0          INCR    L
 0049  REF  54  LAST  425  13,2061  24 001 0          INCR    L               RETURN ADRES IN L.
 0050  REF   9  LAST  424  13,2062  53'115 1          DXCH    EBUF2           STORE CADR AND RETURN.
 0051  REF  17  LAST  418  13,2063  0 6006 1          TC      INTPRET
 0052                      13,2064   77624 1          CALL
 0053  REF  10  LAST  425  13,2065   01114 1                  EBUF2           INDIRECTLY EXECUTE ROUTINE.  IT MUST
 0054                      13,2066   77776 1          EXIT                    LEAVE VIA RVQ OR EQUIVALENT.
 0055  REF  11  LAST  425  13,2067  23'115 0          LXCH    EBUF2 +1        PICK UP RETURN.
 0056  REF  18  LAST  425  13,2070  1 6010 1          TCF     INTPRET +2      SET LOC AND RETURB TO CALLER
```

```
P0057   E/JOBWAK        FOR WAKING UP ERASABLE MEMORY JOBS.
R0058           THIS ROUTINE MUST BE CALLED IN INTERRUPT OR WITH INTERRUPTS INHIBITED.
R0060           THE CALLING SEQUENCE IS:

A0061                                                   INHINT
A0062                                                     .
A0063                                                     .
A0064                                                   CA      WAKEADR         ADDRESS OF SLEEPING JOB
A0065                                                   TC      IBNKCALL
A0066                                                   CADR    E/JOBWAK
A0067                                                     .                     RETURNS HERE
A0068                                                     .
A0069                                                     .
A0070                                                   RELINT                  IF YOU DID AN INHINT.

 0072   REF   1                12,2000                 SETLOC  E/PROG
 0073                          12,2000                 BANK

 0074   REF   1                                        COUNT*  $$/P07

 0075   REF   3  LAST  388     12,2000  0 5167 1  E/JOBWAK TC     JOBWAKE         ARRIVE IWTH ADRES IN A.
 0076   REF  18  LAST  359     12,2001  4 4756 0           CS     BIT11
 0077   REF   2  LAST  383     12,2002  50 064 0           NDX    LOCCTR
 0078   REF   3  LAST  425     12,2003  26 164 0           ADS    LOC             KNOCK FIXED MEMORY BIT OUT OF ADRES
 007?   REF   1                12,2004  0 0072 1           TC     RUPTREG3        RETURN

R0080   THESE PROGRAMS ARE PROVIDED TO ALLOW OVERLAY OF BANKS 30 THRU 33 OF THE 205 VERSIONS OF SYSTEM TESTS AND
R0082   PRELAUNCH ALIGN.  THE INTENT IS TO ALLOW THE STG AND HYBRID LABS TO RUN ALL THE TESTS WITH COLOSSUS.

 0085   REF   1                33,2000                 SETLOC  TESTLEAD
 0086                          33,2000                 BANK

 0087   REF   1                                        COUNT*  $$/COMST
 0088   REF   2  LAST  258     E5,1425                 EBANK=  QPLACE

 0089   REF   1                33,2000  0 3212 0  COMPVER TC     GCOMPVER        MUST BE 33,2000.

 0090   REF   1                33,2001  0 2703 1  GTSCPSS1 TC     GTSCPSS         MUST BE AT 33,2001
```

L IMU CALIBRATION AND ALIGNMENT USER'S PAGE NO. 1 E S3

R0010 NAME- IMU PERFORMANCE TESTS 2

R0011 DATE- MARCH 20,1967

R0012 BY- SYSTEM TEST GROUP 864-6900 EXT. 1274

R0013 MODNO.- ZERO

R0014 FUNCTIONAL DESCRIPTION

R0015 POSITIONING ROUTINES FOR THE IMU PERFORMANCE TESTS AS WELL AS SOME OF
R0016 THE TESTS THEMSELVES. FOR A DESCRIPTION OF THESE SUBROUTINES AND THE
R0017 OPERATING PROCEDURES (TYPICALLY) SEE STG MEMO 685.THEORETICAL REF.E-1973

```
 0019   REF   1              33,2000                        SETLOC  IMUCAL
 0020                       33,2002                        BANK

 0021   REF   1              E5,1423                        EBANK=  POSITON
 0022   REF   2 LAST  426 TO  427:     2     2*            COUNT*  $$/COMST
 0036   REF  63  LAST  415   33,2002  0 4636 0  GEOIMUTT  TC      BANKCALL        GYROCOMPASS COMES IN HERE
 0037   REF   2  LAST  252   33,2003   16627 0             CADR    IMUZERO
 0038   REF   1              33,2004  0 2126 0             TC      IMUSTLLG
 0039   REF  91  LAST  422   33,2005  3 4772 1  IMUBACK    CA      ZERO
 0040   REF   1              33,2006  55'421 0             TS      NDXCTR
 0041   REF   1              33,2007  55'450 0             TS      TORQNDX
 0042   REF   2  LAST  427   33,2010  55'451 1             TS      TORQNDX +1
 0043   REF   1              33,2011  3 4352 1  NBPOSPL    CA      DEC17
 0044   REF   1              33,2012  55'655 1             TS      ZERONDX1
 0045   REF   1              33,2013  3 2221 1             CA      XNBADR
 0046   REF   1              33,2014  0 2134 0             TC      ZEROING
 0047   REF   1              33,2015  3 4753 1             CA      HALF
 0048   REF   2  LAST  299   33,2016  55'713 1             TS      XNB
 0049   REF  19  LAST  425   33,2017  0 6006 1             TC      INTPRET
 0050                       33,2020   73545 1             DLOAD   SIN
 0051   REF   1              33,2021   02401 0                     AZIMUTH
 0052   REF   2  LAST  299   33,2022   02724 1             STORE   YNB +2
 0053   REF   2  LAST  299   33,2023   16734 0             STODL   ZNB +4
 0054   REF   2  LAST  427   33,2024   02401 0                     AZIMUTH
 0055                       33,2025   77746 1             COS
 0056   REF   3  LAST  427   33,2026   02726 0             STORE   YNB +4
 0057                       33,2027   77676 0             DCOMP
 0058   REF   3  LAST  427   33,2030   02732 0             STORE   ZNB +2
 00581                      33,2031   77776 1             EXIT
 00582  REF  13  LAST  276   33,2032  0 5354 0             TC      CHECKMM
 00583                      33,2033   00003 1             MM      03              SEE IF IN OPTICAL VERIFICATION
 00584                      33,2034  1 2036 1             TCF     +2              NO
 00585  REF   1              33,2035  1 3217 1             TCF     SETNBPOS +1       YES
 00586  REF  20  LAST  427   33,2036  0 6006 1             TC      INTPRET
 00587                      33,2037   77624 1             CALL
 0059   REF   1              33,2040   47344 1                     CALCGA
```

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```
0060                          33,2041   77776 1          EXIT
0061   REF  64 LAST  427      33,2042   0 4636 0         TC      BANKCALL
0062   REF   2 LAST  254      33,2043    16724 1         CADR    IMUCOARS
0063   REF   1                33,2044   3 4753 1         CAF     GLOKFBIT      IF GLOKFAIL SET, GIMBAL LOCK
0064   REF   4 LAST  208      33,2045   7 0077 0         MASK    FLAGWRD3
0065                          33,2046   0 0006 1         EXTEND
0066                          33,2047   1 2051 0         BZF     +2
0067   REF   2 LAST  427      33,2050   25'421 1         INCR    NDXCTR        +1 IF IN GIMBAL LOCK,OTHERWISE
0068   REF  23 LAST  279      33,2051   0 5561 0         TC      DOWNFLAG      RESET GIMBAL LOCK FLAG
0069   REF   1                33,2052    00056 1         ADRES   GLOKFAIL      BIT 14 FLAG 3
0070   REF   2 LAST  427      33,2053   0 2126 0         TC      IMUSTLLG
0071   REF   3 LAST  428      33,2054   11'421 0         CCS     NDXCTR        IF ONE GO AND DO A PIPA TEST ONLY
0072   REF   1                33,2055   0 2103 1         TC      PIPACHK       ALIGN AND MEASURE VERTICAL PIPA RATE
0074   REF  65 LAST  428      33,2056   0 4636 0         TC      BANKCALL
0075   REF   2 LAST  256      33,2057    17133 0         CADR    IMUFINE
0076   REF   3 LAST  428      33,2060   0 2126 0         TC      IMUSTLLG
0077                          33,2061   0 0006 1         EXTEND
00771  REF   1                33,2062   3 1657 1         DCA     PERFDLAY
00772  REF   1                33,2063   0 5332 0         TC      LONGCALL
00773  REF   2 LAST  427      E5,1423                    EBANK=  POSITON
00774  REF   1                33,2064    02070 1         2CADR   GOESTIMS
00774  REF   1                33,2065    66065 1
00775  REF   1                33,2066   3 2073 1         CA      ESTICADR
00776  REF   1                33,2067   0 5163 0         TC      JOBSLEEP
00777  REF   2 LAST  428      33,2070   3 2073 1 GOESTIMS CA     ESTICADR
00778  REF   4 LAST  426      33,2071   0 5167 1         TC      JOBWAKE
00779  REF  16 LAST  422      33,2072   0 5314 1         TC      TASKOVER
007791 REF   1                33,2073    66227 0 ESTICADR CADR  ESTIMS

0078   REF  92 LAST  427      33,2074   3 4772 1 TORQUE  CA      ZERO
0079   REF   7 LAST  295      33,2075   55'253 0         TS      DSPTEM2
0080   REF   1                33,2076   3 1514 0         CA      DRIFTI
0081   REF   8 LAST  428      33,2077   55'254 1         TS      DSPTEM2 +1
0082   REF   3 LAST  428      33,2100   51'423 0         INDEX   POSITON
0083   REF   2 LAST  102      33,2101   55'430 0         TS      SOUTHDR -1
0084   REF   1                33,2102   0 2205 1         TC      SHOW

0085   REF   1                33,2103   3 4756 1 PIPACHK CA      EBANK4
0086   REF  12 LAST  384      33,2104   54 003 0         TS      EBANK
00865  REF   1                E4,1400                    EBANK=  ERASPIP
0087   REF   2 LAST  428      33,2105   0 1400 1         TC      ERASPIP
0183   REF   1                E5,1512                    EBANK=  DRIFTO
0184   REF   2 LAST  428      33,2106   3 1512 0 VALMIS  CA      DRIFTO
0185   REF   9 LAST  428      33,2107   55'254 1         TS      DSPTEM2 +1
0186   REF  93 LAST  428      33,2110   3 4772 1         CA      ZERO
0187   REF  10 LAST  428      33,2111   55'253 0         TS      DSPTEM2
0188   REF   2 LAST  428      33,2112   0 2205 1         TC      SHOW

01894  REF  24 LAST  428      33,2113   0 5561 0 ENDTEST1 TC     DOWNFLAG      IMU NOT IN USE
```

L IMU CALIBRATION AND ALIGNMENT

```
0190   REF   3  LAST  270   33,2114   00007 0        ADRES  IMUSE        BIT 8 FLAG 0
0191   REF  94  LAST  428   33,2115   4 4772 0       CS     ZERO
0192   REF   3  LAST  221   33,2116   0 5347 1       TC     NEWMODEA
0193   REF  66  LAST  428   33,2117   0 4636 0       TC     BANKCALL
0194   REF   1               33,2120    16073 1     CADR   MKRELEAS
0195   REF  20  LAST  402   33,2121   0 5524 1       TC     ENDEXT
```

```
0196                        33,2122  43215 0  OVERFFIX DAD     DAD
0197  REF   1               33,2123  15344 0           DPPOSMAX
0198  REF   1               33,2124  26670 1           CNEDPP
0199                        33,2125  77616 0           RVQ


0212                        33,2126  0 0006 1 IMUSTLLG EXTEND
0213  REF   3  LAST  426    33,2127  23'425 0          QXCH    QPLACE
0214  REF  67  LAST  429    33,2130  0 4636 0          TC      BANKCALL
0215  REF   6  LAST  314    33,2131   17644 1          CADR    IMUSTALL
0216  REF   1               33,2132  0 2655 0          TC      SOMERR2
0217  REF   4  LAST  430    33,2133  0 1425 0          TC      QPLACE
0241  REF  55  LAST  425    33,2134  54 001 1 ZEROING   TS      L
0242                        33,2135  1 2137 1          TCF     +2
0243  REF   2  LAST  427    33,2136  55'655 1 ZEROING1  TS      ZERONDX1
0244  REF  95  LAST  429    33,2137  3 4772 1          CAF     ZERO
0245  REF  56  LAST  430    33,2140  50 001 0          INDEX   L
0246                        33,2141  54 000 0          TS      0
0247  REF  57  LAST  430    33,2142  24 001 0          INCR    L
0248  REF   3  LAST  430    33,2143  11'655 1          CCS     ZERONDX1
0249  REF   1               33,2144  1 2136 0          TCF     ZEROING1
0250  REF 123  LAST  423    33,2145  0 0002 0          TC      Q
```

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```
0251   REF   1                32,2000                          SETLOC  IMUCAL3
0252                          32,2000                          BANK
0253   REF   1                                                 COUNT*  $$/COMST
0254                          32,2000   65345 0  ERTHRVSE      DLOAD   PDDL
0255   REF   1                32,2001   26663 0                SCHZEROS        PD24 = (SIN          -COS    0)(OMEG/MS)
0256   REF   1                32,2002   02403 1                LATITUDE
0257                          32,2003   57546 1                COS     DCOMP
0258                          32,2004   73525 1                PDDL    SIN
0259   REF   2  LAST  431     32,2005   02403 1                LATITUDE
0260                          32,2006   74266 0                VDEF    VXSC
0261   REF   1                32,2007   26224 1                OMEG/MS
0262   REF   1                32,2010   02405 1                STORE   ERVECTOR
0263                          32,2011   77634 0                RTB
0264   REF   1                32,2012   51751 0                LOADTIME
0265   REF   1                32,2013   26443 0                STOVL   TMARK
0266   REF   2  LAST  431     32,2014   26663 0                SCHZEROS
0267   REF   1                32,2015   02650 0                STORE   ERCOMP1
0268                          32,2016   77616 0                RVQ
0269   REF   2  LAST  427     33,2000                          SETLOC  IMUCAL
0270                          33,2146                          BANK
0271   REF   3 LAST  427 TO  431:   100   102*                 COUNT*  $$/COMST
0272                          33,2146   47020 0  EARTHR        ITA     RTB             CALCULATES AND COMPENSATES EARTH RATE
0273   REF   1                33,2147   00051 0                S2
0274   REF   2  LAST  431     33,2150   51751 0                LOADTIME
0275   REF   1                33,2151   02441 1     +3         STORE   TEMPTIME
0276                          33,2152   51025 1                DSU     BPL
0277   REF   2  LAST  431     33,2153   02443 0                TMARK
0278   REF   1                33,2154   66157 1                ERTHR
0279                          33,2155   77624 1                CALL
0280   REF   1                33,2156   66122 0                OVERFFIX
0281                          33,2157   74261 1  ERTHR         SL      VXSC
0282                          33,2160   20212 1                9D
0283   REF   2  LAST  431     33,2161   02405 1                ERVECTOR
0284                          33,2162   53321 1                MXV     VAD
0285   REF  14  LAST  424     33,2163   02672 0                XSM
0286   REF   2  LAST  431     33,2164   02650 0                ERCOMP1
0287   REF   3  LAST  431     33,2165   16650 0                STODL   ERCOMP1
0288   REF   2  LAST  431     33,2166   02441 1                TEMPTIME
0289   REF   3  LAST  431     33,2167   02443 0                STORE   TMARK
0290                          33,2170   47170 1                AXT,1   RTB
0291   REF   4  LAST  431     33,2171   02647 0                ECADR   ERCOMP1
0292   REF   1                33,2172   45722 1                PULSEIMU
0293                          33,2173   77650 1                GOTO
0294   REF   2  LAST  431     33,2174   00051 0                S2
0295                          33,2175   0 0006 1  EARTHR*       EXTEND
02951  REF   1                33,2176   23'426 0               QXCH    QPLACES
02952  REF  21  LAST  427     33,2177   0 6006 1               TC      INTPRET
02953                          33,2200    77624 1               CALL
02954  REF   1                33,2201    66146 1                       EARTHR
02955                          33,2202    77776 1  PROUT         EXIT
```

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02956  REF   4  LAST  428   33,2203  0 2126 0          TC      IMUSTLLG
02957  REF   2  LAST  431   33,2204  0 1426 0          TC      QPLACES
0296                        33,2205  0 0006 1  SHOW    EXTEND
0297   REF   5  LAST  430   33,2206  23'425 0          QXCH    QPLACE
0298   REF   4  LAST  428   33,2207  3 1423 0  SHOW1   CA      POSITON
0299   REF  11  LAST  428   33,2210  55'255 0          TS      DSPTEM2 +2
0300   REF   1              33,2211  3 2217 1          CA      VB06N98
0301   REF  68  LAST  430   33,2212  0 4636 0          TC      BANKCALL
0302   REF   2  LAST  402   33,2213   20743 0          CADR    GOFLASH
0304   REF   1              33,2214  0 2113 0          TC      ENDTEST1        V 34
0305   REF   6  LAST  432   33,2215  0 1425 0          TC      QPLACE           V33
0306   REF   1              33,2216  1 2207 1          TCF     SHOW1

0307   REF   2  LAST  431   33,2223                    399DEC  =       OMEG/MS
0308                        33,2217   01542 0  VB06N98 VN      0698
0310   REF   6  LAST  373     4352                     DEC17   =       ND1
0311   REF  11  LAST  294   33,2220   02757 0  OGCPL   ECADR   OGC
0312   REF   7  LAST  421     5016                     1SECX   =       1SEC
0313   REF   5  LAST  381     4351                     DEC57   =       VD1
0314   REF   3  LAST  427   33,2221   01713 0  XNBADR  GENADR  XNB
0315   REF  15  LAST  431   33,2222   01671 0  XSMADR  GENADR  XSM
0316                        33,2223   07623 1  OMEG/MS 2DEC    .24339048
0316                        33,2224   26552 1

03161  REF  69  LAST  432   33,2225  0 4636 0  P11OUT  TC      BANKCALL
03162  REF   2  LAST  231   33,2226   70115 0          CADR    MATRXJOB        RETURN TO P11

03165  REF   2  LAST  238      4000                    SETLOC  FFTAG1
0317                            4510                    BANK

03175  REF   1                                         COUNT*  $$/COMST
0318                            4510  0 0004 0  FINETIME INHINT                RETURNS WITH INTERRUPT INHIBITED
0319                            4511  0 0006 1    +1    EXTEND
0320   REF   1                  4512  00 004 0          READ    LOSCALAR
0321   REF  58  LAST  430       4513  54 001 1          TS      L
0322                            4514  0 0006 1          EXTEND
0323   REF   2  LAST  432       4515  06 004 0          RXOR    LOSCALAR
0324                            4516  0 0006 1          EXTEND
0325                            4517  1 4523 0          BZF     +4
0326                            4520  0 0006 1          EXTEND
0327   REF   3  LAST  432       4521  00 004 0          READ    LOSCALAR
0328   REF  59  LAST  432       4522  54 001 1          TS      L
0329   REF  11  LAST  360       4523  4 4750 0  +4      CS      POSMAX
0330   REF  60  LAST  432       4524  6 0001 0          AD      L
0331                            4525  0 0006 1          EXTEND
0332   REF   1                  4526  1 4511 1          BZF     FINETIME +1
0333                            4527  0 0006 1          EXTEND
0334   REF   1                  4530  00 003 1          READ    HISCALAR
```

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```
 0335   REF 124  LAST  430      4531  0 0002 0          TC     Q


R0336   PROGRAM NAME-OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION
R0337   DATE- NOVEMBER 2  1966
R0338   BY- GEORGE SCHMIDT IL 7-146 EXT. 126
R0339   MOD NO 3
R0340   FUNCTIONAL DESCRIPTION

R0341   THIS     SECTION CONSISTS OF PRELAUNCH ALIGNMENT AND GYRO DRIFT TESTS
R0342   INTEGRATED TOGETHER TO SAVE WORDS. COMPASS IS COMPLETELY RESTART
R0343   PROOFED EXCEPT FOR THE FIRST 30 SECONDS OR SO.  PERFORMANCE TESTS OF
R0344   THE IRIGS IS RESTART PROOFED ENOUGH TO GIVE 75 PERCENT CONFIDENCE THAT
R0345   IF A RESTART OCCURS THE DATA WILL STILL BE GOOD. GOOD PRACTICE TO RECYCL
R0346   WHEN A RESTART OCCURS UNLESS IT HAPPENS NEAR THE END OF A TEST-THEN WAIT
R0347   FOR THE DATA TO FLASH.
R0347A  A RESTART IN GYROCOMPASS DURING GYRO TORQUING CAUSES PULSES TO BE LOST
R0348   THE PRELAUNCH ALIGNMENT TECHNIQUE IS BASICALLY THE SAME AS IN BLOCK 1
R0349   EXCEPT THAT IT HAS BEEN SIMPLIFIED IN THE SENSE THAT SMALL ANGLE APPROX.
R0350   HAVE BEEN USED. THE DRIFT TESTS USE A UNIQUE IMPLEMENTATION OF THE
R0351   OPTIMUM STATISTICAL FILTER. FOR A DESCRIPTION SEE E-1973.BOTH OF THESE
R0352   ROUTINES USE STANDARD SYSTEM TEST LEADIN PROCEDURES. THE INITIALIZATION
R0353   PROCEDURE FOR THE DRIFT TESTS IS IN THE JDC S. THE INITIALIZATION METHOD
R0354   FOR GYROCOMPASS IS AN ERAS LOAD THEN A MISSION PHASE CALL.
R0355   THE COMPASS ALIGNS TO Z DOWN,X DOWNRANGE, HAS THE CAPABILITY
R0356   CHANGE AZIMUTH WHILE RUNNING , IS COMPENSATED FOR
R0357   COMPONENT ERRORS,IS CAPABLE OF OPTICAL VERIFICATION( CSM ONLY).

R0358   COMPASS ERASABLE LOAD REQUIRED

R0359    1-LAUNCHAZ -DP AZIMUTH IN REV FROM NORTH OF XSM DESIRED      (NOM=.2)
R0360   2- LATITUDE -DP-OF LAUNCH PAD
R0361   3- AZIMUTH-DP-OF ZNB OF VEHICLE
R0361A  4- IMU COMPENSATION PARAMETERS
R0362   5-AZ AND ELEVATION OF TARGETS 1,2     ****OPTIONAL****

R0363   TO PERFORM AS PART OF COMPASS

R0364   1-OPTICAL VERIFICATION- V 65 E
R0365   2-AZIMUTH CHANGE-V 78 E

R0366   SUBROUTINES CALLED

R0367   DURING OPTICAL VERIFICATION (CSM ONLY) ESSENTIALLY ALL OF INFLIGHT ALIGN
R0368   IS CALLED IN ONE WAY OR ANOTHER. SEE THE LISTING.

R0369   NORMAL EXIT

R0370   DRIFT TESTS- LENGTHOT GOES TO ZERO-RETURN TO IMU PERF TEST2 CONTROL
R0371   GYROCOMPASS-MANY,SEE THE LISTING
```

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R0372 ALARMS

R0373 1600 OVERFLOW IN DRIFT TEST
R0374 1601 BAD IMU TORQUE ABORT
R0375 1602 BAD OPTICS DURING VERIFICATION-RETURN TO COMPASS CSM ONLY

R0376 OUTPUT

R0377 DRIFT TESTS- FLASHING DISPLAYS OF RESULTS-CONTROLLED IN IMU PERF TESTS 2
R0378 COMPASS-PROGRAM MODE LIGHTS TELL YOU WHAT PHASE OF PROGRAM YOU ARE IN
R0379 01 INITIALIZING THE PLATFORM POSITION AND ERASABLE
R0380 02 GYROCOMPASSING
R0381 03 DOING OPTICAL VERIFICATION (CSM)
R0382
R0383
R0384 DEBRIS

R0385 ALL CENTRALS, ALL OF EBANK XSM

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R0386    MOST OF THE ROUTINES COMMON TO ALIGNMENT AND CALIBRATION APPEAR
R0387    ON THE NEXT FEW PAGES.

0388  REF  16  LAST  432   E5,1671                      EBANK= XSM
0390  REF   3  LAST  431   33,2000                     SETLOC IMUCAL
0391                        33,2227                     BANK

03915 REF   1                                          COUNT* $$/P02
0392  REF   2  LAST  270   33,2227  0 5362 0  ESTIMS   TC     2PHSCHNG      COMES HERE FROM IMU2
0393                        33,2230   00075 0           OCT    00075
03931                       33,2231   00004 0           OCT    00004         TURN OFF GROUP 4 IF ON
03932 REF   1               01,2256             5P7SPT1 =      5.7SPOT
0394                        33,2232  0 0004 0  RSTGTS1  INHINT                COMES HERE PHASE1 RESTART
0395  REF  11  LAST  421   33,2233  3 0025 0           CA     TIME1
0396  REF   1               33,2234  55'645 0           TS     GTSWTLT1
0397  REF  96  LAST  430   33,2235  3 4772 1           CAF    ZERO          ZERO THE PIPAS
0398  REF   4  LAST  283   33,2236  54 037 1           TS     PIPAX
0399  REF   3  LAST  182   33,2237  54 040 1           TS     PIPAY
0400  REF   2  LAST  182   33,2240  54 041 0           TS     PIPAZ
0402                        33,2241  0 0003 1           RELINT
0403  REF   1               33,2242  3 2701 0           CA     77DECML       ZERO ALL NECESSARY LOCATIONS
0404  REF   4  LAST  430   33,2243  55'655 1           TS     ZERONDX1
0405  REF   1               33,2244  3 2702 0           CA     ALXXXZ
0406  REF   2  LAST  427   33,2245  0 2134 0           TC     ZEROING
0407  REF  22  LAST  431   33,2246  0 6006 1           TC     INTPRET
04084                       33,2247   77735 0           SLOAD
04085 REF   3  LAST  431   33,2250   26663 0                  SCHZEROS
04086 REF   9  LAST  317   33,2251   25477 1           STOVL  GCOMPSW -1
0409  REF   1               33,2252   26674 0                  INTVAL +2     LOAD SOME INITIAL DRIFT GAINS
0410  REF   1               33,2253   26455 1           STOVL  ALXIS
0411  REF   4  LAST  435   33,2254   26663 0                  SCHZEROS
0412  REF  17  LAST  317   33,2255   01472 1           STORE  GCOMP
0413  REF   6  LAST  310   33,2256   01315 1           STORE  DELVX         GCOMPZER SUBROUTINE NO LONGER NEEDED
0414                        33,2257   77776 1           EXIT

0415  REF   1               33,2260  11'643 0           CCS    GEOCOMP1      NON ZERO IF COMPASS.
0416                        33,2261  0 2263 1           TC     +2
0417  REF   1               33,2262  0 2277 1           TC     SLEEPIE +1
0422  REF  23  LAST  435   33,2263  0 6006 1           TC     INTPRET
04221                       33,2264   77624 1           CALL
04222 REF   1               33,2265   64000 0                  ERTHRVSE
04223                       33,2266   77776 1           EXIT
0423  REF   1               33,2267  3 1412 1           CA     LENGTHOT      TIMES FIVE IS THE NUM OF SEC ERECTING
0424  REF   1               33,2270  55'646 0           TS     ERECTIME

0425  REF   1               33,2271  0 5344 1           TC     NEWMODEX
0426                        33,2272   00002 0           MM     02
0427  REF  70  LAST  432   33,2273  0 4636 0           TC     BANKCALL      SET UP PIPA FAIL TO CAUSE ISS ALARM
0428  REF   2  LAST  317   33,2274   17214 0           CADR   PIPUSE        COMPASS NEVER TURNS THIS OFF
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0429  REF   1          33,2275  0 3157 1        TC     ANNNNNN          END OF FIRST TIME THROUGH
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R0430    COMES HERE AT THE END OF EVERY ITERATION THROUGH DRIFT TEST OR COMPASS

R0431    SET UP WAITLIST SECTION
 0432    REF   2  LAST  435   33,2276  55'412 0  SLEEPIE  TS      LENGTHOT        TEST NOT OVER-DECREMENT LENGTHOT
 0433    REF  11  LAST  415   33,2277  0 5402 1    +1     TC      PHASCHNG         CHANGE PHASE
 0434                         33,2300   00135 0            OCT     00135
 04345   REF   1              01,2264                5P13SPT1 =     5.13SPOT
 0435    REF   3  LAST  427   33,2301  11'450 0           CCS     TORQNDX         ARE WE DOING VERTDRIFT
 0436    REF   1              33,2302  0 2175 0           TC      EARTHR*         TRUE TORQUE SOUTH GYRO
 0437    REF   1              33,2303  0 3162 1  WTLISTNT TC      CHKCOMED              SEE IF COMPASS OVER
 04371   REF   1              33,2304  0 2306 0           TC      SETGWLST
 04372   REF  48  LAST  421   33,2305  0 5205 0           TC      ENDOFJOB

 04373                        33,2306  0 0006 1  SETGWLST EXTEND
 04374   REF 211  LAST  409   33,2307  22 154 1           QXCH    MPAC            CALLED EVERY WAITLIST OR AZIMUTH CHANGE
 0438                         33,2310  0 0004 0           INHINT
 0439    REF  12  LAST  435   33,2311  4 0025 1           CS      TIME1
 0440    REF   2  LAST  435   33,2312  6 1645 1           AD      GTSWTLT1
 0441                         33,2313  0 0006 1           EXTEND
 0442                         33,2314  6 2316 1           BZMF    +2
 0443    REF   2  LAST  421   33,2315  6 4752 0           AD      NEGMAX           10 MS ERROR OK
 0444    REF   1              33,2316  6 1644 0           AD      1SECXT1         1 SEC FOR CALIBRATION, .5 SEC IN COMPASS
 0445                         33,2317  0 0006 1           EXTEND
 0446    REF   1              33,2320  6 2324 0           BZMF    RIGHTGTS
 0447    REF   6  LAST  421   33,2321  0 5223 1  WTGTSMPL TC      TWIDDLE
 0449    REF   1              33,2322   02350 0           ADRES   ALLOOP
 0451    REF 212  LAST  437   33,2323  0 0154 1           TC      MPAC
 0452    REF   7  LAST  370   33,2324  3 4766 1  RIGHTGTS CAF     FOUR            SET UP NEXT WAITLIST-ALLOW SOME TIME
 0453    REF   1              33,2325  0 2321 0           TC      WTGTSMPL        END OF WAITLIST SECTION

R0454    STORE AND LOAD DATA SECTIONS FOR RESTART PROOFING

 0455    REF   2  LAST  363     4125                     25DECML  EQUALS  OCT31
 0456    REF   1              33,2326  3 4125 0  STOREDTA CAF     25DECML
 0457    REF 213  LAST  437   33,2327  54 154 0    +1     TS      MPAC
 0458    REF 214  LAST  437   33,2330  50 154 1           INDEX   MPAC
 0459    REF   2  LAST  103   33,2331  31'460 1           CAE     THETAX1
 0460    REF 215  LAST  437   33,2332  50 154 1           INDEX   MPAC
 0461    REF   1              33,2333  55'577 1           TS      RESTARPT
 0462    REF 216  LAST  437   33,2334  10 154 0           CCS     MPAC
 0463    REF   1              33,2335  1 2327 1           TCF     STOREDTA +1
 0464    REF 125  LAST  433   33,2336  0 0002 0           TC      Q

 0465    REF   2  LAST  437   33,2337  3 4125 0  LOADSTDT CAF     25DECML
 0466    REF 217  LAST  437   33,2340  54 154 0    +1     TS      MPAC
 0467    REF 218  LAST  437   33,2341  50 154 1           INDEX   MPAC
 0468    REF   2  LAST  437   33,2342  3 1577 0           CA      RESTARPT
 0469    REF 219  LAST  437   33,2343  50 154 1           INDEX   MPAC
```

```
0470   REF   3  LAST  437   33,2344  55'460 0          TS     THETAX1
0471   REF 220  LAST  437   33,2345  10 154 0          CCS    MPAC
0472   REF   1               33,2346  1 2340 0          TCF    LOADSTDT +1
0473   REF 126  LAST  437   33,2347  0 0002 0          TC     G

R0474    COMES HERE EVERY ITERATION BY A WAITLIST CALL SET IN SLEEPIE

0475   REF  13  LAST  437   33,2350  3 0025 0  ALLOOP  CA     TIME1
0476   REF   3  LAST  437   33,2351  55'645 0          TS     GTSWTLT1     STORE TIME TO SET UP NEXT WAITLIST.
0477   REF   1               33,2352  3 1540 1  ALLOOP3 CA     ALTIM
0478   REF   1               33,2353  55'631 0          TS     GEOSAVE1
0479   REF  12  LAST  437   33,2354  0 5402 1          TC     PHASCHNG
0480                         33,2355   00115 1          OCT    00115
04805  REF   1               01,2261            5P11SPT1 =      5,11SPOT
0481   REF   2  LAST  438   33,2356  31'631 1  ALLOOP1 CAE    GEOSAVE1
0482   REF   2  LAST  438   33,2357  55'540 0          TS     ALTIM
0483   REF 133  LAST  421   33,2360  10 000 0          CCS    A
0484   REF 134  LAST  438   33,2361  3 0000 1          CA     A            SHOULD NEVER HIT THIS LOCATION
0485   REF   1               33,2362  55'541 1          TS     ALTIMS
0486   REF 135  LAST  438   33,2363  4 0000 0          CS     A
0487   REF   3  LAST  438   33,2364  55'540 0          TS     ALTIM
0488   REF  97  LAST  435   33,2365  3 4772 1          CAF    ZERO
04881  REF   5  LAST  435   33,2366  56 037 0          XCH    PIPAX
0489   REF   7  LAST  435   33,2367  55'314 1          TS     DELVX
0490   REF  98  LAST  438   33,2370  3 4772 1          CAF    ZERO
04901  REF   4  LAST  435   33,2371  56 040 0          XCH    PIPAY
0491   REF   4  LAST  310   33,2372  55'316 0          TS     DELVY
0492   REF  99  LAST  438   33,2373  3 4772 1          CAF    ZERO
04921  REF   3  LAST  435   33,2374  56 041 1          XCH    PIPAZ
0493   REF   3  LAST  311   33,2375  55'320 0          TS     DELVZ
0494   REF   1               33,2376  3 4351 1          CAF    19DECML      23 OCT
0495   REF   1               33,2377  0 4126 0          TC     NEWPHASE
0496                         33,2400   00005 1          OCT    00005
0497   REF   1               01,2300            5P23SPT1 =      5,23SPOT
0501   REF   3  LAST  248   33,2401  3 7644 0  SPECSTS CAF    PRIO22
0502   REF  19  LAST  422   33,2402  0 5135 0          TC     FINDVAC
0503   REF   3  LAST  438   E5,1631                    EBANK= GEOSAVE1
0504   REF   1               33,2403   02406 1          2CADR  ALFLT        START THE JOB
0504   REF   1               33,2404   66065 1
0505   REF  17  LAST  428   33,2405  0 5314 1          TC     TASKOVER
```

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R0506 THIS IS PART OF THE JOB DONE EVERY ITERATION

```
0507  REF   2  LAST  437   33,2406  0 2326 1  ALFLT    TC      STOREDTA      STORE DATA IN CASE OF RESTART IN JOB
0508  REF  13  LAST  438   33,2407  0 5402 1           TC      PHASCHNG      THIS IS THE JOB DONE EVERY ITERATION
0509                       33,2410   00215 1           OCT     00215
05095 REF   1              01,2275             5P21SPT1 =       5,21SPOT
0510                       33,2411  1 2413 1           TCF     +2
0511  REF   2  LAST  438   33,2412  0 2337 1  ALFLT1   TC      LOADSTDT      COMES HERE ON RESTART

0512  REF   2  LAST  435   33,2413  11'643 0           CCS     GEOCOMP1
0513                       33,2414  0 2416 0           TC      +2
0514  REF   1              33,2415  0 2421 1           TC      NORMLOP
0515  REF   2  LAST  437   33,2416  0 3162 1           TC      CHKCOMED      SEE IF PRELAUNCH OVER
0516  REF  71  LAST  435   33,2417  0 4636 0           TC      BANKCALL      COMPENSATION IF IN COMPASS
0517  REF   1              33,2420   15276 0           CADR    1/PIPA

0518  REF  24  LAST  435   33,2421  0 6006 1  NORMLOP  TC      INTPRET
0519                       33,2422   77745 1           DLOAD
0520  REF   2  LAST  435   33,2423   26672 0                   INTVAL
0521  REF   5  LAST  414   33,2424   24051 0           STOVL   S1
0522  REF   8  LAST  438   33,2425   01315 1                   DELVX
0523                       33,2426   76505 0           VXM     VSL1
0524  REF  17  LAST  435   33,2427   02672 0                   XSM
0525                       33,2430   57545 1           DLOAD   DCOMP
0526  REF 221  LAST  438   33,2431   00160 0                   MPAC +3
0527  REF   1              33,2432   16533 0           STODL   DPIPAY
0528  REF 222  LAST  439   33,2433   00162 1                   MPAC +5
0529  REF   1              33,2434   02537 1           STORE   DPIPAZ

0530                       33,2435   76001 1           SETPD   AXT,1
0531                       33,2436   00001 0                   0
0532                       33,2437   00010 0                   8D
0533                       33,2440   57535 0           SLOAD   DCOMP
0534  REF   3  LAST  439   33,2441   02644 0                   GEOCOMP1
0535                       33,2442   77640 0           BMN
0536  REF   1              33,2443   66764 1                   ALWAYSG       DO A QUICK COMPASS
```

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R0537 NOW WE HAVE JUST THE CALIBRATION PARTS OF THE PROGRAM-NEXT PAGES

```
05375 REF  4 LAST 431 TO 432:    4? 151*          COUNT* $$/COMST
0538                      33,2444  50135 0  ALCGKK  SLOAD  BMN
0539  REF  2 LAST 438      33,2445  02542 0           ALTIMS
0540  REF  1               33,2446  66461 1           ALFLT3      NO NEW GAINS NEEDED
0541                      33,2447  72174 0  ALKCG   AXT,2  LXA,1  LOADS SLOPES AND TIME CONSTANTS AT RQST
0542                      33,2450  00014 1           12D
0543  REF  2 LAST 435      33,2451  02454 0           ALX1S
0544                      33,2452  62143 0  ALKCG2  DLOAD* INCR,1
0545  REF  2 LAST  96      33,2453  02243 0           ALFDK +144D,1
0546                      33,2454  77775 1           DEC    -2
0547  REF  1               33,2455  12555 1           STORE  ALDK +10D,2
0548                      33,2456  66104 1           TIX,2  SXA,1
0549  REF  1               33,2457  66452 1           ALKCG2
0550  REF  3 LAST 440      33,2460  02454 0           ALX1S

0551                      33,2461  77770 1  ALFLT3  AXT,1               MEASUREMENT INCORPORATION ROUTINES
0552                      33,2462  00010 0           8D                 AND GAIN UPDATES
0553                      33,2463  41343 0  DELMLP  DLOAD* DMP
0554  REF  2 LAST 439      33,2464  02543 1           DPIPAY +8D,1
0555  REF  1               33,2465  27427 0           PIPASC
0556                      33,2466  43661 1           SLR    BDSU*
0557                      33,2467  21212 0           9D
0558  REF  1               33,2470  02511 0           INTY +8D,1
0559  REF  2 LAST 440      33,2471  06511 1           STORE  INTY +8D,1
0560                      33,2472  40725 0           PDDL   DMP*
0561  REF  1               33,2473  27431 1           VELSC
0562  REF  1               33,2474  02531 1           VLAUN +8D,1
0563                      33,2475  77732 1           SL2R
0564                      33,2476  45425 0           DSU    STADR
0565  REF  1               33,2477  71206 0           STORE  DELM +8D,1
0566  REF  2 LAST 440      33,2500  06573 0           STORE  DELM +10D,1
0567                      33,2501  77100 0           TIX,1  AXT,2
0568  REF  1               33,2502  66463 0           DELMLP
0569                      33,2503  00004 0           4
0570                      33,2504  56743 1  ALILP   DLOAD* DMPR*
0571  REF  3 LAST 103      33,2505  75314 0           ALK +4,2
0572  REF  2 LAST 440      33,2506  75230 1           ALDK +4,2
0573  REF  4 LAST 440      33,2507  12463 0           STORE  ALK +4,2
0574                      33,2510  77104 1           TIX,2  AXT,2
0575  REF  1               33,2511  66504 0           ALILP
0576                      33,2512  00010 0           8D
0577                      33,2513  66140 1  ALKLP   LXC,1  SXA,1
0578  REF  1               33,2514  02455 1           CMPX1
057?  REF  2 LAST 440      33,2515  02455 1           CMPX1
0580                      33,2516  56743 1           DLOAD* DMPR*
0581  REF  5 LAST 440      33,2517  02460 1           ALK +1,1
0582  REF  3 LAST 440      33,2520  75206 1           DELM +8D,2
0583                      33,2521  77613 0           DAD*
```

```
0584  REF   3  LAST  440   33,2522  75266 1            INTY +8D,2
0585  REF   4  LAST  441   33,2523  12511 1      STORE INTY +8D,2
0586                       33,2524  42743 1      DLOAD* DAD*
0587  REF   6  LAST  440   33,2525  75304 1            ALK +12D,2
0588  REF   3  LAST  440   33,2526  75220 0            ALDK +12D,2
0589  REF   7  LAST  441   33,2527  12473 1      STORE ALK +12D,2
0590                       33,2530  42673 0      DMPR* DAD*
0591  REF   4  LAST  440   33,2531  75206 1            DELM +8D,2
0592  REF   5  LAST  441   33,2532  75256 1            INTY +16D,2
0593  REF   6  LAST  441   33,2533  12521 1      STORE INTY +16D,2
0594                       33,2534  40743 0      DLOAD* DMP*
0595  REF   1              33,2535  27434 1            ALSK +1,1
0596  REF   5  LAST  441   33,2536  75206 1            DELM +8D,2
0597                       33,2537  42772 0      SL1R  DAD*
0598  REF   2  LAST  440   33,2540  75246 0            VLAUN +8D,2
0599  REF   3  LAST  441   33,2541  12531 0      STORE VLAUN +8D,2
0600                       33,2542  76104 0      TIX,2 AXT,1
0601  REF   1              33,2543  66513 0            ALKLP
0602                       33,2544  00010 0            8D


0603                       33,2545  64743 0 LOOSE DLOAD* PDDL*          EXTRAPOLATE SWAY VARIABLES
0604  REF   1              33,2546  02533 0            ACCWD +8D,1
0605  REF   4  LAST  441   33,2547  02531 1            VLAUN +8D,1
0606                       33,2550  55523 0      PDDL* VDEF
0607  REF   1              33,2551  02541 0            POSNV +8D,1
0608                       33,2552  76521 0      MXV   VSL1
0609  REF   2  LAST   96   33,2553  02001 1            TRANSM1
0610                       33,2554  77745 1      DLOAD
0611  REF 223  LAST  439   33,2555  00155 0            MPAC
0612  REF   2  LAST  441   33,2556  06541 1      STORE POSNV +8D,1
0613                       33,2557  77745 1      DLOAD
0614  REF 224  LAST  441   33,2560  00160 0            MPAC +3
0615  REF   5  LAST  441   33,2561  06531 0      STORE VLAUN +8D,1
0616                       33,2562  77745 1      DLOAD
0617  REF 225  LAST  441   33,2563  00162 1            MPAC +5
0618  REF   2  LAST  441   33,2564  06533 1      STORE ACCWD +8D,1
0619                       33,2565  77700 0      TIX,1
0620  REF   1              33,2566  66545 0            LOOSE


0621                       33,2567  76174 1      AXT,2 AXT,1          EVALUATE SINES AND COSINES
0622                       33,2570  00006 1            6
0623                       33,2571  00002 0            2
0624                       33,2572  57343 1 BOOP DLOAD* DMPR
0625  REF   1              33,2573  02513 1            ANGX +2,1
0626  REF   1              33,2574  27437 1            GEORGEJ
0627                       33,2575  77722 0      SR2R
0628                       33,2576  73406 1      PUSH  SIN
0629                       33,2577  56072 1      SL3R  XAD,1
```

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```
0630   REF   1                33,2600   00046 0                 X1
0631                          33,2601   10021 0          STORE  16D,2
0632                          33,2602   77745 1          DLOAD
0633                          33,2603   77746 1          COS
0634                          33,2604   10027 0          STORE  22D,2          COSINES
0635                          33,2605   77704 1          TIX,2
0636   REF   1                33,2606   66572 1                 BCOP
0637                          33,2607   77776 1  PERFERAS EXIT
0638   REF   4  LAST  276     33,2610   0 4606 0         TC     E7SETTER
0639   REF   7  LAST  293     E7,1400                    EBANK= LAT(SPL)
0640   REF   8  LAST  442     33,2611   0 1400 1         TC     LAT(SPL)       GO TO ERASABLE ONLY TO RETURN

R0641            CAUTION

R0642   THE ERASABLE PROGRAM THAT DOES THE CALCULATIONS MUST BE LOADED
R0643   BEFORE ANY ATTEMPT IS MADE TO RUN THE IMU PERFORMANCE TEST

0734   REF   3  LAST  437     E5,1412                    EBANK= LENGTHOT
0735   REF   4  LAST  442     33,2612   11'412 0 ONCEMORE CCS    LENGTHOT
0736   REF   2  LAST  435     33,2613   0 2276 0         TC     SLEEPIE        TEST NOT OVER SET UP NEXT WAITLIST

07361  REF   4  LAST  437     33,2614   11'450 0         CCS    TORQNDX
07362                         33,2615   1 2617 1         TCF    +2
07363  REF   1                33,2616   0 2621 0         TC     SETUPER1
07364  REF   9  LAST  423     33,2617   3 0032 0         CA     CDUX
07365  REF   2  LAST  102     33,2620   55'414 0         TS     LOSVEC +1      FOR TROUBLESHOOTING POSNS 2$4 VD
0737   REF  25  LAST  439     33,2621   0 6006 1 SETUPER1 TC    INTPRET        DRIFT TEST OVER
0738                          33,2622   65345 0          DLOAD  PDDL           ANGLES FROM DRIFT TEST ONLY
0739   REF   1                33,2623   02503 0                 ANGZ
0740   REF   1                33,2624   02507 1                 ANGY
0741                          33,2625   55525 0          PDDL   VDEF
0742   REF   2  LAST  441     33,2626   02511 0                 ANGX
0743                          33,2627   74276 1          VCOMP  VXSC
0744   REF   2  LAST  441     33,2630   27437 1                 GEORGEJ
0745                          33,2631   74521 1          MXV    VSR1
0746   REF  18  LAST  439     33,2632   02672 0                 XSM
0747   REF  12  LAST  432     33,2633   02760 1          STORE  OGC
0748                          33,2634   77776 1          EXIT

0749   REF  14  LAST  439     33,2635   0 5402 1 TORQINCH TC    PHASCHNG
0750                          33,2636   00005 1          OCT    00005
0751   REF   1                33,2637   3 2220 0         CA     OGCPL
0752   REF  72  LAST  439     33,2640   0 4636 0         TC     BANKCALL
0753   REF   3  LAST  314     33,2641   17244 0          CADR   IMUPULSE
0754   REF   5  LAST  432     33,2642   0 2126 0         TC     IMUSTALL
0755   REF   5  LAST  442     33,2643   11'450 0         CCS    TORQNDX        + IF IN VERTICAL DRIFT TEST
0756   REF   1                33,2644   0 2106 1         TC     VALMIS         VERT DRIFT TEST OVER
0757   REF  26  LAST  442     33,2645   0 6006 1         TC     INTPRET
07571                         33,2646   77624 1          CALL                  SET UP ERATE FOR PIP TEST OR COMPASS
07572  REF   2  LAST  435     33,2647   64000 0                 ERTHRVSE
```

```
C7573                          33,2650   77776 1          EXIT
C758   REF   1                 33,2651   0 2074 0         TC     TORQUE          GO TO IMU2 FOR A PIPA TEST AND DISPLAY

C759   REF  19  LAST  268      33,2652   0 5671 1 SOMEERRR TC     ALARM
C760                           33,2653    01600 0         OCT    1600
C761                           33,2654   0 2657 1         TC     +3
C762   REF  20  LAST  443      33,2655   0 5671 1 SOMERR2  TC     ALARM
C763                           33,2656    01601 1         OCT    1601
C764   REF  15  LAST  442      33,2657   0 5402 1         TC     PHASCHNG
C765                           33,2660    00005 1         OCT    00005
C766   REF   2  LAST  432      33,2661   0 2113 0         TC     ENDTEST1

R0767   THE FAMOUS MAGIC NUMBERS OF SCHMIDT ARE NOW PART OF AN ERASABLE LOAD.

C769                           33,2662    00000 1 SCHZEROS 2DEC   .00000000
C769                           33,2663    00000 1
C770                           33,2664    00000 1         2DEC   .00000000
C770                           33,2665    00000 1
C771                           33,2666    00000 1         OCT    00000
C772                           33,2667    00000 1 ONEDPP  OCT    00000
C773                           33,2670    00001 0   +1    OCT    00001          ABOVE ORDER IS IMPORTANT

C774                           33,2671    00004 0 INTVAL  OCT    4
C775                           33,2672    00002 0         OCT    2
C776                           33,2673    00220 1         DEC    144
C777                           33,2674    77776 1         DEC    -1
C778                           33,2675    35730 0 SOUPLY  2DEC   .93505870       INITIAL GAINS FOR PIP OUTPUTS
C778                           33,2676    00035 1
C779                           33,2677    10317 0         2DEC   .26266423       INITIAL GAINS/4 FOR ERECTION ANGLES
C779                           33,2700    17550 1

C780                           33,2701    00115 1 77DECML DEC    77
C781   REF   4  LAST  440      33,2702    01453 1 ALXXXZ  GENADR ALX1S -1
R0789   GYROCOMPASS PORTIONS FINISH THIS LOG SECTION

C7895  REF   1                                            COUNT* $$/P01
R0790   INITIALIZATION SECTION

C791   REF  22  LAST  418      33,2703   3 0075 0 GTSCPSS CA     FLAGWRD1        CALLED BY V37
C7911  REF   2  LAST  195      33,2704   7 4755 0         MASK   NOP01BIT
C7913                          33,2705   0 0006 1         EXTEND
C7914  REF   1                 33,2706   1 2711 0         BZF    GTSCPSSA
C7915  REF   3  LAST  381      33,2707   0 5726 1         TC     POODOO
C7916                          33,2710    21521 1         OCT    21521           NO DO ALARM FOR P01 - P11 ALREADY DONE
```

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07917  REF   1                 33,2711  3 4753 1  GTSCPSSA CAF    PRIO20          INITIAL PRIORITY ONLY 13
07918  REF   4  LAST  396      33,2712  0 5176 1           TC     PRIOCHNG        CHANGE TO 20

07919  REF  50  LAST  421      33,2713  3 4770 0           CAF    ONE
0792   REF   4  LAST  439      33,2714  55'643 0           TS     GEOCOMP1        THIS IS THE LEAD IN FOR COMPASS.
0793   REF   1                 33,2715  3 3211 0           CA     1/PIPAGT
0794   REF   7  LAST  317      33,2716  55'277 0           TS     1/PIPADT
0795   REF  26  LAST  314      33,2717  3 4761 0  NXXTBNN  CA     BIT8
0796   REF   5  LAST  442      33,2720  55'412 0           TS     LENGTHOT
0797   REF   1                 33,2721  3 5011 1           CAF    1/2SECX         COMPASS IS A .5 SEC LOOP
0798   REF   2  LAST  437      33,2722  55'644 1           TS     1SECXT1
0799   REF  51  LAST  444      33,2723  3 4770 0           CAF    ONE
0800   REF   1                 33,2724  55'632 0           TS     PREMTRX1
08005  REF   2  LAST  428      33,2725  55'657 0           TS     PERFDLAY +1
08006  REF 100  LAST  438      33,2726  3 4772 1           CAF    ZERO
08007  REF   3  LAST  444      33,2727  55'656 1           TS     PERFDLAY
0801                           33,2730  0 0006 1           EXTEND
0802   REF   4  LAST  103      33,2731  3 1634 1           DCA    LUNCHAZ1
0803   REF   1                 33,2732  53'636 1           DXCH   NEWAZ1
08031                          33,2733  0 0006 1           EXTEND
08032  REF   5  LAST  444      33,2734  3 1634 1           DCA    LUNCHAZ1
08033  REF   1                 33,2735  53'640 0           DXCH   OLDAZMTH
0804   REF   2  LAST  427      33,2736  3 4352 1  SETUPGC  CA     DEC17
0805   REF   5  LAST  435      33,2737  55'655 1           TS     ZERONDX1
0806   REF   1                 33,2740  3 2222 1           CA     XSMADR
0807   REF   3  LAST  435      33,2741  0 2134 0           TC     ZEROING
0808   REF   1                 33,2742  0 2744 1           TC     POSN17C
0809   REF   1                 33,2743  0 2002 1           TC     GEOIMUTT        GO TO IMU2 FOR FURTHER INITIALIZATION

0810                           33,2744  0 0006 1  POSN17C  EXTEND                  COMPASS POSITION Z DOWN,X DOWNRANGE
0811   REF   7  LAST  432      33,2745  23'425 0           QXCH   QPLACE          FROM NORTH IN REVOLUTIONS + CLOCKWSE
0812   REF   2  LAST  427      33,2746  4 4753 0           CS     HALF            ALL THIS TO INITIALIZE MATRIX
0813   REF   2  LAST   99      33,2747  55'705 0           TS     ZSM
0814   REF  27  LAST  442      33,2750  0 6006 1           TC     INTPRET
0815                           33,2751    41545 0         DLOAD  PUSH
0816   REF   2  LAST  444      33,2752    02636 0                NEWAZ1
0817                           33,2753    77756 0         SIN
0818   REF  19  LAST  442      33,2754    02676 1         STORE  XSM +4
0819   REF   2  LAST   99      33,2755    16702 0         STODL  YSM +2
0820                           33,2756    77746 1         COS
0821   REF   3  LAST  444      33,2757    02704 0         STORE  YSM +4
0822                           33,2760    77676 0         DCOMP
0823   REF  20  LAST  444      33,2761    02674 0         STORE  XSM +2
0824                           33,2762    77776 1         EXIT
0825   REF   8  LAST  444      33,2763  0 1425 0           TC     QPLACE

R0826    JOB DONE EVERY ITERATION THROUGH COMPASS PROGRAM. SET BY TASK ALLOOP
```

```
08268 REF   2 LAST  435 TO  440:   141   141*          COUNT* $$/P02
0827                          33,2764   44743 1 ALWAYSG DLOAD* DSU*          COMPASS AND ERECT
0828  REF   3 LAST  440      33,2765   02543 1                DPIPAY +8D,1
0829  REF   2 LAST  103      33,2766   02505 0                FILDELV1 +8D,1
0830                          33,2767   42675 0          DMPR  DAD*
0831  REF   1                 33,2770   27441 0                GEOCONS1
0832  REF   3 LAST  445      33,2771   02505 0                FILDELV1 +8D,1
0833  REF   4 LAST  445      33,2772   06505 1          STORE FILDELV1 +8D,1
0834                          33,2773   77613 0          DAD*
0835  REF   1                 33,2774   02507 1                INTVEC1 +8D,1
0836  REF   2 LAST  445      33,2775   06507 0          STORE INTVEC1 +8D,1
0837                          33,2776   42675 0          DMPR  DAD*
0838  REF   1                 33,2777   27443 1                GEOCONS2
0839  REF   5 LAST  445      33,3000   02505 0                FILDELV1 +8D,1
0840                          33,3001   41475 1          DMPR  PUSH
0841  REF   1                 33,3002   15334 1                GEOCONS5
0842                          33,3003   67300 0          TIX,1 SLOAD
0843  REF   2 LAST  439      33,3004   66764 1                ALWAYSG
0844  REF   1                 33,3005   02647 0                ERECTIM1
0845                          33,3006   71254 1          BZE   DLOAD
0846  REF   1                 33,3007   67020 1                COMPGS
0847  REF   2 LAST  103      33,3010   02471 1                THETAN1 +2
0848                          33,3011   45425 0          DSU   STADR
0849  REF   3 LAST  445      33,3012   61306 0          STODL THETAN1 +2       ERECTION ONLY.
0850                          33,3013   77621 1          BDSU
0851  REF   4 LAST  445      33,3014   02473 0                THETAN1 +4
0852  REF   5 LAST  445      33,3015   02473 0          STORE THETAN1 +4
0853                          33,3016   77650 1          GOTO
0854  REF   1                 33,3017   67042 0                ADDINDRF
0855                          33,3020   43345 1 COMPGS   DLOAD DAD            COMPASS
0856  REF   6 LAST  445      33,3021   02467 0                THETAN1
0857  REF   6 LAST  445      33,3022   02475 0                FILDELV1
0858  REF   7 LAST  445      33,3023   16467 0          STODL THETAN1
0859  REF   7 LAST  445      33,3024   02475 0                FILDELV1
0860                          33,3025   44275 1          DMPR  BDSU
0861  REF   1                 33,3026   27445 1                GEOCONS3
0862  REF   8 LAST  445      33,3027   02473 0                THETAN1 +4
0863  REF   9 LAST  445      33,3030   16473 0          STODL THETAN1 +4
0864  REF   8 LAST  445      33,3031   02501 1                FILDELV1 +4
0865                          33,3032   44275 1          DMPR  BDSU
0866  REF   2 LAST  445      33,3033   27445 1                GEOCONS3
0867  REF  10 LAST  445      33,3034   02471 1                THETAN1 +2
0868                          33,3035   57325 1          PDDL  DMPR
0869  REF   3 LAST  445      33,3036   02503 0                INTVEC1 +4
0870  REF   1                 33,3037   27447 0                GEOCONS4
0871                          33,3040   45421 1          BDSU  STADR
0872  REF  11 LAST  445      33,3041   75306 0          STORE THETAN1 +2
0873                          33,3042   77776 1 ADDINDRF EXIT
```

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```
0874  REF   6  LAST  444   33,3043  11'412 0  ENDGTSAL CCS     LENGTHOT      IS 5 SEC OVER-THE TIME TO TORQ PLATFORM
0875  REF   3  LAST  442   33,3044  0 2276 0           TC      SLEEPIE       NO-SET UP NEXT WAITLIST CALL FOR .5 SEC
0876  REF   3  LAST  439   33,3045  0 3162 1           TC      CHKCOMED
0877  REF   2  LAST  204   33,3046  11'324 1           CCS     LGYRO         YES BUT ARE GYROS BUSY
0878  REF   4  LAST  446   33,3047  1 2277 0           TCF     SLEEPIE +1    BUSY-GET THEM .5 SECONDS FROM NOW

0879  REF  28  LAST  444   33,3050  0 6006 1  LASTGTS  TC      INTPRET
0880                       33,3051   77775 1           VLOAD
0881  REF   5  LAST  431   33,3052   02650 0                   ERCOMP1
0882  REF   4  LAST  438   33,3053   16461 0           STODL   THETAX1
0883  REF   4  LAST  431   33,3054   02443 0                   TMARK
0884  REF   8  LAST  441   33,3055   02457 0           STORE   ALK
0885                       33,3056   77776 1           EXIT                  PREVIOUS SECTION WAS FOR RESTARTS

0886  REF  16  LAST  443   33,3057  0 5402 1  RESTAIER TC      PHASCHNG
0887                       33,3060   00275 1           OCT     00275
C8875 REF   1              01,2306             5P27SPT1 =      5.27SPOT
0888  REF  29  LAST  446   33,3061  0 6006 1           TC      INTPRET       ADD COMPASS COMMANDS INTO ERATE
0889                       33,3062   64375 1           VLOAD   MXV
0890  REF  12  LAST  445   33,3063   02467 0                   THETAN1
0891  REF  21  LAST  444   33,3064   02672 0                   XSM
0892                       33,3065   53372 1           VSL1    VAD
0893  REF   5  LAST  446   33,3066   02461 0                   THETAX1
0894  REF   6  LAST  446   33,3067   16650 0           STODL   ERCOMP1
0895  REF   9  LAST  446   33,3070   02457 0                   ALK
0896  REF   5  LAST  446   33,3071   02443 0           STORE   TMARK
0897                       33,3072   77776 1           EXIT
0898  REF   2  LAST  437   33,3073  0 2175 0           TC      EARTHR*       TORQUE IT ALL IN
0899  REF   2  LAST  445   33,3074  31'646 1           CAE     ERECTIM1
0900  REF   4  LAST  438   33,3075  55'631 0           TS      GEOSAVE1
0901  REF  17  LAST  446   33,3076  0 5402 1           TC      PHASCHNG
0902                       33,3077   00155 0           OCT     00155
09025 REF   1              01,2267             5P15SPT1 =      5.15SPOT
0903  REF  30  LAST  446   33,3100  0 6006 1  RESTEST1 TC      INTPRET
0904                       33,3101   77775 1           VLOAD
0905  REF   5  LAST  435   33,3102   26663 0                   SCHZEROS
0906  REF  13  LAST  446   33,3103   02467 0           STORE   THETAN1
0907                       33,3104   77776 1           EXIT
0912  REF   1              33,3105  11'632 0           CCS     PREMTRXC
09121 REF   1              33,3106  0 3155 0           TC      NOCHORLD
09122 REF  18  LAST  446   33,3107  0 5402 1           TC      PHASCHNG
0913                       33,3110   00255 0           OCT     00255
C91305 REF  1              01,2303             5P25SPT1 =      5.25SPOT
09131 REF  31  LAST  446   33,3111  0 6006 1  RESTEST3 TC      INTPRET
0914                       33,3112   77745 1           DLOAD
09142 REF   2  LAST  183   33,3113   02634 1                   LAUNCHAZ
0915                       33,3114   53025 0           DSU     BZE
09151 REF   2  LAST  444   33,3115   02640 1                   OLDAZMTH
09152 REF   1              33,3116   67152 0                   NOAZCHGE
09153                      33,3117   00001 0           STORE   OD
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09154                          33,3120  43335 0            SLOAD   DAD
09155  REF   2  LAST  430      33,3121  26671 0                    ONEDPP +1
0918   REF   2  LAST  446      33,3122  02633 0                    PREMTRXC        DOES NOT CHANGE LAUNCHAZ
0919   REF   3  LAST  447      33,3123  16633 0            STODL   PREMTRXC
0920   REF   3  LAST  446      33,3124  02634 1                    LAUNCHAZ
09201  REF   1                 33,3125  16636 0            STODL   NEWAZMTH
09202                          33,3126  00001 0                    OD
09203  REF   1                 33,3127  02654 1  ADERCOMP  STORE   ERCOMP +4
09204                          33,3130  77776 1            EXIT
09205  REF   2  LAST  444      33,3131  0 2744 1           TC      POSN17C
09206  REF  19  LAST  446      33,3132  0 5402 1           TC      PHASCHNG
09207                          33,3133  00335 1            OCT     00335
09208  REF   1                 01,2314          1         5P33SPT1 =      5.33SPOT
0921                           33,3134  0 0006 1  RESCHNG  EXTEND
0922   REF   2  LAST  447      33,3135  3 1636 0           DCA     NEWAZMTH
0923   REF   3  LAST  446      33,3136  53'640 0           DXCH    OLDAZMTH
09231  REF  22  LAST  395      33,3137  3 4762 0           CA      BIT7            SPEND 320 SEC ERECTING
09232  REF   7  LAST  446      33,3140  55'412 0           TS      LENGTHOT
0924   REF  20  LAST  447      33,3141  0 5402 1           TC      PHASCHNG
0925                           33,3142  00075 0            OCT     00075
09255  REF   2  LAST  435      01,2256          1         5P7SPT2  =      5.7SPOT
0926   REF   1                 33,3143  3 3210 1  SPITGYRO CA      ERCOMPPL
0927   REF  73  LAST  442      33,3144  0 4636 0           TC      BANKCALL
0928   REF   4  LAST  442      33,3145  17244 0            CADR    IMUPULSE
0929   REF  74  LAST  447      33,3146  0 4636 0           TC      BANKCALL
0930   REF   7  LAST  430      33,3147  17644 1            CADR    IMUSTALL
0931   REF   2  LAST  430      33,3150  0 2655 0           TC      SOMERR2
09311  REF   2  LAST  428      33,3151  0 2227 1           TC      ESTIMS          RE-INITIALIZE

0932                           33,3152  77776 1  NOAZCHGE EXIT
0933   REF  52  LAST  444      33,3153  3 4770 0           CA      ONE
0934   REF   4  LAST  447      33,3154  55'632 0           TS      PREMTRXC
0941   REF   5  LAST  446      33,3155  11'631 0  NOCHORLD CCS     GEOSAVE1
0942   REF   3  LAST  446      33,3156  55'646 0           TS      ERECTIM1        COUNTS DOWN FOR ERECTION.

0943   REF   1                 33,3157  3 4322 0  ANNNNNN  CAF     NINE
0944   REF   8  LAST  447      33,3160  55'412 0           TS      LENGTHOT
0945   REF   5  LAST  446      33,3161  0 2277 1           TC      SLEEPIE +1

0946                           33,3162  0 0004 0  CHKCOMED INHINT
09461  REF   8  LAST  396      33,3163  4 1214 0           CS      MODREG          CHECK FOR MM 07 FIRST
09462  REF  10  LAST  381      33,3164  6 4774 1           AD      SEVEN
09463                          33,3165  0 0006 1           EXTEND
09464  REF   1                 33,3166  1 3202 0           BZF     GOBKCALB        IF MM 07 RETURN TO PERF TEST
0947   REF 101  LAST  444      33,3167  4 4772 0           CS      ZERO
0948                           33,3170  0 0006 1           EXTEND
0949   REF   5  LAST  261      33,3171  06 030 1           RXOR    CHAN30          READ AND INVERT BITS IN CHANNEL 30
0950   REF  19  LAST  388      33,3172  7 4764 1           MASK    BIT5            LIFTOFF BIT
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0951   REF 136  LAST  438   33,3173  10 000 0            CCS     A
0952   REF   1              33,3174  1 3203 1            TCF     PRELTERM        LIFTOFF HAS OCCURRED

0953   REF   2  LAST  261   33,3175  3 4764 0            CA      GRRBKBIT        CHECK FOR BACKUP LIFTOFF
0954   REF   9  LAST  261   33,3176  7 0101 0            MASK    FLAGWRD5        BIT5 FLAGWRD5
0955   REF 137  LAST  448   33,3177  10 000 0            CCS     A
0956   REF   2  LAST  448   33,3200  1 3203 1            TCF     PRELTERM        BACKUP RECEIVED

0957                        33,3201  0 0003 1            RELINT
0958   REF 127  LAST  438   33,3202  0 0002 0  GOBKCALB  TC      G

0959   REF   4  LAST  438   33,3203  3 7644 0  PRELTERM  CA      PRIO22          PRELAUNCH DONE - SET UP P11
0960   REF   5  LAST  444   33,3204  0 5176 1            TC      PRIOCHNG        INCREASE PRIORITY HIGHER THAN SERVICER
0961                        33,3205  0 0004 0            INHINT
0962   REF  35  LAST  421   33,3206  0 4655 0            TC      POSTJUMP
0963   REF   1              33,3207   70000 0            CADR    P11

0965   REF   2  LAST  447   33,3210   02647 0  ERCOMPPL  ECADR   ERCOMP

0968   REF   3  LAST  400   26,3333            GEOCONS5  EQUALS  HIDPHALF
0969                        33,3211   06200 0  1/PIPAGT  OCT     06200
0970   REF   7  LAST  432      4352             17DECML   =       ND1             OCT 21
0971   REF   6  LAST  432      4351             19DECML   =       VD1             OCT 23
0972   REF   3  LAST  200      5011             1/2SECX   =       .5SEC
```

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P0973 OPTICAL VERIFICATION ROUTINES FOR GYROCOMPASS

```
09735  REF   1                                          COUNT* $$/P03
0974   REF  21  LAST  447  33,3212  0 5402 1  GCOMPVER  TC     PHASCHNG     OPTICAL VERIFICATION ROUTINE
0975                       33,3213   00154 1             OCT    00154
09755  REF   1                       01,2143             =      4.15SPOT
0976   REF   2  LAST  435  33,3214  0 5344 1             TC     NEWMODEX     ENTERED BY VERB 65 ENTER
0977                       33,3215   00003 1             MM     03
09771  REF   1                       33,3216  0 2011 0  SETNBPOS TC    NBPOSPL
0978   REF  75  LAST  447  33,3217  0 4636 0  +1        TC     BANKCALL
0979   REF   2  LAST  429  33,3220   16073 1             CADR   MKRELEAS
0980   REF  25  LAST  382  33,3221  3 4770 0  CPTDATA   CAF    BIT1         CALLS FOR AZIMUTH AND ELEVATION OF TARGE
0981                       33,3222  22 007 0             ZL                  T 1,THEN TARGET 2
0982   REF   1                       33,3223  23'427 1  +2        LXCH   RUN
0983   REF  14  LAST  367  33,3224  55'252 1             TS     DSPTEM1 +2   ELEVATION MEASURED FROM HORIZONTAL
0984                       33,3225  0 0006 1             EXTEND
0985   REF   2  LAST  449  33,3226  5 1427 1             INDEX  RUN
0986   REF   1                       33,3227  3 1433 1  DCA    TAZEL1
0987   REF  15  LAST  449  33,3230  53'251 1             DXCH   DSPTEM1
0988   REF   1                       33,3231  3 3252 1  OPTDATA8 CAF   V05N30E
0989   REF  76  LAST  449  33,3232  0 4636 0             TC     BANKCALL
0990   REF   1                       33,3233   20705 1             CADR   GODSPRET
0991   REF   1                       33,3234  3 5032 0             CAF    V06N41
09911  REF  77  LAST  449  33,3235  0 4636 0             TC     BANKCALL
09912  REF   3  LAST  432  33,3236   20743 0             CADR   GOFLASH
09913  REF   2  LAST  241  33,3237  0 3370 0             TC     GCOMP5
09914                       33,3240  0 3242 0             TC     +2
09915  REF   1                       33,3241  1 3231 0  TCF    OPTDATA8

0992   REF  16  LAST  449  33,3242  53'251 1             DXCH   DSPTEM1      TAZEL1  TARGET 1 AZIMUTH
0993   REF   3  LAST  449  33,3243  51'427 1             INDEX  RUN
0994   REF   2  LAST  449  33,3244  53'433 0             DXCH   TAZEL1       TAZEL1 +2 TARGET 2 AZIMUTH
0995   REF   4  LAST  449  33,3245  11'427 0             CCS    RUN
0996   REF   1                       33,3246  1 3313 1  TCF    CONTIN33
0997   REF  24  LAST  418  33,3247  3 4767 0  CAF       TWO
0998   REF  61  LAST  432  33,3250  54 001 1  TS        L
0999   REF   1                       33,3251  1 3223 0  TCF    OPTDATA +2   MPAC    1ST PASS=0  2ND PASS=2

099921                     33,3252   01236 1  V05N30E   VN     0530

10136  REF  32  LAST  446  33,3253  0 6006 1             TC     INTPRET      UNDYNAMIC ASSEMBLER
1014                       33,3254   77170 1  TAR/EREF  AXT,1   AXT,2       TARGET VECTOR
1015                       33,3255   00002 0                    2           SIN(EL)  -COS(AZ)COS(EL)   SIN(AZ)COS(EL
1016                       33,3256   00014 1                    120
1017                       33,3257   40331 1             SSP    SETPD
1018   REF   3  LAST  431  33,3260   00052 0                    S2
1019                       33,3261   00006 1                    6
1020                       33,3262   00001 0                    0
1021                       33,3263   60533 1  TAR1      SLOAD*   SR2         X1=2 X2=12 S2=6 X1=0 X2=6 S2=6
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```
1022  REF   3 LAST  449   33,3264  02436 1                TAZEL1 +3,1
1023                      33,3265  00001 0        STORE   0              PD00    ELEVATION    PD00
1024                      33,3266  77756 0        SIN
1025                      33,3267  10023 1        STORE   18D,2          PD06 ***    SIN(EL)    ***PD12
1026                      33,3270  77745 1        DLOAD
1027                      33,3271  00001 0                0
1028                      33,3272  41546 0        COS     PUSH           PD00     COS(EL)   PD00
1029                      33,3273  47133 0        SLOAD*  RTB
1030  REF   4 LAST  450   33,3274  02435 1                TAZEL1 +2,1
1031  REF   4 LAST  409   33,3275  51754 0                CDULOGIC
1032                      33,3276  00003 1        STORE   2              PD02        AZIMUTH   PD02
1033                      33,3277  41356 1        SIN     DMP
1034                      33,3300  00001 0                0
1035                      33,3301  77752 1        SL1
1036                      33,3302  10027 0        STORE   22D,2          PD10  *** SIN(AZ)COS(EL)  ***PD16
1037                      33,3303  71545 0        DLOAD   COS
1038                      33,3304  00003 1                2
1039                      33,3305  72405 0        DMP     SL1
1040                      33,3306  76076 1        DCOMP   AXT,1
1041                      33,3307  00000 1                0
1042                      33,3310  10025 1        STORE   20D,2          PD08 ***   -COS(AZ)COS(EL)  ***PD14
1043                      33,3311  43504 1        TIX,2   RVQ
1044  REF   1             33,3312  67263 1                TAR1
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104435 REF   4  LAST  435   33,2000                       SETLOC  IMUCAL
10444                     33,3313                       BANK
104445 REF   2 LAST  449 TO  450:    65    65*           COUNT*  $$/P03
10445  REF  53  LAST  447   33,3313  3 4770 0  CONTIN33   CA      ONE
10446  REF   3  LAST  293   33,3314  55'140 1             TS      STARCODE
10447  REF 102  LAST  447   33,3315  3 4772 1             CA      ZERO
10448  REF   1             33,3316  0 3375 0             TC      TARGDRVE
10449  REF  33  LAST  449   33,3317  0 6006 1             TC      INTPRET
104492                    33,3320   77624 1              CALL
104494 REF   1            33,3321   67254 0                      TAR/EREF
104496                    33,3322   64375 1  NEXTBNKS    VLOAD   MXV
1045                      33,3323   00007 0                      6D
1047   REF  22  LAST  446   33,3324  02672 0                      XSM
10471                     33,3325   77772 0              VSL1
1048   REF   3  LAST   99   33,3326  26736 1              STOVL   STARAD
1049                      33,3327   00015 0                      12D
1050                      33,3330   76521 0              MXV     VSL1
1051   REF  23  LAST  450   33,3331  02672 0                      XSM
1052   REF   4  LAST  450   33,3332  36744 0              STCALL  STARAD +6
1054   REF   1             33,3333  67450 1                      LITTLSUB
1060   REF   3  LAST  442   33,3334  02414 1              STORE   LOSVEC
1061                      33,3335   77776 1              EXIT
1069   REF  25  LAST  449   33,3336  3 4767 0  NEXBNKSS   CAF     TWO
1070   REF   4  LAST  450   33,3337  55'140 1             TS      STARCODE
1071   REF  15  LAST  420   33,3340  3 6211 0             CAF     SIX
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1072  REF   2  LAST  450   33,3341  0 3375 0          TC      TARGDRVE
1073  REF  34  LAST  450   33,3342  0 6006 1          TC      INTPRET
1074                       33,3343   77624 1          CALL
1075  REF   2  LAST  450   33,3344   67450 1                  LITTLSUB
10751                      33,3345   24015 0          STOVL   12D
10752 REF   4  LAST  450   33,3346   02414 1                  LOSVEC
10753                      33,3347   34007 1          STCALL  06D
10754 REF   1              33,3350   47432 1                  AXISGEN
10755                      33,3351   77624 1          CALL
10756 REF   1              33,3352   47240 1                  CALCGTA
10757                      33,3353   77776 1          EXIT
1076  REF   1              33,3354  3 5040 0  GCOMP4  CAF     V06N93
1077  REF  78  LAST  449   33,3355  0 4636 0          TC      BANKCALL
1078  REF   4  LAST  449   33,3356   20743 0          CADR    GOFLASH
1079  REF   3  LAST  449   33,3357  0 3370 0          TC      GCOMP5
1080                       33,3360  1 3362 1          TCF     +2
1081  REF   1              33,3361  1 3354 1          TCF     GCOMP4
1082  REF  35  LAST  451   33,3362  0 6006 1          TC      INTPRET
1083                       33,3363   53375 0          VLOAD   VAD
1084  REF  13  LAST  442   33,3364   02760 1                  CGC
1085  REF   7  LAST  446   33,3365   02650 0                  ERCOMP1
1086  REF   8  LAST  451   33,3366   02650 0          STORE   ERCOMP1
1087                       33,3367   77776 1          EXIT
1090  REF   3  LAST  449   33,3370  0 5344 1  GCOMP5  TC      NEWMODEX
1091                       33,3371   00002 0          MM      02
1092  REF  22  LAST  449   33,3372  0 5402 1          TC      PHASCHNG
1093                       33,3373   00004 0          OCT     00004
1094  REF  49  LAST  437   33,3374  0 5205 0          TC      ENDOFJOB
1137  REF   5  LAST  450   33,2000                    SETLOC  IMUCAL
1138                       33,3375                    BANK


1139  REF   3 LAST  450 TO  451:    50   115*         COUNT*  $$/P03
1140                       33,3375  0 0006 1  TARGDRVE EXTEND
1141  REF   1              33,3376  23'424 1          QXCH    QPLAC
1142  REF   1              33,3377  55'431 1          TS      TARG1/2
11421 REF  36  LAST  451   33,3400  0 6006 1          TC      INTPRET
1143                       33,3401   77624 1          CALL
1144  REF   2  LAST  450   33,3402   67254 0                  TAR/EREF
1145                       33,3403   76740 0          LXC,1   VLOAD*
1146  REF   2  LAST  451   33,3404   02431 0                  TARG1/2
1147                       33,3405   00007 0                  6D,1
1148  REF   7  LAST  300   33,3406   36766 0          STCALL  STAR
1149  REF   1              33,3407   46053 0                  SXTANG
1150                       33,3410   77776 1          EXIT
1151  REF   6  LAST  300   33,3411  3 1773 0          CA      SAC
1152  REF   3  LAST  255   33,3412  55'313 0          TS      DESOPTS
1153  REF   6  LAST  300   33,3413  3 1775 0          CA      PAC
1154  REF   4  LAST  255   33,3414  55'312 1          TS      DESOPTT
1155  REF 103  LAST  450   33,3415  3 4772 1  RETARG  CAF     ZERO
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```
1156   REF  20  LAST  396   33,3416  55'323 0            TS      OPTIND
1158   REF  79  LAST  451   33,3417  0 4636 0            TC      BANKCALL
1159   REF   1              33,3420   16000 0           CADR    SXTMARK
11621  REF  11  LAST  248   33,3421  10 301 1            CCS     MARKINDX
11622  REF   1              33,3422  0 3415 1            TC      RETARG          NO MARK TAKEN - DO AGAIN

11623  REF  80  LAST  452   33,3423  0 4636 0            TC      BANKCALL
11624  REF   3  LAST  449   33,3424   16073 1           CADR    MKRELEAS

1163   REF   2  LAST  451   33,3425  0 1424 1            TC      QPLAC


1171   REF   6  LAST  451   33,2000                      SETLOC  IMUCAL
1172                        33,3426                      BANK
1173   REF   4 LAST  451 TO  452:     25   140*         COUNT*  $$/P03
1200                        33,3426   30341 1  PIPASC    2DEC    .76376833
1200                        33,3427   22444 0
1201                        33,3430   57223 0  VELSC     2DEC    -.52223476
1201                        33,3431   66451 1
1202                        33,3432   05427 0  ALSK      2DEC    .17329931
1202                        33,3433   12577 1
1203                        33,3434   77567 0            2DEC    -.00835370
1203                        33,3435   44202 1
1204                        33,3436   24276 1  GEORGEJ   2DEC    .63661977
1204                        33,3437   14066 1
1207                        33,3440   03146 1  GEOCONS1  2DEC    .1
1207                        33,3441   14632 0
1208                        33,3442   00121 0  GEOCONS2  2DEC    .005
1208                        33,3443   35341 1
1209                        33,3444   01767 0  GEOCONS3  2DEC    .062
1209                        33,3445   31666 0
1210                        33,3446   00004 0  GEOCONS4  2DEC    .0003
1210                        33,3447   35223 1
12525  REF   3 LAST  445 TO  449:    150    291*         COUNT*  $$/P02
1253                        33,3450   74020 0  LITTLSUB  STQ     AXC,1
1254   REF   2  LAST   73   33,3451   00300 1            QMAJ
1255   REF  23  LAST  295   33,3452   03722 0            MRKBUF1
1256                        33,3453   77650 1            GOTO
1257   REF   1              33,3454   36073 0            SXTSM2
R1270

1271   REF   5  LAST  275   43,2000                      SETLOC  EXTVERBS
1272                        43,3132                      BANK

1273   REF   8 LAST  279 TO  282:     24   565*         COUNT*  $$/EXTVB
1300   REF  37  LAST  451   43,3132  0 6006 1  AZMTHCG1  TC      INTPRET
1301                        43,3133   47145 1            DLOAD   RTB
1302   REF   3  LAST  447   43,3134   02636 0            NEWAZMTH
1303   REF   3  LAST  300   43,3135   45640 1            1STO2S
1304                        43,3136   77776 1            EXIT
```

```
1305   REF 226  LAST  441   43,3137  56 154 1          XCH    MPAC
1306   REF  17  LAST  449   43,3140  55'250 0          TS     DSPTEM1
1307   REF  81  LAST  452   43,3141   0 4636 0         TC     BANKCALL
1308   REF   1               43,3142   20715 0         CADR   CLEANDSP
1309   REF   1               43,3143   3 3165 0        CAF    VN0629
1310   REF  82  LAST  453   43,3144   0 4636 0         TC     BANKCALL
1311   REF   5  LAST  451   43,3145   20743 0         CADR   GOFLASH
1312                        43,3146   1 3157 0         TCF    +11
1313                        43,3147   1 3151 0         TCF    +2
1314                        43,3150   1 3143 0         TCF    -5
1315   REF  38  LAST  452   43,3151   0 6006 1         TC     INTPRET
1316                        43,3152   47135 0          SLOAD  RTB
1317   REF  18  LAST  453   43,3153   01251 0                DSPTEM1
1318   REF   5  LAST  450   43,3154   51754 0                CDULOGIC
1319   REF   4  LAST  447   43,3155   02634 1          STORE  LAUNCHAZ
1320                        43,3156   77776 1          EXIT
1321   REF 104  LAST  451   43,3157   3 4772 1   +11   CAF    ZERO
1322   REF   5  LAST  447   43,3160   55'632 0         TS     PREMTRXC
1323   REF  23  LAST  451   43,3161   0 5402 1         TC     PHASCHNG
1324                        43,3162   00004 0          OCT    00004
1325   REF  36  LAST  448   43,3163   0 4655 0         TC     POSTJUMP
13255  REF   5  LAST  376   43,3164   21275 1          CADR   PINBRNCH

1326                        43,3165   01435 1  VN0629  VN     0629
```

L IMU CALIBRATION AND ALIGNMENT USER'S PAGE NO. 28 E5 S4

*** END OF DIOGENES.064 ***

L GROUND TRACKING DETERMINATION PROGRAM - P21 USER'S PAGE NO. 1 E1 S4

```
P0001   GROUND TRACKING DETERMINATION PROGRAM P21
R0002   PROGRAM DESCRIPTION
R0003   MOD NO - 1
R0004   MOD BY - N.M.NEVILLE
R0005   FUNCTIONAL DECRIPTION-
R0006
R0007   TO PROVIDE THE ASTRONAUT DETAILS OF THE LM OR CSM GROUND TRACK WITHOUT
R0008   THE NEED FOR GROUND COMMUNICATION (REQUESTED BY DSKY).
R0009   CALLING SEQUENCE -
R0010
R0011   ASTRONAUT REQUEST THROUGH DSKY V37E21E
R0012   SUBROUTINES CALLED-
R0013
R0014   GOPERF4
R0015   GOFLASH
R0016   THISPREC
R0017   OTHPREC
R0018   LAT-LONG
R0019   NORMAL EXIT MODES-
R0020
R0021   ASTRONAUT REQUEST TROUGH DSKY TO TERMINATE PROGRAM V34E
R0022   ALARM OR ABORT EXIT MODES-
R0023
R0024   NONE
R0025   OUTPUT -
R0026
R0027   OCTAL DISPLAY OF OPTION CODE AND VEHICLE WHOSE GROUND TRACK IS TO BE
R0028   COMPUTED
R0029           OPTION CODE  00002
R0030           THIS         00001
R0031           OTHER        00002
R0032   DECIMAL DISPLAY OF TIME TO BE INTEGRATED TO HOURS , MINUTES , SECONDS
R0033   DECIMAL DISPLAY OF LAT,LONG,ALT
R0034   ERASABLE INITIALIZATION REQUIRED
R0035
R0036   AXO     2DEC   4.652459653 E-5   RADIANS        "68-69 CONSTANTS"
R0037
R0038   -AYO    2DEC   2.147535898 E-5   RADIANS
R0039
R0040   AZO     2DEC   .7753206164       REVOLUTIONS
R0041   FOR LUNAR ORBITS 504LM VECTOR IS NEEDED
R0042
R0043   504LM   2DEC   -2.700340600 E-5  RADIANS
R0044
R0045   504LM_2 2DEC   -7.514128400 E-4  RADIANS
R0046
R0047   504LM_4 2DEC   _2.553198641 E-4  RADIANS
R0048
R0049   NONE
R0050   DEBRIS
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R0051
R0052  CENTRALS-A,Q,L
R0053  OTHER-THOSE USED BY THE ABOVE LISTED SUBROUTINES
R0054  SEE LEMPREC,LAT-LONG
 0055  REF   6 LAST  393   30,2000                    SBANK= LOWSUPER      FOR LOW 2CADR'S.

 0057  REF   1             37,2000                    SETLOC P20S
 0058                      37,2000                    BANK

 0059  REF   3 LAST  134   E7,1537                    EBANK= P21TIME
 0060  REF   1                                        COUNT* $$/P21
 0061  REF  54 LAST  450   37,2000  3 4770 0 PROG21  CAF    ONE
 0062  REF   3 LAST  188   37,2001  54 776 0         TS     OPTION2       ASSUMED VEHICLE IS LM , R2 = 000 1
 0623  REF  29 LAST  402   37,2002  0 5547 1         TC     UPFLAG
 0626  REF   5 LAST  395   37,2003   00031 0         ADRES  TRACKFLG

 0063  REF  20 LAST  382   37,2004  3 4767 0         CAF    BIT2          OPTION 2
 0064  REF  83 LAST  453   37,2005  0 4636 0         TC     BANKCALL
 0065  REF   1             37,2006   21074 1         CADR   GOPERF4
 0066  REF   5 LAST  396   37,2007  0 4103 1         TC     GOTOPOOH      TERMINATE
 0067                      37,2010  0 2012 0         TC     +2            PROCEED VALUE OF ASSUMED VEHICLE OK
 0068                      37,2011  0 2004 1         TC     -5            R2 LOADED THROUGH DSKY
 0682  REF 105 LAST  453   37,2012  3 4772 1         CAF    ZERO          ZERO DSPTEM
 0685  REF  19 LAST  453   37,2013  55'250 0         TS     DSPTEM1
 0688  REF  20 LAST  456   37,2014  55'251 1         TS     DSPTEM1 +1
 0069  REF   1             37,2015  3 5027 1 P21PROG1 CAF   V6N34         LOAD DESIRED TIME OF LAT-LONG.
 0070  REF   2 LAST  206   37,2016  0 5535 1         TC     VNFLASH
 0075  REF  39 LAST  453   37,2017  0 6006 1         TC     INTPRET
 0076                      37,2020   53145 1         DLOAD  BZE
 0763  REF  21 LAST  456   37,2021   01251 0                DSPTEM1
 0767  REF   1             37,2022   76155 1                P21PRTM       SET TO INTEG TO PRES TIME
 0077  REF   2 LAST  228   37,2023   34041 0 P21PROG2 STCALL TDEC1        INTEG TO TIME SPECIFIED IN TDEC
 0773  REF   6 LAST  275   37,2024   27516 0                INTSTALL
 0776                      37,2025   43014 0         BON    SET
 0078  REF   1             37,2026   01303 0                P21FLAG
 0783  REF   1             37,2027   76045 1                P21CONT       ON...RECYCLE USING BASE VECTOR
 0786  REF   4 LAST  228   37,2030   01474 1                VINTFLAG      OFF..1ST PASS CALC BASE VECTOR
 0079                      37,2031   70535 0         SLOAD  SR1
 0080  REF   4 LAST  456   37,2032   00777 0                OPTION2
 0805                      37,2033   43030 0         BHIZ   CLEAR
 0081                      37,2034   76036 0                +2            ZERO..THIS VEHICLE (CM)
 0813  REF   5 LAST  456   37,2035   01674 0                VINTFLAG      ONE...OTHER VEHICLE(LM)
 0816                      37,2036   43014 0         CLEAR  CLEAR
 0082  REF   3 LAST  228   37,2037   01676 1                DIMFLAG
 0823  REF   1             37,2040   01673 1                INTYPFLG      PRECISION
 0826                      37,2041   77624 1         CALL
 0083  REF   3 LAST  228   37,2042   27236 0                INTEGRV       CALCULATE
 0084                      37,2043   77650 1         GOTO                 .AND
 0845  REF   1             37,2044   76066 0                P21VSAVE      ..SAVE BASE VECTOR
 0085                      37,2045   77775 1 P21CONT  VLOAD               RECYCLE..INTEG FROM BASE VECTOR
```

```
0086   REF  3  LAST  134   37,2046  03605 1                 P21BASER
0087   REF  4  LAST  301   37,2047  25535 0          STOVL  RCV          ..POS
0088   REF  3  LAST  134   37,2050  03613 0                 P21BASEV
0089   REF  4  LAST  302   37,2051  15543 1          STODL  VCV          ..VEL
0090   REF  4  LAST  456   37,2052  03540 0                 P21TIME
0091   REF  6  LAST  301   37,2053  01517 0          STORE  TET          ..TIME
0093                       37,2054  43014 0          CLEAR  CLEAR
0094   REF  4  LAST  456   37,2055  01676 1                 DIMOFLAG
0095   REF  1              37,2056  00263 0                 MOONFLAG
0096                       37,2057  53135 0          SLOAD  BZE
00965  REF  2  LAST  133   37,2060  03604 0                 P21ORIG
0097                       37,2061  76064 1                 +3             ZERO = EARTH
00975                      37,2062  77614 1          SET                   ...2 = MOON
0098   REF  2  LAST  457   37,2063  00063 1                 MOONFLAG
00985                      37,2064  77624 1          CALL
0099   REF  1              37,2065  27211 0                 INTEGRVS
00995                      37,2066  77745 1  P21VSAVE DLOAD                SAVE CURRENT BASE VECTOR
0100   REF  1              37,2067  00015 0                 TAT
01003  REF  5  LAST  457   37,2070  27540 0          STOVL  P21TIME         ..TIME
01006  REF  1              37,2071  00017 1                 RATT1
0101   REF  4  LAST  457   37,2072  27605 1          STOVL  P21BASER        ..POS B-29 OR B-27
01013  REF  1              37,2073  00025 0                 VATT1
01014  REF  4  LAST  457   37,2074  03613 0          STORE  P21BASEV        ..VEL B-7  OR B-5
01015                      37,2075  77614 1          BONCLR                 WITH ADJUSTED P29 BASE TIME, SKIP
010155 REF  1              37,2076  02605 0                 NEWTFLAG               P29 DISPLAYS
01016  REF  1              37,2077  60015 0                 HOP29DSP
010162                     37,2100  47014 1          BOFF   RTB            RETURN TO P29 IF P29FLAG IS SET
010164 REF  1              37,2101  00356 1                 P29FLAG
010166                     37,2102  76104 0                 +2
010168 REF  1              37,2103  60004 0                 LONGPASS
01017                      37,2104  53646 0          ABVAL  SL*
010172                     37,2105  57576 1                 0,2
010175 REF  3  LAST  293   37,2106  27623 0          STOVL  P21VEL          /VEL/ FOR N73 DSP
01018  REF  1              37,2107  00001 0                 RATT
010185                     37,2110  50256 0          UNIT   DOT
010188 REF  1              37,2111  00007 0                 VATT           U(R).(V)
01019                      37,2112  67471 1          DDV    ASIN           U(R).U(V)
010192 REF  4  LAST  457   37,2113  03623 0                 P21VEL
010195 REF  2  LAST  293   37,2114  03625 0          STORE  P21GAM          SIN-1 U(R).U(V), -90 TO +90
0102                       37,2115  43134 0          SXA,2  SET
01025  REF  3  LAST  457   37,2116  03603 1                 P21ORIG        0 = EARTH  2 = MOON
01026  REF  2  LAST  456   37,2117  01063 0                 P21FLAG
0103                       37,2120  67214 1  P21DSP  CLEAR  SLOAD          GENERATE DISPLAY DATA
01033  REF  1              37,2121  01663 0                 LUNAFLAG
01036  REF  1              37,2122  00050 1                 X2
0104                       37,2123  43054 1          BZE    SET
01043                      37,2124  76126 0                 +2             0 = EARTH
01046  REF  2  LAST  457   37,2125  01463 1                 LUNAFLAG
0105                       37,2126  77775 1          VLOAD
01053  REF  2  LAST  457   37,2127  00001 0                 RATT
```

L GROUND TRACKING DETERMINATION PROGRAM - P21 USER'S PAGE NO. 4 E7 S3

```
01156  REF   2  LAST   93   37,2130  16152 0          STODL  ALPHAV
0106   REF   2  LAST  457   37,2131  00015 0                 TAT
01063                       37,2132  45014 0          CLEAR  CALL
01066  REF   1               37,2133  00662 0                 ERADFLAG
0107   REF   1               37,2134  26453 1                 LAT-LONG
01072                       37,2135  77605 1          DMP                    MPAC = ALT, METERS B-29
01075  REF   1               37,2136  36166 0                 K,01
01078  REF   3  LAST  293   37,2137  03621 1          STORE  P21ALT          ALT/100 FOR N73 DSP
0108                        37,2140  77776 1          EXIT
0109   REF   1               37,2141  3 2164 0         CAF    V06N43         DISPLAY LAT,LONG,ALT
0110   REF  84  LAST  456   37,2142  0 4636 0         TC     BANKCALL       LAT,LONG = REVS  B    BOTH EARTH/MOON
0111   REF   6  LAST  453   37,2143  20743 0          CADR   GOFLASH        ALT = METERS B-29    BOTH EARTH/MOON
0112   REF   6  LAST  456   37,2144  0 4103 1         TC     GOTOPOOH       TERM
0113   REF   7  LAST  458   37,2145  0 4103 1         TC     GOTOPOOH
0114   REF  40  LAST  456   37,2146  0 6006 1         TC     INTPRET        V32E RECYCLE
0115                        37,2147  43345 1          DLOAD  DAD
0116   REF   6  LAST  457   37,2150  03540 0                 P21TIME
0117   REF   1               37,2151  36161 1                 600SEC         600 SECONDS OR 1  MIN
0118   REF  22  LAST  456   37,2152  01251 0          STORE  DSPTEM1
0119                        37,2153  77634 0          RTB
0120   REF   1               37,2154  76015 1                 P21PROG1
01202                       37,2155  52034 1  P21PRTM RTB    GOTO
01205  REF   3  LAST  431   37,2156  51751 0                 LOADTIME
01208  REF   1               37,2157  76023 1                 P21PROG2
0121                        37,2160  00003 1  600SEC  2DEC   60000          10 MIN
0121                        37,2161  25140 0
0122                        37,2162  00001 0  P21ONENN OCT   00001          NEEDED TO DETERMINE VEHICLE
0123                        37,2163  00000 1          OCT    00000          TO BE INTEGRATED
0124                        37,2164  01453 1  V06N43  VN     00643
0125   REF   1                 5027          V6N34   =      V06N34
0131                        37,2165  00243 1  K,01    2DEC   ,01
0131                        37,2166  32703 1
1000   REF   1               30,2000                 SETLOC P29TAG1
1001                        30,2000                 BANK

10015  REF   1                                       COUNT* $$/P29
1002   REF   2  LAST  134   E7,1543                  EBANK= LONGFOR

1003   REF  41  LAST  458   30,2000  0 6006 1  P29     TC     INTPRET        TIME-TO-LONGITUDE PROGRAM
1004                        30,2001  47014 1           SET    RTB            SET=P29,CLEARED=P21--CHECKED IN P21
1005   REF   2  LAST  457   30,2002  00076 0                  P29FLAG        FLAG ALSO MARKS FIRST PASS THRU P29
1006   REF   2  LAST  225   30,2003  76000 0                  PROG21         GET BASE TIME + STATE VECTOR FROM P21
1007   REF   1               30,2004  3 2152 0  LONGPASS CAF    V06N43LP
1008   REF   1               30,2005  0 5540 0          TC     VNFLASHR       ASTRONAUT LOADS DESIRED LONGITUDE
1009                        30,2006  1 2012 1          TCF    +4
1010   REF   9  LAST  355   30,2007  3 4773 0          CAF    FIVE           BLANK R1,R3
1011   REF   1               30,2010  0 5516 0          TC     BLANKET
1012   REF  50  LAST  451   30,2011  0 5205 0          TC     ENDOFJOB
1013   REF   5  LAST  293   30,2012  52 751 0          DXCH   LONG
1014   REF   3  LAST  458   30,2013  53'544 1          DXCH   LONGFOR         STORE DESIRED LONGITUDE
```

L GROUND TRACKING DETERMINATION PROGRAM - P21 USER'S PAGE NO. 5 E7 S3

```
1015  REF  42 LAST 458  30,2014  0 6006 1          TC      INTPRET
1016                    30,2015    65375 0  HOP29DSP VLOAD   PDDL      STORE UNIT NORTH(IN PLANETARY COORDS )
1017  REF   2 LAST  34  30,2016    15330 0           UNITZ              AND BASE TIME ON PUSHLIST FOR
1018  REF   1          30,2017    03540 0           P29BASET           RP-TO-R
1019  REF   2 LAST 134  30,2020    03542 1           STORE   PASSTIME   INITIALIZE TIME OF CROSSING
1020                    30,2021    43125 0           PDDL    SET
1021  REF   3 LAST 220  30,2022    15336 0           ZEROVECS
1022  REF   3 LAST 458  30,2023    00076 0           P29FLAG            IN CASE OF RESTART OR REPEAT INTEGRATION
1023  REF   2 LAST 134  30,2024    03546 0           STORE   DELTLONG   INITIALIZE LONGITUDE DIFFERENCE TO ZERO
1024                    30,2025    43014 0           CLEAR   BOFF
1025  REF   3 LAST 457  30,2026    01663 0           LUNAFLAG
1026  REF   2 LAST  34  30,2027    04343 1           CMOONFLG
1027                    30,2030    60034 0           +4
1028                    30,2031    71214 0           SET     DLOAD
1029  REF   4 LAST 459  30,2032    01463 1           LUNAFLAG           SET LUNAFLAG=CMOONFLG FOR LAT-LONG
1030  REF   1          30,2033    20150 1           FMOON              MPAC NONZERO FOR MOON, ZERO FOR EARTH
1031                    30,2034    77624 1           CALL               GET UNIT PLANETARY NORTH IN BASE COORDS
1032  REF   1          30,2035    55345 0           RP-TO-R
1033                    30,2036    41406 0           PUSH    PUSH       PD=12D,MUSUBZ(UNIT PLANETARY NORTH)
1034                    30,2037    53435 0           VXV     UNIT
1035  REF   1          30,2040    03605 1           P29BASER
1036  REF   2 LAST 134  30,2041    27552 0           STOVL   MUSUBE     PD=6D,MUSUBE=UNIT LOCAL EAST AT P29BASER
1037                    30,2042    53435 0           VXV     UNIT
1038  REF   3 LAST 459  30,2043    03552 0           MUSUBE
1039  REF   2 LAST 134  30,2044    27560 1           STOVL   MUSUBC     UNIT EQUATORIAL CENTRAL-DIRECTED VECTOR
1040  REF   2 LAST 459  30,2045    03605 1           P29BASER
1041                    30,2046    53435 0           VXV     UNIT       FORM MUSUBN(UNIT ORBITAL LOCAL NORTH)
1042  REF   1          30,2047    03613 0           P29BASEV
1043                    30,2050    41406 0           PUSH    PUSH       PD=18D
1044                    30,2051    53435 0           VXV     UNIT
1045  REF   3 LAST 459  30,2052    03605 1           P29BASER
1046  REF   2 LAST 134  30,2053    27566 1           STOVL   MUSUBS     PD=12D,MUSUBS=UNIT ORBITAL TANG. VEL.
1047                    30,2054    63241 0           DOT     PDVL       PD=8D,MUSUBZ AT 0D, EXCHANGE DOT-PRODUCT
1048                    30,2055    00001 0           CD                 WITH MUSUBN IN PUSHLIST
1049                    30,2056    45565 0           SIGN    STADR      PD=6D, PUT MUSUBN IN HEMI. OF MUSUBZ
1050  REF   1          30,2057    50203 0           STOVL   MUSUBN
1051  REF   4 LAST 459  30,2060    03605 1           P29BASER
1052                    30,2061    70414 1  HOPALONG BOFF    VSR2       MUST BE B+29 FOR LAT-LONG
1053  REF   3 LAST 459  30,2062    04343 1           CMOONFLG
1054                    30,2063    60064 0           +1
1055  REF   3 LAST 458  30,2064    16152 0           STODL   ALPHAV     STORE FOR LAT-LONG
1056  REF   3 LAST 459  30,2065    03542 1           PASSTIME
1057                    30,2066    45014 0           CLEAR   CALL       FIND LONGITUDE FOR PRESENT ITERATION OF
1058  REF   2 LAST 458  30,2067    00662 0           ERADFLAG           POSITION VECTOR
1059  REF   2 LAST 458  30,2070    26453 1           LAT-LONG
1060                    30,2071    45345 1           DLOAD   DSU        COMPARE WITH DESIRED LONGITUDE
1061  REF   4 LAST 458  30,2072    03544 1           LONGFOR
1062  REF   6 LAST 458  30,2073    00751 1           LONG
1063                    30,2074    51406 1           PUSH    ABS        PD=2D, SAVE DELTA
1064                    30,2075    50025 0           DSU     BMN        IF WITHIN EPSILONG, DISPLAY RESULTS
```

L GROUND TRACKING DETERMINATION PROGRAM - P21 USER'S PAGE NO. 6 E7 S3

```
1065  REF  1                 30,2076  20142 1          EPSILONG  .01 DEGREES
1066  REF  1                 30,2077  60122 0          PASSOUT
1067                         30,2100  77600 1  BOV                CLEAR OVERFLOW INDICATOR
1068                         30,2101  60102 1          +1
1069                         30,2102  40015 1  DAD     BOV       CHECK WHETHER WITHIN EPSILON OF 360 DEG.
1070  REF  1                 30,2103  20144 1          TWICEEPS  .02 DEGREES
1071  REF  2  LAST  460      30,2104  60122 0          PASSOUT
1072                         30,2105  71214 0  BOFCLR  DLOAD     P29FLAG CLEARED FOR LATER PASSES
1073  REF  4  LAST  459      30,2106  00256 0          P29FLAG   PD=0D
1074  REF  1                 30,2107  40272 1          MODULO
1075                         30,2110  43244 1  BPL     DAD       MAKE DELTA>0
1076                         30,2111  60113 1          +2
1077  REF  2  LAST  430      30,2112  15344 0          DPPOSMAX
1078                         30,2113  45214 1  BOFF    DSU       FOR EARTH,DELTA>0
1079  REF  4  LAST  459      30,2114  04343 1          CMOONFLG  FOR MOON, DELTA<0
1080  REF  1                 30,2115  40212 1          HOP1
1081  REF  3  LAST  460      30,2116  15344 0          DPPOSMAX
1082                         30,2117  52125 0  PDDL    GOTO      PD=2D
1083  REF  2  LAST  459      30,2120  20150 1          FMOON     327.8/328.8, B+1
1084  REF  1                 30,2121  40214 1          HOP2
1085  REF  1                 20,2000          SETLOC  P29TAG2
1086                         20,2212          BANK
```

```
1086  REF  1                 20,2212  77725 1  HOP1    PDDL      COUNT* $$/P29
1087                         20,2213  20146 0          FEARTH    PD=2D
1088  REF  1                 20,2214  03550 1  HOP2    STORE     FUDGE     16/15, B+1
1089  REF  2  LAST  134      20,2215  77745 1  DELTLOAD DLOAD
1090                         20,2216  40005 0  THETCOMP DMP      BOV       PD=0D, LOAD DELTA
1091                         20,2217  03550 1          FUDGE
1092  REF  3  LAST  460      20,2220  40221 1          +1
1093                         20,2221  43352 1  SL1     DAD       CLEAR OVERFLOW INDICATOR
1094                         20,2222  03546 0          DELTLONG  SHIFT TO GET B0, SINCE FUDGE IS B+1
1095  REF  3  LAST  459      20,2223  40006 0  PUSH    BOV       PD=2D, IF FUDGE FACTOR MAKES DELTLONG>
1096                         20,2224  40303 0          ADDTEN         360, MODIFY BASE TIME
1097  REF  1                 20,2225  03546 0  STORE   DELTLONG  CUMULATIVE EQUATORIAL DELTA
1098  REF  4  LAST  460      20,2226  74346 0  COS     VXSC
1099                         20,2227  03552 0          MUSUBE
1100  REF  4  LAST  459      20,2230  73525 1  PDDL    SIN       PD=6D
1101                         20,2231  53361 0  VXSC    VAD       PD=0D
1102                         20,2232  03560 1          MUSUBC    ROTATE MUSUBE THRU ANGLE DELTLONG
1103  REF  3  LAST  459      20,2233  53435 0  VXV     UNIT      FORM MUSUBD=ROTATED ORBITAL UNIT
1104                         20,2234  03574 1          MUSUBN         POSITION VECTOR, OUTWARD-DIRECTED
1105  REF  2  LAST  459      20,2235  63206 0  PUSH    PDVL      PD=12D
1106                         20,2236  03605 1          P29BASER
1107  REF  5  LAST  459      20,2237  50256 0  UNIT    DOT       PD=6D, DOT PRODUCT IS B+2
1108                         20,2240  63352 0  SL1     PDVL      PD=2D, MAKE B+1 FOR ACOS, EXCHANGE
1109                         20,2241  65241 0  DOT     PDDL      PD=2D, EXCHANGE WITH PUSHLIST
1110                         20,2242  03566 1          MUSUBS
1111  REF  3  LAST  459      20,2243  75326 1  ACOS    SIGN      PD=0D
1112
```

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1113                          20,2244  73406 1            PUSH    SIN             PD=2D, FORM THETA=ORBITAL DELTA
1114  REF   2 LAST  100      20,2245  16732 0            STODL   SNTH            PD=0D
1115                          20,2246  74146 1            COS     AXC,1
1116                          20,2247  00002 0                    2D
1117  REF   2 LAST  100      20,2250  26734 0            STOVL   CSTH            STORE ANGLE DATA AND BASE STATE VECTOR
1118  REF   6 LAST  460      20,2251  03605 1                    P29BASER                FOR TIME-THETA
1119  REF   1                20,2252  26657 1            STOVL   RVEC
1120  REF   2 LAST  459      20,2253  03613 0                    P29BASEV
1121  REF   2 LAST  100      20,2254  02746 0            STORE   VVEC
1122                          20,2255  74014 1            BOFF    AXC,1           SET X1=-2D FOR EARTH, -10D FOR MOON
1123  REF   5 LAST  460      20,2256  04343 1                    CMOONFLG
1124                          20,2257  40261 0                    +2
1125                          20,2260  00012 1                    10D
1126                          20,2261  45014 0            CLEAR   CALL            INTEGRATE BASE STATE VECTOR THRU THETA
1127  REF   1                20,2262  03666 1                    RVSW
1128  REF   1                20,2263  25002 1                    TIMETHET
1129                          20,2264  43345 1            DLOAD   DAD
1130  REF   1                20,2265  00037 0                    T               T=TIME TO TRAVERSE THETA
1131  REF   2 LAST  459      20,2266  03540 0                    P29BASET
1132  REF   4 LAST  459      20,2267  27542 1            STOVL   PASSTIME        TIME OF LONGITUDE CROSSING
1133                          20,2270  77650 1            GOTO                    UPDATED POSITION VECTOR LOADED FOR
1134  REF   1                20,2271  60061 0                    HOPALONG                LAT-LONG
1135                          20,2272  50025 0  MODULO    DSU     BMN             MPAC CONTAINS ABS(DELTA)+EPSILONG
1136  REF   7 LAST  414      20,2273  15334 1                    DPHALF          IF THIS IS NEAR 360, MUST ADJUST DELTA
1137  REF   1                20,2274  40215 0                    DELTLOAD                BY 360 TO GET ANGLE NEAR ZERO
1138                          20,2275  77625 0            DSU                     TO ADJUST, SUBTRACT DPHALF (TWICE) AND
1139  REF   2 LAST  460      20,2276  20142 1                    EPSILONG                EPSILONG TO GET NEGATIVE NUMBER,
1140                          20,2277  75225 0            DSU     SIGN                    AND SIGN BY UNADJUSTED DIFFERENCE,
1141  REF   8 LAST  461      20,2300  15334 1                    DPHALF                  AT TOP OF PUSHLIST, PD=0D.
1142                          20,2301  77650 1            GOTO
1143  REF   1                20,2302  40216 0                    THETCOMP
1144                          20,2303  43345 1  ADDTEN     DLOAD   DAD             ADD 10 MINUTES TO BASE TIME
1145  REF   3 LAST  461      20,2304  03540 0                    P29BASET
1146  REF   2 LAST  458      20,2305  36161 1                    600SEC
1147                          20,2306  52014 0            SET     GOTO            SET FLAG TO SKIP DISPLAYS ON RETURN TO
1148  REF   2 LAST  457      20,2307  02465 1                    NEWTFLAG                P29
1149  REF   2 LAST  458      20,2310  76023 1                    P21PROG2        GO TO P21 FOR INTEGRATION
1150  REF   2 LAST  458      30,2000                     SETLOC  P29TAG1
1151                          30,2122                     BANK

11515 REF   2 LAST  458 TO  460:    82     82*          COUNT*  $$/P29
1152                          30,2122   77776 1  PASSOUT  EXIT
1153  REF   5 LAST  461      30,2123  53'542 1            DXCH    PASSTIME
1154  REF  23 LAST  458      30,2124  53'251 1            DXCH    DSPTEM1
1155  REF   1                30,2125  3 2151 0            CAF     V06N34LP
1156  REF  85 LAST  458      30,2126  0 4636 0            TC      BANKCALL
1157  REF   7 LAST  458      30,2127   20743 0            CADR    GOFLASH         DISPLAY PASSTIME
1158  REF   8 LAST  458      30,2130  0 4103 1            TC      GOTOPOOH
1159                          30,2131  0 2133 1            TC      +2
1160  REF   2 LAST  457      30,2132  0 2004 1            TC      LONGPASS        RECYCLE TO LONGITUDE INPUT
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L GROUND TRACKING DETERMINATION PROGRAM - P21 USER'S PAGE NO. 8 E7 S3

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1161  REF   2  LAST  458   30,2133  3 2152 0            CAF     V06N43LP
1162  REF  86  LAST  461   30,2134  0 4636 0            TC      BANKCALL        DISPLAY LAT,LONG,ALT AT DESIRED
1163  REF   8  LAST  461   30,2135   20743 0            CADR    GOFLASH              LONGITUDE
1164  REF   9  LAST  461   30,2136  0 4103 1            TC      GOTOPOOH
1165  REF  10  LAST  462   30,2137  0 4103 1            TC      GOTOPOOH
1166  REF   2  LAST  225   30,2140  0 2000 0            TC      P29             RECYCLE TO START OF PROGRAM
1167                        30,2141   00000 1  EPSILONG 2DEC    .2777778E-04    .01 DEGREES
1167                        30,2142   16441 1
1168                        30,2143   00000 1  TWICEEPS 2DEC    .5555556E-04    .02 DEGREES
1168                        30,2144   35101 1
1169                        30,2145   21042 1  FEARTH   2DEC    1.06666667 B-01 16/15
1169                        30,2146   04211 1
1170                        30,2147   17747 0  FMOON    2DEC    .996958637 B-01 327.8/328.8
1170                        30,2150   02563 0
1171                        30,2151   01442 1  V06N34LP VN      0634
1172                        30,2152   01453 1  V06N43LP VN      0643
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L P34-P35, P74-P75 USER'S PAGE NO. 1 EQ S3

P0010 TRANSFER PHASE INITIATION (TPI) PROGRAMS (P34 AND P74)

R0011 MOD NO -1 LOG SECTION - P32-P35, P72-P75
R0012 MOD BY WHITE.P DATE 1JUNE67

R0013 PURPOSE

R0014 (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0015 REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE TRANSFER
R0016 PHASE INITIATION (TPI) MANEUVER, GIVEN -

R0017 (A) TIME OF IGNITION TIG (TPI) OR THE ELEVATION ANGLE (E) OF
R0018 THE ACTIVE/PASSIVE VEHICLE LOS AT TIG (TPI).

R0019 (B) CENTRAL ANGLE OF TRANSFER (CENTANG) FROM TIG (TPI) TO
R0020 INTERCEPT TIME (TIG (TPF)).

R0021 (2) TO CALCULATE TIG (TPI) GIVEN E OR E GIVEN TIG (TPI).

R0022 (3) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0023 APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0024 (4) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0025 VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0026 ASTRONAUT/GROUND.

R0027 (5) TO STORE THE TPI TARGET PARAMETERS FOR USE BY THE DESIRED
R0028 THRUSTING PROGRAM.

R0029 ASSUMPTIONS

R0030 (1) LM ONLY - THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF
R0031 THE CONSTANT DELTA ALTITUDE (CDH) PROGRAM (P33/P73).
R0032 THEREFORE -

R0033 (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R0034 BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R0035 A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R0036 HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R0037 (B) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R0038 COMPUTED TO BE GREATER THAN 10 MINUTES.

R0039 (C) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R0040 ORBITS WAS MINIMIZED.

R0041 (D) THE PERICENTER ALTITUDES OF ORBITS FOLLOWING CSI AND

R0042 CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR

R0043 ORBIT OR 85 NM FOR EARTH ORBIT.

R0044 (E) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R0045 THE PLANE OF THE PASSIVE VEHICLE ORBIT. HOWEVER, CREW
R0046 MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED
R0047 IN AN OUT-OF-PLANE MANEUVER.

R0048 (2) STATE VECTOR UPDATED BY P27 ARE DISALLOWED DURING AUTOMATIC
R0049 STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (4)).

R0050 (3) THIS PROGRAM MUST BE DONE OVER A TRACKING STATION FOR REAL
R0051 TIME GROUND PARTICIPATION IN DATA INPUT AND OUTPUT. COMPUTED
R0052 VARIABLES MAY BE STORED FOR LATER VERIFICATION BY THE GROUND.
R0053 THESE STORAGE CAPABILITIES ARE LIMITED ONLY TO THE PARAMETERS
R0054 FOR ONE THRUSTING MANEUVER AT A TIME EXCEPT FOR CONCENTRIC
R0055 FLIGHT PLAN MANEUVER SEQUENCES.

R0056 (4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R0057 OR CSM STATE VECTORS FOR THIS PROGRAM. IF RADAR USE IS
R0058 DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R0059 PREVIOUS SELECTION OF P20. RADAR SIGHTING MARKS WILL BE MADE
R0060 AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R0061 TRACK AND UPDATE FLAGS (SEE P20). THE RENDEZVOUS TRACKING
R0062 MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R0063 THRUSTING MANEUVER.

R0064 (5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0065 (6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0066 ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0067 DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0068 CALCULATES THE MANEUVER PARAMETERS. SET AT THE START OF
R0069 EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0070 FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0071 SELECTED THE FINAL MANEUVER COMPUTATION CYCLE.

R0072 EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0073 REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0074 PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0075 (7) ONCE THE PARAMETWRS REQUIRED FOR COMPUTION OF THE MANEUVER
R0076 HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0077 VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0078 THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0079 THROUGH THE USE OF V06N52.

R0080 THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0081 CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN

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R0082              170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0083              ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0084              UPON DELTA V AND EXPECTED MANEUVER TIME.

R0085          (8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0086                   P34 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0087                   P74 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0088    INPUT

R0089          (1) TTPI      TIME OF THE TPI MANEUVER
R0090          (2) ELEV      DESIRED LOS ANGLE AT TPI
R0091          (3) CENTANG   ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0092                        TRANSFER FROM TPI TO TIME OF INTERCEPT

R0093    OUTPUT

R0094          (1) TRKMKCNT NUMBER OF MARKS
R0095          (2) TTOGO    TIME TO GO
R0096          (3) +MGA     MIDDLE GIMBAL ANGLE
R0097          (4) TTPI     COMPUTED TIME OF TPI MANEUVER
R0098               OR
R0099               ELEV    COMPUTED LOS ANGLE AT TPI
R0100          (5) POSTTPI  PERIGEE ALTITUDE AFTER THE TPI MANEUVER
R0101          (6) DELVTPI  MAGNITUDE OF DELTA V AT TPI
R0102          (7) DELVTPF  MAGNITUDE OF DELTA V AT INTERCEPT
R0103          (8) DVLOS    DELTA VELOCITY AT TPI - LINE OF SIGHT
R0104          (9) DELVLVC  DELTA VELOCITY AT TPI - LOCAL VERTICAL COORDINATES

R0105    DOWNLINK

R0114          (1) TTPI     TIME OF THE TPI MANEUVER
R0115          (2) TIG      TIME OF THE TPI MANEUVER
R0116          (3) ELEV     DESIRED LOS ANGLE AT TPI
R0117          (4) CENTANG  ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0118                       TRANSFER FROM TPI TO TIME OF INTERCEPT
R0119          (5) DELVEET3 DELTA VELOCITY AT TPI - REFERENCE COORDINATES
R0120          (6) TPASS4   TIME OF INTERCEPT
R0121    COMMUNICATION TO THRUSTING PROGRAMS

R0122          (1) TIG      TIME OF THE TPI MANEUVER
R0123          (2) RTARG    OFFSET TARGET POSITION
R0124          (3) TPASS4   TIME OF INTERCEPT
R0125          (4) XDELVFLG RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0126    SUBROUTINES USED

R0127          AVFLAGA
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R0128           AVFLAGP
R0129           VNPOOH
R0130           DISPLAYE
R0131           SELECTMU
R0132           PRECSET
R0133           S33/34.1
R0134           ALARM
R0135           BANKCALL
R0136           GOFLASH
R0137           GOTOPOOH
R0138           TIMETHET
R0139           S34/35.2
R0140           PERIAPO1
R0141           SHIFTR1
R0142           S34/35.5
R0143           VN1645

 0144  REF  1                 35,2000                          SETLOC  CSI/CDH
 0145                         35,2000                          BANK
 0146  REF  4  LAST  267      E4,1760                          EBANK=  SUBEXIT
 0147  REF  1                                                  COUNT*  $$/P3474
 0148  REF  1                 35,2000  0 4553 0  P34           TC      AVFLAGA
 0149  REF  1                 35,2001  0 2003 0               TC      P34/P74A
 0150  REF  1                 35,2002  0 4565 0  P74           TC      AVFLAGP
 0150S REF  1                 35,2003  0 4572 0  P34/P74A      TC      P20FLGON
 0151  REF 43  LAST  459      35,2004  0 6006 1               TC      INTPRET
 0151S2                       35,2005   71214 0               CLEAR   DLOAD
 0151S4 REF  2  LAST  220     35,2006   05274 0                       TPIMNFLG
 0151S6 REF  1                35,2007   32205 1                       130DEG
 0151S8 REF  5  LAST  292     35,2010   17754 1               STODL   CENTANG
 0151S  REF  4  LAST  459     35,2011   15336 0                       ZEROVECS
 0151S2 REF  5  LAST  292     35,2012   03744 0               STORE   ELEV
 0151S4 REF  7  LAST  217     35,2013   03766 0               STORE   NN
 0151S5                       35,2014   77776 1               EXIT

 0151S6 REF  1                35,2015  3 4532 1               CAF     V06N37
 0152   REF  3  LAST  456     35,2016  0 5535 1               TC      VNFLASH
 0153   REF  1                35,2017  3 4533 0               CAF     V06N55
 0153S1 REF  4  LAST  466     35,2020  0 5535 1               TC      VNFLASH
 0154   REF 44  LAST  466     35,2021  0 6006 1               TC      INTPRET
 0155                         35,2022   71214 0               CLEAR   DLOAD
 0156   REF  2  LAST   51     35,2023   01270 0                       ETPIFLAG
 0157   REF  4  LAST  284     35,2024   03663 1                       TTPI
 0158   REF 17  LAST  284     35,2025   17413 1               STODL   TIG
 0159   REF  6  LAST  466     35,2026   03744 0                       ELEV
 0160                         35,2027   43054 1               BZE     SET
 0161   REF  1                35,2030   72032 0                       P34/P74B
 0162   REF  3  LAST  466     35,2031   01070 1                       ETPIFLAG
 0163                         35,2032   77624 1  P34/P74B     CALL
 0164   REF  1                35,2033   11217 0                       SELECTMU
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C165                                  0032                DELELO   EQUALS 260
C166                                35,2034   43145 0   P34/P74C DLOAD  SET
C167   REF   5  LAST  466           35,2035   15336 0              ZEROVECS
C168   REF   1                     35,2036   03461 1              ITSWICH
C169                               35,2037   43014 0         BON  CLEAR
C170   REF   4  LAST  466          35,2040   01310 1              ETPIFLAG
C171   REF   1                     35,2041   72043 0              SWCHSET
C172   REF   2  LAST  467          35,2042   03661 0              ITSWICH
C173   REF   1                     35,2043   02355 0   SWCHSET  STORE  NOMTPI
C174                               35,2044   43345 1   INTLOOP  DLOAD  DAD
C175   REF   5  LAST  466          35,2045   03663 1              TTPI
C176   REF   2  LAST  467          35,2046   02355 0              NOMTPI
C177   REF   3  LAST  456          35,2047   34041 0         STCALL TDEC1
C178   REF   1                     35,2050   45236 1              PRECSET
C179                               35,2051   77624 1         CALL
C180   REF   1                     35,2052   72251 1              S33/34.1
C181                               35,2053   77454 1         BZE    EXIT
C182   REF   1                     35,2054   72065 1              SWCHCLR
C183   REF  21  LAST  443          35,2055 0 5671 1   INTALM   TC     ALARM
C184                               35,2056   00611 1         OCT    611
C185   REF   1                     35,2057 3 5023 0         CAF    V05N09
C186   REF  87  LAST  462          35,2060 0 4636 0         TC     BANKCALL
C187   REF   9  LAST  462          35,2061   20743 0         CADR   GOFLASH
C188   REF  11  LAST  462          35,2062 0 4103 1         TC     GOTOPOOH
C189   REF   2  LAST  466          35,2063 0 2003 0         TC     P34/P74A        PROCEED
C190   REF   1                     35,2064 0 2055 0         TC     INTALM          V32
C191                               35,2065   43014 0   SWCHCLR  BONCLR BON
C192   REF   3  LAST  467          35,2066   03601 0              ITSWICH
C193   REF   1                     35,2067   72044 1              INTLOOP
C194   REF   5  LAST  467          35,2070   01310 1              ETPIFLAG
C195   REF   1                     35,2071   72100 0              P34/P74D        DISPLAY TTPI
C196                               35,2072   77776 1         EXIT
C197   REF   2  LAST  466          35,2073 3 4533 0         CAF    V06N55
C1971  REF   5  LAST  466          35,2074 0 5535 1         TC     VNFLASH
C198   REF  45  LAST  466          35,2075 0 6006 1         TC     INTPRET
C1985                              35,2076   77650 1         GOTO
C1986  REF   1                     35,2077   72120 1              P34/74E
C199                               35,2100   77776 1   P34/P74D EXIT
C200   REF   2  LAST  466          35,2101 3 4532 1         CAF    V06N37          TTPI
C201   REF   6  LAST  467          35,2102 0 5535 1         TC     VNFLASH
C202   REF  46  LAST  467          35,2103 0 6006 1   P34/P74E TC     INTPRET
C2021                              35,2104   43014 0         BOFF   BOFF
C20215 REF   1                     35,2105   01351 1              FINALFLG
C2022  REF   2  LAST  467          35,2106   72120 1              P34/74E         LAST PASS
C20225 REF   8  LAST  395          35,2107   05350 1              AUTOSEQ
C2023  REF   3  LAST  467          35,2110   72120 1              P34/74E
C20235                             35,2111   43145 0         DLOAD  CLEAR           IT IS FINAL COMP IN MINKEY
C2024  REF   6  LAST  467          35,2112   15336 0              ZEROVECS          SET UP FOR TIG OPTION
C20245 REF   6  LAST  467          35,2113   01270 0              ETPIFLAG
C2025  REF   7  LAST  466          35,2114   17744 0         STODL  ELEV
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020255	REF	6	LAST	467	35,2115	03663 1			TTPI	
02026	REF	18	LAST	466	35,2116	37413 0		STCALL	TIG	
020265	REF	1			35,2117	72034 0			P34/P74C	
0203					35,2120	71201 1	P34/74E	SETPD	DLOAD	
0204					35,2121	00001 0			0D	
0205	REF	2	LAST	130	35,2122	03746 1			RTX1	
0206	REF	2	LAST	442	35,2123	14047 1		STODL	X1	
0207	REF	6	LAST	466	35,2124	03754 1			CENTANG	
0208					35,2125	71406 0		PUSH	COS	
0209	REF	3	LAST	461	35,2126	16734 0		STODL	CSTH	
0210					35,2127	77756 0		SIN		
0211	REF	3	LAST	461	35,2130	26732 0		STOVL	SNTH	
0212	REF	4	LAST	220	35,2131	03554 0			RPASS3	
0213					35,2132	77657 0		VSR*		
0214					35,2133	57176 0			0,2	
0215	REF	2	LAST	461	35,2134	26657 1		STOVL	RVEC	
0216	REF	4	LAST	220	35,2135	03562 0			VPASS3	
0217					35,2136	43057 1		VSR*	SET	
0218					35,2137	57176 0			0,2	
0219	REF	2	LAST	461	35,2140	03466 0			RVSW	
0220	REF	3	LAST	461	35,2141	36746 1		STCALL	VVEC	
0221	REF	2	LAST	461	35,2142	25002 1			TIMETHET	
0222					35,2143	77745 1		DLOAD		
0223	REF	7	LAST	468	35,2144	03663 1			TTPI	
0224	REF	2	LAST	126	35,2145	03503 1		STORE	INTIME	FOR INITVEL
0225					35,2146	77615 0		DAD		
0226	REF	2	LAST	461	35,2147	00037 0			T	RENDEZVOUS TIME
0227	REF	4	LAST	185	35,2150	37656 0		STCALL	TPASS4	FOR INITVEL
0228	REF	2	LAST	220	35,2151	72561 0			S34/35 2	
0229					35,2152	51575 1		VLOAD	ABVAL	
0230	REF	5	LAST	185	35,2153	03646 0			DELVEET3	
0231	REF	4	LAST	292	35,2154	26635 0		STOVL	DELVTPI	
0232	REF	1			35,2155	03640 0			VPASS4	
0233					35,2156	51451 0		VSU	ABVAL	
0234	REF	3	LAST	127	35,2157	03620 0			VTPRIME	
0235	REF	4	LAST	292	35,2160	26637 1		STOVL	DELVTPF	
0236	REF	6	LAST	220	35,2161	03540 0			RACT3	
0237					35,2162	45115 0		PDVL	CALL	
0238	REF	3	LAST	127	35,2163	03612 1			VIPRIME	
0239	REF	1			35,2164	45174 1			PERIAPSI	
0240					35,2165	77624 1		CALL		
0241	REF	1			35,2166	45330 0			SHIFTR1	
0242	REF	3	LAST	292	35,2167	16641 0		STODL	PCSTTPI	
0243	REF	8	LAST	468	35,2170	03663 1			TTPI	
0244	REF	19	LAST	468	35,2171	03413 1		STORE	TIG	
0245					35,2172	77776 1		EXIT		
0246	REF	1			35,2173	3 4534 1		CAF	V06N58	
0247	REF	7	LAST	467	35,2174	0 5535 1		TC	VNFLASH	
0248	REF	47	LAST	467	35,2175	0 6006 1		TC	INTPRET	
0249					35,2176	77624 1		CALL		

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```
0250   REF   1              35,2177   72774 0                  S34/35 5
0251                        35,2200   77624 1          CALL
0252   REF   1              35,2201   73027 0                  VN1645
0253                        35,2202   77650 1          GOTO
0254   REF   2  LAST  468   35,2203   72034 0                  P34/P74C
02542                       35,2204   13434 0  130DEG  OCT      13434        13 DEG - CENTANG
02544                       35,2205   16163 1          OCT      16163
```

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R0255 RENDEZVOUS MID-COURSE MANEUVER PROGRAMS (P35 AND P75)

R0256 MOD NO -1 LOG SECTION - P32-P35, P72-P75
R0257 MOD BY WHITE.P DATE 1JUNE67

R0258 PURPOSE

R0259 (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0260 REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE NEXT
R0261 MIDCOURSE CORRECTION OF THE TRANSFER PHASE OF AN ACTIVE
R0262 VEHICLE RENDEZVOUS.

R0263 (2) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0264 VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0265 ASTRONAUT/GROUND.

R0266 (3) TO STORE THE TPM TARGET PARAMETERS FOR USE BY THE DESIRED
R0267 THRUSTING PROGRAM.

R0268 ASSUMPTIONS

R0269 (1) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0270 (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0271 STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (3)).

R0272 (3) THE RENDEZVOUS RADAR IS ON AND IS LOCKED ON THE CSM. THIS WAS
R0273 DONE DURING PREVIOUS SELECTION OF P20. RADAR SIGHTING MARKS
R0274 WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN
R0275 ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE
R0276 RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF
R0277 P20 AND AFTER EACH THRUSTING MANEUVER.

R0278 (4) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0279 ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0280 DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0281 CALCULATES THE MANEUVER PARAMETERS. SET AT THE START OF
R0282 EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0283 FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0284 SELECTED THE FINAL MANEUVER COMPUTATION CYCLE

R0285 EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0286 REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0287 PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0288 (5) THE TIME OF INTERCEPT (T(INT)) WAS DEFINED BY PREVIOUS
R0289 COMPLETION OF THE TRANSFER PHASE INITIATION (TPI) PROGRAM
R0290 (P34/P74) AND IS PRESENTLY AVAILABLE IN STORAGE.

```
R0291          (6) ONCE THE PARAMETERS REQUIRED FOR COMPUTION OF THE MANEUVER
R0292              HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0293              VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0294              THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0295              THROUGH THE USE OF V06N52.

R0296              THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0297              CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN
R0298              170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0299              ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0300              UPON DELTA V AND EXPECTED MANEUVER TIME.

R0301          (7) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0302                  P35 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0303                  P75 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0304    INPUT

R0305          (1) TPASS4   TIME OF INTERCEPT - SAVED FROM P34/P74
R0306    OUTPUT

R0307          (1) TRKMKCNT NUMBER OF MARKS
R0308          (2) TTOGO    TIME TO GO
R0309          (3) +MGA     MIDDLE GIMBAL ANGLE
R0310          (4) DVLOS    DELTA VELOCITY AT MID - LINE OF SIGHT
R0311          (5) DELVLVC  DELTA VELOCITY AT MID - LOCAL VERTICAL COORDINATES

R0312    DOWNLINK

R0325          (1) TIG      TIME OF THE TPM MANEUVER
R0326          (2) DELVEET3 DELTA VELOCITY AT TPM - REFERENCE COORDINATES
R0327          (3) TPASS4   TIME OF INTERCEPT
R0328    COMMUNICATION TO THRUSTING PROGRAMS

R0329          (1) TIG      TIME OF THE TPM MANEUVER
R0330          (2) RTARG    OFFSET TARGET POSITION
R0331          (3) TPASS4   TIME OF INTERCEPT
R0332          (4) XDELVFLG RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0333    SUBROUTINES USED

R0334          AVFLAGA
R0335          AVFLAGP
R0336          LOADTIME
R0337          SELECTMU
R0338          PRECSET
R0339          S34/35.1
R0340          S34/35.2
```

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RC341          S34/35.5
RC342          VN1645

C343   REF  1                                          COUNT*  $$/P3575
C344   REF  5  LAST   96   E4,1754                     EBANK=  KT

C345   REF  2  LAST  466   35,2206  0 4553 0  P35     TC      AVFLAGA
C346                       35,2207  0 0006 1          EXTEND
C347   REF  1              35,2210  3 1422 1          DCA     ATIGINC
C348   REF  1              35,2211  0 2215 0          TC      P35/P75A
C349   REF  2  LAST  466   35,2212  0 4565 0  P75     TC      AVFLAGP
C350                       35,2213  0 0006 1          EXTEND
C351   REF  1              35,2214  3 1424 1          DCA     PTIGINC
C352   REF  6  LAST  472   35,2215  53'755 0 P35/P75A DXCH    KT
C3525  REF  2  LAST  466   35,2216  0 4572 0          TC      P20FLGON    SET UPDATFLG, TRACKFLG
C353   REF 48  LAST  468   35,2217  0 6006 1          TC      INTPRET
C359                       35,2220   77624 1          CALL
C360   REF  2  LAST  466   35,2221   11217 0                  SELECTMU
C361                       35,2222   77634 0  P35/P75B RTB
C362   REF  4  LAST  458   35,2223   51751 0                  LOADTIME
C3621  REF  2  LAST  129   35,2224   03665 1          STORE   TSTRT
C3622                      35,2225   77615 0          DAD
C3623  REF  7  LAST  472   35,2226   02355 0                  KT
C3624  REF 20  LAST  468   35,2227   03413 1          STORE   TIG
C363   REF  3  LAST  468   35,2230   03503 1          STORE   INTIME     FOR INITVEL
C364   REF  4  LAST  467   35,2231   34041 0          STCALL  TDEC1
C365   REF  2  LAST  467   35,2232   45236 1                  PRECSET     ADVANCE BOTH VEHICLES
C366                       35,2233   77624 1          CALL
C367   REF  2  LAST  220   35,2234   74000 1                  S34/35.1    GET NORM AND LOS FOR TRANSFORM
C368                       35,2235   77624 1          CALL
C369   REF  3  LAST  468   35,2236   72561 0                  S34/35.2    GET DELTA V(LV)
C370                       35,2237   77624 1          CALL
C371   REF  2  LAST  469   35,2240   72774 0                  S34/35.5
C3711                      35,2241   43014 0          BOFF    SET
C3712  REF  2  LAST  467   35,2242   01351 1                  FINALFLG
C3713                      35,2243   72245 1                  +2
C3714  REF  1              35,2244   05067 0                  P35FLAG
C372                       35,2245   77624 1          CALL
C373   REF  2  LAST  469   35,2246   73027 0                  VN1645
C379                       35,2247   77650 1          GOTO
C380   REF  1              35,2250   72222 0                  P35/P75B
```

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P0381   ..... S33/34.1 .....

 0382                          35,2251  66220 1  S33/34.1 STQ     SSP
 0383   REF   1                35,2252  01023 1           NORMEX
 0384   REF   2  LAST  133     35,2253  03665 1           TITER
 0385                          35,2254  40000 0           OCT     40000
 0386                          35,2255  40345 1           DLOAD   SETPD
 0387   REF   1                35,2256  33145 1           MAX25D
 0388                          35,2257  00001 0           DD
 0389   REF   2  LAST  126     35,2260  27454 1           STOVL   SECMAX
 0390   REF   7  LAST  468     35,2261  03540 0           RACT3
 0391   REF   1                35,2262  27576 0           STOVL   RAPREC
 0392   REF   5  LAST  220     35,2263  03546 0           VACT3
 0393   REF   1                35,2264  27570 0           STOVL   VAPREC
 0394   REF   5  LAST  468     35,2265  03554 0           RPASS3
 0395   REF   1                35,2266  27620 0           STOVL   RPPREC
 0396   REF   5  LAST  468     35,2267  03562 0           VPASS3
 0397   REF   1                35,2270  03612 1           STORE   VPPREC
 0398                          35,2271  77624 1  ELCALC   CALL
 0399   REF   3  LAST  472     35,2272  74000 1           S34/35.1        NORMAL AND LOS
 0400                          35,2273  63235 0           VXV     PDVL
 0401   REF   8  LAST  473     35,2274  03540 0           RACT3           (RA*VA)*RA OD
 0402                          35,2275  53515 0           PDVL    UNIT    ULOS AT 6D
 0403   REF   9  LAST  473     35,2276  03540 0           RACT3
 0404                          35,2277  46315 1           PDVL    VPROJ   XCHNJ AND UP
 0405                          35,2300  51352 1           VSL2    BVSU
 0406   REF   2  LAST   97     35,2301  02625 1           ULOS
 0407                          35,2302  63256 0           UNIT    PDVL    UP AT OD
 0408                          35,2303  63241 0           DOT     PDVL    UP.UN*RA AT OD
 0409                          35,2304  00001 0           DD              UP IN MPAC
 0410                          35,2305  75241 1           DOT     SIGN
 0411   REF   3  LAST  473     35,2306  02625 1           ULOS
 0412                          35,2307  65552 0           SL1     ACOS
 0413                          35,2310  50315 0           PDVL    DOT     EA AT OD
 0414   REF   4  LAST  473     35,2311  02625 1           ULOS
 0415   REF  10  LAST  473     35,2312  03540 0           RACT3
 0416                          35,2313  71244 0           BPL     DLOAD
 0417   REF   1                35,2314  72317 1           TESTY
 0418   REF   4  LAST  460     35,2315  15344 0           DPPOSMAX
 0419                          35,2316  41425 1           DSU     PUSH
 0420                          35,2317  71214 0  TESTY    BOFF    DLOAD
 0421   REF   4  LAST  467     35,2320  03741 0           ITSWICH
 0422   REF   1                35,2321  72546 0           ELEX
 0423   REF   2  LAST  126     35,2322  03452 1           DELEL
 0424   REF   1                35,2323  14033 1           STODL   DELELD
 0425                          35,2324  77625 0           DSU
 0426   REF   8  LAST  467     35,2325  03744 0           ELEV
 0427   REF   3  LAST  473     35,2326  03452 1           STORE   DELEL
 0428                          35,2327  45246 0           ABS     DSU
 0429   REF   1                35,2330  33151 1           ELEPS
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0430                          35,2331  77640 0          BMN
0431  REF   1                 35,2332  72556 1                   TIMEX     COMMERCIALS EVERYWHERE
0432                          35,2333  70535 0  FIGTIME  SLOAD   SR1
0433  REF   3  LAST  473      35,2334  03665 1                   TITER
0434                          35,2335  72030 1          BHIZ     LXA,1
0435  REF   2  LAST  473      35,2336  01023 1                   NORMEX    TOO MANY ITERATIONS
0436  REF 227  LAST  453      35,2337  00154 1                   MPAC
0437                          35,2340  77330 1          SXA,1    VLOAD
0438  REF   4  LAST  474      35,2341  03664 0                   TITER
0439  REF   6  LAST  473      35,2342  03554 0                   RPASS3
0440                          35,2343  65256 0          UNIT     PDDL
0441                          35,2344  00045 0                   36D
0442                          35,2345  53515 0          PDVL     UNIT
0443  REF  11  LAST  473      35,2346  03540 0                   RACT3
0444                          35,2347  77725 1          PDDL
0445                          35,2350  41525 0          PDDL     PUSH
0446                          35,2351  00045 0                   36D
0447                          35,2352  77621 1          BDSU
0448                          35,2353  00015 0                   12D
0449                          35,2354  14037 0          STODL    30D       RP - RA MAGNITUDES
0450  REF   9  LAST  461      35,2355  15334 1                   DPHALF
0451                          35,2356  41425 1          DSU      PUSH
0452  REF   9  LAST  473      35,2357  03744 0                   ELEV
0453                          35,2360  50165 0          SIGN     BMN
0454                          35,2361  00037 0                   30D
0455  REF   3  LAST  474      35,2362  01023 1                   NORMEX
0456                          35,2363  71545 0          DLOAD    COS
0457                          35,2364  56205 0          DMP      DDV
0458                          35,2365  00017 1                   14D
0459                          35,2366  00015 0                   12D
0460                          35,2367  77676 0          DCOMP               SINCE COS(180-A)=-COS A
0461                          35,2370  00035 1          STORE    28D
0462                          35,2371  44246 1          ABS      BDSU
0463  REF  10  LAST  474      35,2372  15334 1                   DPHALF
0464                          35,2373  77240 1          BMN      VLOAD
0465  REF   4  LAST  474      35,2374  01023 1                   NORMEX
0466  REF   2  LAST   97      35,2375  02617 0                   UNRM
0467                          35,2376  53435 0          VXV      UNIT
0468                          35,2377  00007 0                   6D        UN*RA
0469                          35,2400  41241 0          DOT      DMP
0470  REF   6  LAST  473      35,2401  03546 0                   VACT3
0471                          35,2402  00015 0                   12D
0472                          35,2403  47315 0          PDVL     VXV
0473                          35,2404  00001 0                   0D
0474  REF   6  LAST  473      35,2405  03562 0                   VPASS3
0475                          35,2406  53435 0          VXV      UNIT
0476                          35,2407  00001 0                   0D        (RP*VP)*RP
0477                          35,2410  41241 0          DOT      DMP
0478  REF   7  LAST  474      35,2411  03562 0                   VPASS3
0479                          35,2412  00017 1                   14D
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0480                          35,2413  77621 1          BDSU
0481                          35,2414  63301 0          NORM    PDVL            NORMALIZED WA - WP 12D
0482  REF   3  LAST  468      35,2415  00047 1                  X1
0483                          35,2416  00007 0                  6D
0484                          35,2417  50235 0          VXV     DOT
0485                          35,2420  00001 0                  0D
0486  REF   3  LAST  474      35,2421  02617 0                  UNRM            RA*RP.UN 14D
0487                          35,2422  50315 0          PDVL    DOT
0488                          35,2423  00001 0                  0D
0489                          35,2424  00007 0                  6D
0490                          35,2425  65552 0          SL1     ACOS
0491                          35,2426  77765 0          SIGN
0492                          35,2427  43225 0          DSU     DAD             ALPHA   PI
0493  REF  11  LAST  474      35,2430  15334 1                  DPHALF
0494  REF  10  LAST  474      35,2431  03744 0                  ELEV
0495                          35,2432  65525 0          PDDL    ACOS
0496                          35,2433  00035 1                  28D
0497                          35,2434  75221 1          BDSU    SIGN
0498  REF  12  LAST  475      35,2435  15334 1                  DPHALF
0499                          35,2436  00037 0                  30D             CONTAINS RP-RA
0500                          35,2437  77615 0          DAD
0501                          35,2440  56205 0          DMP     DDV
0502  REF   1                 35,2441  33143 1                  TWOPI
0503                          35,2442  77605 1          DMP
0504                          35,2443  41257 1                  SL*     DMP
0505                          35,2444  20176 0                  0 -3,1
0506                          35,2445  51406 1          PUSH    ABS
0507                          35,2446  50025 0          DSU     BMN
0508  REF   3  LAST  473      35,2447  03454 1                  SECMAX
0509  REF   1                 35,2450  72454 1                  OKMAX
0510                          35,2451  75345 1          DLOAD   SIGN            REPLACE TIME WITH MAX TIME SIGNED
0511  REF   4  LAST  475      35,2452  03454 1                  SECMAX
0512                          35,2453  77606 1          PUSH
0513                          35,2454  51135 1  OKMAX   SLOAD   BPL             TEST FIRST ITERATION
0514  REF   5  LAST  474      35,2455  03665 1                  TITER
0515  REF   1                 35,2456  72464 1                  REPETE
0516                          35,2457  71331 0          SSP     DLOAD
0517  REF   6  LAST  475      35,2460  03665 1                  TITER
0518                          35,2461  37777 1          OCT     37777
0519                          35,2462  77650 1          GOTO
0520  REF   1                 35,2463  72522 1                  STORDELT
0521                          35,2464  41345 0  REPETE  DLOAD   DMP
0522  REF   4  LAST  473      35,2465  03452 1                  DELEL
0523  REF   2  LAST  473      35,2466  00033 1                  DELELO
0524                          35,2467  71244 0          BPL     DLOAD
0525  REF   1                 35,2470  72500 1                  NEXTES
0526  REF   5  LAST  475      35,2471  03454 1                  SECMAX
0527                          35,2472  77605 1          DMP
0528  REF   1                 35,2473  33147 0                  THIRD
0529  REF   6  LAST  475      35,2474  17454 1          STODL   SECMAX
```

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0530                          35,2475  70446 0             ABS     SR1          CROSSED OVER SOLUTION
0531                          35,2476  52076 1             DCOMP   GOTO         DT=(-SIGN(DTO)//DT//)/2
0532  REF   1                 35,2477  72510 0                     RESIGN
0533                          35,2500  51545 1  NEXTES     DLOAD   ABS
0534  REF   5  LAST  475      35,2501  03452 1                     DELEL
0535                          35,2502  51525 1             PDDL    ABS
0536  REF   3  LAST  475      35,2503  00033 1                     DELELO
0537                          35,2504  77625 0             DSU
0538                          35,2505  71240 1             BMN     DLOAD
0539  REF   1                 35,2506  72513 0                     REVERS       WRONG DIRECTION
0540                          35,2507  77646 0             ABS
0541                          35,2510  52165 1  RESIGN     SIGN    GOTO
0542  REF   2  LAST  126      35,2511  03450 0                     DELTEEO
0543  REF   2  LAST  475      35,2512  72522 1                     STORDELT
0544                          35,2513  57545 1  REVERS     DLOAD   DCOMP
0545  REF   3  LAST  476      35,2514  03450 0                     DELTEEO
0546                          35,2515  70406 1             PUSH    SR1
0547  REF   4  LAST  476      35,2516  03450 0             STORE   DELTEEO
0548                          35,2517  77615 0             DAD
0549                          35,2520  77650 1             GOTO
0550  REF   1                 35,2521  72523 0                     ADTIME
0551  REF   5  LAST  476      35,2522  03450 0  STORDELT   STORE   DELTEEO
0552                          35,2523  77615 0  ADTIME     DAD
0553  REF   3  LAST  467      35,2524  02355 0                     NOMTPI       SUM OF DELTA T:S
0554  REF   4  LAST  476      35,2525  02355 0             STORE   NOMTPI
0555                          35,2526  63375 0             VLOAD   PDVL
0556  REF   2  LAST  473      35,2527  03570 0                     VAPREC
0557  REF   2  LAST  473      35,2530  03576 0                     RAPREC
0558                          35,2531  77624 1             CALL
0559  REF   1                 35,2532  72734 1                     GOINT
0560                          35,2533  77624 1             CALL
0561  REF   1                 35,2534  45304 1                     ACTIVE       STORE NEW RACT3 VACT3
0562                          35,2535  63375 0             VLOAD   PDVL
0563  REF   2  LAST  473      35,2536  03612 1                     VPPREC
0564  REF   2  LAST  473      35,2537  03620 0                     RPPREC
0565                          35,2540  77624 1             CALL
0566  REF   2  LAST  476      35,2541  72734 1                     GOINT
0567                          35,2542  77624 1             CALL
0568  REF   1                 35,2543  45314 0                     PASSIVE      STORE NEW RPASS3 VPASS3
0569                          35,2544  77650 1             GOTO
0570  REF   1                 35,2545  72271 0                     ELCALC
0571                          35,2546  43345 1  ELEX       DLOAD   DAD
0572  REF   9  LAST  468      35,2547  03663 1                     TTPI
0573  REF   5  LAST  476      35,2550  02355 0                     NOMTPI
0574  REF  10  LAST  476      35,2551  17663 1             STODL   TTPI
0575                          35,2552  77614 1             BON
0576  REF   7  LAST  467      35,2553  01310 1                     ETPIFLAG
0577  REF   2  LAST  474      35,2554  72556 1                     TIMEX
0578  REF  11  LAST  475      35,2555  03744 0             STORE   ELEV
0579                          35,2556  52145 0  TIMEX      DLOAD   GOTO
```

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```
0580   REF   7  LAST  467   35,2557   15336 0        ZEROVECS
0581   REF   5  LAST  474   35,2560   01023 1        NORMEX
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P0582   ..... S34/35.1 .....

R0583   COMPUTE UNIT NORMAL AND LINE OF SIGHT VECTORS GIVEN THE ACTIVE AND
R0584   PASSIVE POS AND VEL AT TIME T3
 05845  REF   1                 36,2000                          SETLOC  S3435LOC
 05846                          36,2000                          BANK

 05848  REF   1                                                  COUNT*  $$/P3474
 0585                           36,2000   52375 1   S34/35.1    VLOAD   VSU
 0586   REF   7  LAST  474      36,2001   03554 0                       RPASS3
 0587   REF  12  LAST  474      36,2002   03540 0                       RACT3
 0588                           36,2003   41456 0                 UNIT  PUSH
 0589   REF   5  LAST  473      36,2004   26625 1                 STOVL ULOS
 0590   REF  13  LAST  478      36,2005   03540 0                       RACT3
 0591                           36,2006   53435 0                 VXV   UNIT
 0592   REF   7  LAST  474      36,2007   03546 0                       VACT3
 0593   REF   4  LAST  475      36,2010   02617 0                 STORE UNRM
 0594                           36,2011   77616 0                 RVQ
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P0595   ..... S34/35.2 .....

R0596   ADVANCE PASSIVE VEH TO RENDEZVOUS TIME AND GET REQ VEL FROM LAMBERT
 05965  REF   2  LAST  466   35,2000                        SETLOC  CSI/CDH
 05966                       35,2561                        BANK

 05968  REF   2 LAST  466 TO  472:   134   134*             COUNT*  $$/P3474
 0597                        35,2561   77220 1  S34/35.2    STQ     VLOAD
 0598   REF   5  LAST  466   35,2562   02360 0                      SUBEXIT
 0599   REF   8  LAST  474   35,2563   03562 0                      VPASS3
 0600                        35,2564   65315 0              PDVL    PDDL
 0601   REF   8  LAST  478   35,2565   03554 0                      RPASS3
 0602   REF   4  LAST  472   35,2566   03503 1                      INTIME
 0603                        35,2567   65325 0              PDDL    PDDL
 0604   REF   5  LAST  468   35,2570   03656 1                      TPASS4
 0605   REF   2  LAST  475   35,2571   33143 1                      TWOPI           CONIC
 0606                        35,2572   46125 0              PDDL    BHIZ
 06061  REF   8  LAST  466   35,2573   03766 0                      NN
 06062  REF   1               35,2574   72577 1                      S3435.23
 06063                       35,2575   65345 0              DLOAD   PDDL
 06065  REF   8  LAST  477   35,2576   15336 0                      ZEROVECS        PRECISION
 06066                       35,2577   77624 1  S3435.23    CALL
 0607   REF   1               35,2600   72740 1                      INTINT          GET TARGET VECTOR
 0608   REF   6  LAST  217   35,2601   27415 1  S3435.25    STOVL   RTARG
 0609   REF   2  LAST  457   35,2602   00007 0                      VATT
 0610   REF   2  LAST  468   35,2603   27640 0              STOVL   VPASS4
 0611   REF   7  LAST  479   35,2604   03415 1                      RTARG

R0612   COMPUTE PHI = PI +(ACOS(UNIT RA.UNIT RP)-PI)SIGN(RA*RP.U)
 0613                        35,2605   63256 0              UNIT    PDVL            UNIT RP
 0614   REF  14  LAST  478   35,2606   03540 0                      RACT3
 0615                        35,2607   41456 0              UNIT    PUSH            UNIT RA
 0616                        35,2610   50235 0              VXV     DOT
 0617                        35,2611   00001 0                      0D
 0618   REF   5  LAST  478   35,2612   02617 0                      UNRM            RA*RP.U
 0619                        35,2613   77715 1              PDVL
 0620                        35,2614   72441 0              DOT     SL1             UNIT RA.UNIT RP
 0621                        35,2615   00001 0                      0D
 0622                        35,2616   75326 1              ACOS    SIGN
 0623                        35,2617   43244 1              BPL     DAD
 0624   REF   1               35,2620   72622 1                      NOPIE
 0625   REF   5  LAST  473   35,2621   15344 0                      DPPOSMAX        REASONABLE TWO PI
 0626   REF   3  LAST  292   35,2622   16633 0  NOPIE       STODL   ACTCENT
 0627   REF   6  LAST  479   35,2623   03656 1                      TPASS4
 0628                        35,2624   77625 0              DSU
 0629   REF   5  LAST  479   35,2625   03503 1                      INTIME
 0630   REF   4  LAST  185   35,2626   03423 1              STORE   DELLT4
 0631                        35,2627   40335 0              SLOAD   SETPD
 0632   REF   9  LAST  479   35,2630   03766 0                      NN              NUMBER OF OFFSETS
 0633                        35,2631   00001 0                      0D
 06331                       35,2632   63325 0              PDDL    PDVL
```

```
06332  REF   1                    35,2633   33156 0          EPSFOUR
06333  REF  15  LAST  479          35,2634   03540 0          RACT3
06334  REF   3  LAST  127          35,2635   27570 0  STOVL   RINIT
06335  REF   8  LAST  478          35,2636   03546 0          VACT3
06336  REF   3  LAST  127          35,2637   37576 1  STCALL  VINIT
06337  REF   1                    35,2640   22000 1          INITVEL
0634                               35,2641   77624 1  CALL
0635   REF   1                    35,2642   72721 0          LOMAT
0636                               35,2643   64375 1  VLOAD   MXV
0637   REF   6  LAST  468          35,2644   03646 0          DELVEET3
0638                               35,2645   00001 0          OD
0639                               35,2646   77772 0  VSL1
0640   REF  10  LAST  294          35,2647   37405 1  STCALL  DELVLVC
0641   REF   6  LAST  479          35,2650   02360 0          SUBEXIT
```

P0642 ..... S34/35.3 .....

```
0643                          35,2651  45020 1  S34/35.3 STQ     CALL
0644  REF   6  LAST  477      35,2652  01023 1                   NORMEX
0645  REF   2  LAST  480      35,2653  72721 0                   LOMAT      GET MATRIX IN PUSH LIST
0646                          35,2654  61375 1           VLOAD   VXM
0647  REF  11  LAST  480      35,2655  03405 0                   DELVLVC    NEW DEL V TPI
0648                          35,2656  00001 0                   OD
0649                          35,2657  77772 0           VSL1
0650  REF   7  LAST  480      35,2660  03646 0           STORE   DELVEET3   SAVE FOR TRANSFORM
0651                          35,2661  63255 0           VAD     PDVL
0652  REF   9  LAST  480      35,2662  03546 0                   VACT3      NEW V REQ
0653  REF  16  LAST  480      35,2663  03540 0                   RACT3
0654                          35,2664  65325 0           PDDL    PDDL
0655  REF  21  LAST  472      35,2665  03413 1                   TIG
0656  REF   7  LAST  479      35,2666  03656 1                   TPASS4
0657                          35,2667  41525 0           PDDL    PUSH
0658  REF   6  LAST  479      35,2670  15344 0                   DPPOSMAX
0659                          35,2671  77624 1           CALL                INTEG. FOR NEW TARGET VEC
0660  REF   2  LAST  479      35,2672  72740 1                   INTINT
0661                          35,2673  77775 1           VLOAD
0662  REF   3  LAST  457      35,2674  00001 0                   RATT
0663  REF   8  LAST  479      35,2675  03415 1           STORE   RTARG
0664                          35,2676  41575 0  NOVRWRT  VLOAD   PUSH
0665  REF   6  LAST  478      35,2677  02625 1                   ULOS
0666                          35,2700  57435 1           VXV     VCOMP
0667  REF   6  LAST  479      35,2701  02617 0                   UNRM
0668                          35,2702  41456 0           UNIT    PUSH
0669                          35,2703  76435 1           VXV     VSL1
0670  REF   7  LAST  481      35,2704  02625 1                   ULOS
0671                          35,2705  77715 1           PDVL
0672                          35,2706  64315 1           PDVL    MXV
0673  REF   8  LAST  481      35,2707  03646 0                   DELVEET3
0674                          35,2710  00001 0                   OD
0675                          35,2711  77772 0           VSL1
0676  REF   7  LAST  292      35,2712  36611 1           STCALL  DVLOS
0677  REF   7  LAST  481      35,2713  01023 1                   NORMEX
```

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```
P0678   ..... S34/35.4 .....

 0679                        35,2714  40220 0  S34/35.4 STQ    SETPD          NO ASTRONAUT OVERWRITE
 0680   REF   8  LAST  481   35,2715  01023 1                  NORMEX
 0681                        35,2716  00001 0                  CD
 0682                        35,2717  77650 1           GOTO
 0683   REF   1              35,2720  72676 0                  NOVRWRT
```

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P0684 ..... LOMAT .....

```
0685                          35,2721  57575 1  LOMAT   VLOAD   VCOMP
0686  REF   7 LAST  481      35,2722  02617 0           UNRM
0687                          35,2723  24007 0          STOVL   6D          Y
0688  REF  17 LAST  481      35,2724  03540 0           RACT3
0689                          35,2725  57456 1          UNIT    VCOMP
0690                          35,2726  00015 0          STORE   12D
0691                          35,2727  76435 1          VXV     VSL1
0692  REF   8 LAST  483      35,2730  02617 0           UNRM    Z*-Y
0693                          35,2731  00001 0          STORE   0D
0694                          35,2732  43401 0          SETPD   RVQ
0695                          35,2733  00023 0                  18D
0696                          35,2734  65325 0  GOINT   PDDL    PDDL        DO
0697  REF   9 LAST  479       35,2735  15336 0                  ZEROVECS      NOT
0698  REF   6 LAST  476       35,2736  02355 0                  NOMTPI
0699                          35,2737  41406 0          PUSH    PUSH                ORDER OR INSERT BEFORE INTINT
0700                          35,2740  45020 1  INTINT  STQ     CALL
0701  REF   2 LAST   95       35,2741  02357 1                  RTRN
0702  REF   7 LAST  456       35,2742  27516 0                  INTSTALL
0703                          35,2743  71214 0          CLEAR   DLOAD
0704  REF   2 LAST  456       35,2744  01673 1                  INTYPFLG
0705                          35,2745  43054 1          BZE     SET
0706                          35,2746  72750 0                  +2
0707  REF   3 LAST  483       35,2747  01473 0                  INTYPFLG
0708                          35,2750  45545 1          DLOAD   STADR
0709  REF   5 LAST  472       35,2751  63736 0          STODL   TDEC1
0710                          35,2752  73014 0          SET     LXA,2
0711  REF   3 LAST  457       35,2753  00063 1                  MOONFLAG
0712  REF   2 LAST  130       35,2754  03746 1                  RTX2
0713                          35,2755  43014 0          BON     CLEAR
0714  REF   6 LAST  461       35,2756  04303 0                  CMOONFLG
0715  REF   1                 35,2757  72761 1                  ALLSET
0716  REF   4 LAST  483       35,2760  00263 0                  MOONFLAG
0717  REF   7 LAST  457       35,2761  25517 0  ALLSET  STOVL   TET
0718                          35,2762  77657 0          VSR*
0719                          35,2763  57176 0                  0,2
0720  REF   5 LAST  457       35,2764  25535 0          STOVL   RCV
0721                          35,2765  77657 0          VSR*
0722                          35,2766  57176 0                  0,2
0723  REF   5 LAST  457       35,2767  35543 0          STCALL  VCV
0724  REF   2 LAST  457       35,2770  27211 0                  INTEGRVS
0725                          35,2771  52175 0          VLOAD   GOTO
0726  REF   4 LAST  481       35,2772  00001 0                  RATT
0727  REF   3 LAST  483       35,2773  02357 1                  RTRN
```

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P0728   ..... S34/35.5 .....
R0729   SUBROUTINES USED

R0730           BANKCALL
R0731           GOFLASH
R0732           GOTOPOOH
R0733           S34/35.3
R0734           S34/35.4
R0735           VNPOOH

 0736                                   35,2774   43020 1  S34/35.5 STQ     BON
 0737   REF   7  LAST  480              35,2775   02360 0                    SUBEXIT
 0738   REF   3  LAST  472              35,2776   01311 0                    FINALFLG
 0739   REF   1                        35,2777   73003 0                    FLAGON
 0740                                   35,3000   52014 0           SET      GOTO
 0741   REF   2  LAST  270              35,3001   00470 1                    UPDATFLG
 0742   REF   2  LAST  484              35,3002   73005 0                    FLAGON +2
 C7422                                  35,3003   77614 1  FLAGON   SET
 07424  REF   3  LAST  466              35,3004   05074 1                    TPIMNFLG       INDICATE TPI MANEUVER DONE
 0743                                   35,3005   77775 1        +2 VLOAD
 0744   REF  12  LAST  481              35,3006   03405 0                    DELVLVC
 0745   REF   4  LAST  468              35,3007   03620 0           STORE    VTPRIME        SAVE DELTA V BEFORE DISPLAY
 0746                                   35,3010   77776 1           EXIT
 0747   REF   1                        35,3011  3 4535 0           CAF      V06N81
 0748   REF   8  LAST  468              35,3012  0 5535 1           TC       VNFLASH
 0749   REF  49  LAST  472              35,3013  0 6006 1           TC       INTPRET
 0750                                   35,3014   52375 1           VLOAD    VSU            TEST FOR OVERWRITE OF COMPUTED
 0751   REF  13  LAST  484              35,3015   03405 0                    DELVLVC                DELTA V
 0752   REF   5  LAST  484              35,3016   03620 0                    VTPRIME
 0753                                   35,3017   53046 0           ABVAL    BZE
 0754   REF   1                        35,3020   73023 1                    FLAGOFF
 0755                                   35,3021   77624 1           CALL
 0756   REF   1                        35,3022   72651 0                    S34/35.3       COMPUTE NEW TARGET VECTOR
R0762   TRANSFER OF DELVEET3 TO DELVSIN OUT...THEY SHARE SAME ERASABLE.
 0763                                   35,3023   77624 1  FLAGOFF  CALL
 0764   REF   1                        35,3024   72714 0                    S34/35.4
 0769                                   35,3025   77650 1  FLAGEND  GOTO
 0770   REF   8  LAST  484              35,3026   02360 0                    SUBEXIT
```

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PC771   ..... VN1645  .....

R0772   SUBROUTINES USED

R0773           P3XORP7X
R0774           GET+MGA
R0775           BANKCALL
R0776           DELAYJOB
R0777           COMPTGO
R0778           GOFLASHR
R0779           GOTOPOOH
R0780           FLAGUP

 0781                                35,3027  71220 1  VN1645  STQ     DLOAD
 0782   REF   9  LAST  484          35,3030  02360 0          TC      SUBEXIT
 0783   REF   1                     35,3031  33154 1          DP      -.01
 0784   REF   3  LAST  292          35,3032  03626 0          STORE   +MGA           MGA = -.01
 0785                                35,3033  71214 0          BOFF    DLOAD
 0786   REF   4  LAST  484          35,3034  01351 1          TC      FINALFLG
 0787   REF   1                     35,3035  73055 0          TC      GET45
 0788   REF   2  LAST  485          35,3036  33154 1          DP      -.01
 0789                                35,3037  77615 0          DAD
 0790   REF   3  LAST  485          35,3040  33154 1          DP      -.01
 0791   REF   4  LAST  485          35,3041  03626 0          STORE   +MGA           MGA = -.02
 0792                                35,3042  77414 0          BOFF    EXIT
 0793   REF   1                     35,3043  01742 1          TC      REFSMFLG
 0794   REF   2  LAST  485          35,3044  73055 0          TC      GET45
 0795   REF   1                     35,3045  0 3137 1         TC      P3XORP7X
 0796                               35,3046  0 3050 1         TC      +2            P3X
 0797   REF   3  LAST  485          35,3047  0 3056 1         TC      GET45 +1      P7X
 0798   REF  50  LAST  484          35,3050  0 6006 1         TC      INTPRET
 0799                               35,3051   41575 0         VLOAD   PUSH
 0800   REF   3  LAST  127          35,3052   03646 0                 DELVSIN
 0801                               35,3053   77624 1         CALL                  COMPUTE MGA
 0802   REF   1                     35,3054   56444 0                 GET+MGA
 0803                               35,3055   77776 1  GET45  EXIT
 0804   REF   1                     35,3056  0 3525 0   +1    TC      COMPTGO       INITIATE TASK TO UPDATE TTOGO
 0805   REF  10  LAST  485          35,3057  3 1760 1         CA      SUBEXIT
 0806   REF   3  LAST   95          35,3060  55'756 0         TS      QSAVED
 0808   REF  88  LAST  467          35,3061  0 4636 0         TC      BANKCALL
 0809   REF   1                     35,3062   01730 1         CADR    1SECDELY
 0810   REF   1                     35,3063  3 4536 0         CAF     V16N45        TRKMKCNT, TTOGO, +MGA
 0811   REF  89  LAST  485          35,3064  0 4636 0         TC      BANKCALL
 0812   REF  10  LAST  467          35,3065   20743 0         CADR    GOFLASH
 0813   REF  12  LAST  467          35,3066  0 4103 1         TC      GOTOPOOH      TERMINATE
 0814   REF   1                     35,3067  0 3071 1         TC      N45PROC       PROCEED
 0815   REF   1                     35,3070  0 3101 1         TC      CLUPDATE      RECYCLE - RETURN FOR INITIAL COMPUTATION
 0819   REF  10  LAST  315          35,3071  4 0076 1  N45PROC CS      FLAGWRD2
 0820   REF   1                     35,3072  7 4763 0         MASK    FINALBIT
 0821                               35,3073  0 0006 1         EXTEND
```

```
0822    REF   1                    35,3074   1 3113 0                BZF     N45ENAJ         FINAL FLAG SET - FINAL PASS
0823    REF  24  LAST  453          35,3075   0 5402 1  N45NORM       TC      PHASCHNG
0824                                35,3076    04024 0                OCT     04024
0825    REF  30  LAST  456          35,3077   0 5547 1                TC      UPFLAG          SET
0826    REF   5  LAST  485          35,3100    00047 1                ADRES   FINALFLG        FINALFLG
0827    REF  25  LAST  428          35,3101   0 5561 0  CLUPDATE      TC      DOWNFLAG
0828    REF   1                     35,3102    00155 0                ADRES   TIMRFLAG        TERMINATE CLOKTASK
08282   REF   1                     35,3103   3 3136 0                CAF     VN1645AD        CHANGE BACK TO 4.1 FOR
08284   REF   3  LAST  213          35,3104   54 373 1                TS      TEMPFLSH        FUTURE DISPLAYS
0829    REF  25  LAST  486          35,3105   0 5402 1                TC      PHASCHNG
0830                                35,3106    00014 1                OCT     14

0831    REF  51  LAST  485          35,3107   0 6006 1  VN1645R       TC      INTPRET
0832                                35,3110    52014 0                CLEAR   GOTO
0833    REF   3  LAST  484          35,3111    00670 0                        UPDATFLG
0834    REF   4  LAST  485          35,3112    02356 0  +3                    QSAVED
083402  REF  26  LAST  486          35,3113   0 5402 1  N45ENAJ       TC      PHASCHNG        PROTECT MANEVFLG, WRENDPOS
083404                              35,3114    04024 0                OCT     04024
083411  REF  52  LAST  486          35,3115   0 6006 1                TC      INTPRET
083412                              35,3116    77745 1                DLOAD
083414  REF  22  LAST  481          35,3117    03413 1                        TIG
083416  REF   3  LAST  220          35,3120    03450 0                STORE   NOMTIG
08342                               35,3121    43014 0                BON     SET
083421  REF   2  LAST  216          35,3122    05316 0                        PCFLAG
083422  REF   1                     35,3123    73125 0                        CHGRMS
083423  REF   2  LAST  216          35,3124    05072 1                        MANEUFLG        DONT SET FLAG IF PC MANEUVER
083424                              35,3125    71214 0  CHGRMS        BOFF    DLOAD
083425  REF   9  LAST  467          35,3126    05350 1                        AUTOSEQ
083426  REF   1                     35,3127    73132 0                        SAMERMS
083427  REF   1                     35,3130    33135 0                        POSVEL2         CHANGE RMS ONLY IN MINKEY
083428  REF   1                     35,3131    02001 1                STORE   WRENDPOS
083429                              35,3132    77776 1  SAMERMS       EXIT
08343   REF   1                     35,3133   1 4105 0                TCF     MNKGOPOO
083431                              35,3134    00023 0  POSVEL2       DEC     608 B-19        2000 FT IN METERS
083432                              35,3135    00144 0  POSVEL3       DEC     .00608          2 FT/SEC IN M/CS
0835    REF   1                     35,3136    73112 1  VN1645AD      CADR    VN1645R +3
```

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P0853   ..... P3XORP7X .....

 0854   REF   1                  35,3137  3 7677 0  P3XORP7X CAF     HIGH9
 0855   REF   9  LAST  447       35,3140  7 1214 0           MASK    MODREG
 0856   REF   4  LAST  261       35,3141  1 5651 1           TCF     INCRQCK
 0860   REF   1                     4000                    SETLOC  P30SUBS
 0861                              4532                    BANK

 0862   REF   1                                             COUNT*  $$/P3474
```

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PC874   ..... CONSTANTS .....

 0875                          4532   01445 0  V06N37   VN     0637
 0876                          4533   01467 0  V06N55   VN     0655
 0877                          4534   01472 1  V06N58   VN     0658
 0879                          4535   01521 0  V06N81   VN      681
 0880                          4536   04055 0  V16N45   VN     1645
 08801                         4537   01006 0  V04N06   VN     0406

 08805  REF   3 LAST  479     35,2000                    SETLOC CSI/CDH
 08806                       35,3142                    BANK

 08808  REF   3 LAST  479 TO  487:   241   375*          COUNT* $$/P3474
 0881                        35,3142   14441 0  TWOPI    2DEC   6.283185307 B-4
 0881                        35,3143   37325 1
 0882                        35,3144   00001 0  MAX250   2DEC   25 E3
 0882                        35,3145   20650 0
 0883                        35,3146   12525 0  THIRD    2DEC   .333333333
 0883                        35,3147   12525 0
 0884                        35,3150   00004 0  ELEPS    2DEC   .27777777 E-3
 0884                        35,3151   21505 1
 0885                        35,3152   00002 0  DECTWO   DEC    2
 0886                        35,3153   77777 0  DP-.01   OCT    77777          CONSTANTS
 0887                        35,3154   61337 1           OCT    61337          ADJACENT      -.01 FOR MGA DSP
 08871                       35,3155   01252 0  EPSFOUR  2DEC   .0416666666
 08871                       35,3156   25253 1
 08872                       35,3157   01473 0  V06N59   VN     0659
```

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```
R0888   ..... INITVEL .....

R0889   MOD NO -1       LOG SECTION - P34-P35, P74-P75
R0890   MOD BY WHITE.P  DATE  21NOV67

R0891   FUNCTIONAL DESCRIPTION

R0892           THIS SUBROUTINE COMPUTES THE REQUIRED INITIAL VELOCITY VECTOR FOR
R0893           A TRAJECTORY OF SPECIFIED TRANSFER TIME BETWEEN SPECIFIED INITIAL
R0894           AND TARGET POSITIONS.  THE TRAJECTORY MAY BE EITHER CONIC OR
R0895           PRECISION DEPENDING ON AN INPUT PARAMETER (NAMELY, NUMBER OF
R0896           OFFSETS).  IN ADDITION, IN THE PRECISION TRAJECTORY CASE, THE
R0897           SUBROUTINE ALSO COMPUTES AN OFFSET TARGET VECTOR, TO BE USED
R0898           DURING PURE-CONIC CROSS-PRODUCT STEERING.  THE OFFSET TARGET
R0899           VECTOR IS THE TERMINAL POSITION VECTOR OF A CONIC TRAJECTORY WHICH
R0900           HAS THE SAME INITIAL STATE AS A PRECISION TRAJECTORY WHOSE
R0901           TERMINAL POSITION VECTOR IS THE SPECIFIED TARGET VECTOR.

R0902           IN ORDER TO AVOID THE INHERENT SINGULARITIES IN THE 180 DEGREE
R0903           TRANSFER CASE WHEN THE (TRUE OR OFFSET) TARGET VECTOR MAY BE
R0904           SLIGHTLY OUT OF THE ORBITAL PLANE, THIS SUBROUTINE ROTATES THIS
R0905           VECTOR INTO A PLANE DEFINED BY THE INPUT INITIAL POSITION VECTOR
R0906           AND ANOTHER INPUT VECTOR (USUALLY THE INITIAL VELOCITY VECTOR),
R0907           WHENEVER THE INPUT TARGET VECTOR LIES INSIDE A CONE WHOSE VERTEX
R0908           IS THE ORIGIN OF COORDINATES, WHOSE AXIS IS THE 180 DEGREE
R0909           TRANSFER DIRECTION, AND WHOSE CONE ANGLE IS SPECIFIED BY THE USER.

R0910           THE LAMBERT SUBROUTINE IS UTILIZED FOR THE CONIC COMPUTATIONS AND
R0911           THE COASTING INTEGRATION SUBROUTINE IS UTILIZED FOR THE PRECISION
R0912           TRAJECTORY COMPUTATIONS.

R0913   CALLING SEQUENCE

R0914           L         CALL
R0915           L+1               INITVEL
R0916           L+2       (RETURN - ALWAYS)

R0917   INPUT

R0918           (1) RINIT     INITIAL POSITION RADIUS VECTOR
R0919           (2) VINIT     INITIAL POSITION VELOCITY VECTOR
R0920           (3) RTARG     TARGET POSITION RADIUS VECTOR
R0921           (4) DELLT4    DESIRED TIME OF FLIGHT FROM RINIT TO RTARG
R0922           (5) INTIME    TIME OF RINIT
R0923           (6) OD        NUMBER OF ITERATIONS OF LAMBERT/INTEGRVS
R0924           (7) 2D        ANGLE TO 180 DEGREES WHEN ROTATION STARTS
R0925           (8) RTX1      -2 FOR EARTH, -10D FOR LUNAR
R09251          (9) RTX2      COORDINATE SYSTEM ORIGIN - 0 FOR EARTH, 2 FOR LUNAR
R0926           PUSHLOC SET AT 4D
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R0927 OUTPUT

R0928 (1) RTARG OFFSET TARGET POSITION VECTOR
R0929 (2) VIPRIME MANEUVER VELOCITY REQUIRED
R0930 (3) VTPRIME VELOCITY AT TARGET AFTER MANEUVER
R0931 (4) DELVEET3 DELTA VELOCITY REQUIRED FOR MANEUVER

R0932 SUBROUTINES USED

R0933 LAMBERT
R0934 INTSTALL
R0935 INTEGRVS

```
 0936  REF   1                 11,2000                    SETLOC  INTVEL
 0937                          11,2000                    BANK

 0938  REF   1                                            COUNT*  $$/INITV
 0958                          11,2000   77614 1  INITVEL  SET             COGA GUESS NOT AVAILABLE
 0959  REF   1                 11,2001   00475 1                   GUESSW
 0960                          11,2002   44175 1  HAVEGUES VLOAD   STQ
 0961  REF   9  LAST  481      11,2003   03415 1                   RTARG
 0962  REF   9  LAST  482      11,2004   01023 1                   NORMEX
 0963  REF   2  LAST  126      11,2005   03604 0           STORE   RTARG1
 0964                          11,2006   46135 1           SLOAD   BHIZ
 0965  REF   3  LAST  483      11,2007   03747 0                   RTX2
 0967  REF   1                 11,2010   22022 1                   INITVEL1
 0968                          11,2011   72575 0           VLOAD   VSL2
 0969  REF   4  LAST  480      11,2012   03570 0                   RINIT           B29
 0970  REF   5  LAST  490      11,2013   27570 0           STOVL   RINIT           B27
 0971  REF   4  LAST  480      11,2014   03576 0                   VINIT           B7
 0972                          11,2015   77752 1           VSL2
 0973  REF   5  LAST  490      11,2016   27576 0           STOVL   VINIT           B5
 0974  REF   3  LAST  490      11,2017   03604 0                   RTARG1
 0975                          11,2020   77752 1           VSL2
 0976  REF   4  LAST  490      11,2021   03604 0           STORE   RTARG1
R0977       INITIALIZATION

 0978                          11,2022   71331 0  INITVEL1 SSP     DLOAD           SET ITCTR TO -1,LOAD MPAC WITH E4(PL 2D)
 0979  REF   1                 11,2023   03505 1                   ITCTR
 0980                          11,2024   77776 1                   0 -1
 0981                          11,2025   70546 1           COSINE  SR1             CALCULATE COSINE (E4)  (+2)
 0982  REF   2  LAST  127      11,2026   17630 1           STODL   COZY4           SET COZY4 TO COSINE(E4)        (PL 0D)
 0983                          11,2027   67154 0           LXA,2   SXA,2
 0984  REF 228  LAST  474      11,2030   00154 1                   MPAC
 0985  REF   2  LAST  100      11,2031   02703 1                   VTARGTAG        SET VTARGTAG TO 0D (SP)
 0986                          11,2032   77775 1           VLOAD
 0987  REF   6  LAST  490      11,2033   03570 0                   RINIT
 0988  REF   4  LAST  100      11,2034   26657 1           STOVL   R1VEC           R1VEC EQ RINIT
 0989  REF   5  LAST  490      11,2035   03604 0                   RTARG1
 0990  REF   2  LAST  100      11,2036   16665 0           STODL   R2VEC           R2VEC EQ RTARG
```

```
0991   REF  5 LAST 479   11,2037  03423 1                    DELLT4
0992   REF  2 LAST 100   11,2040  02673 1          STORE     TDESIRED      TDESIRED EQ DELLT4
0993                     11,2041  77201 1          SETPD     VLOAD
0994                     11,2042  00001 0                    0D            INITIALIZE PL TO 0D
0995   REF  7 LAST 490   11,2043  03570 0                    RINIT         MPAC EQ RINIT (+29)
0996                     11,2044  41456 0          UNIT      PUSH          UNIT(RI)  (+1)                  (PL 6D)
0997                     11,2045  53435 0          VXV       UNIT
0998   REF  6 LAST 490   11,2046  03576 0                    VINIT         MPAC EQ UNIT(RI) X VI   (+8)
0999   REF  2 LAST 100   11,2047  26676 1          STOVL     UN
1000   REF  6 LAST 490   11,2050  03604 0                    RTARG1
1001                     11,2051  50256 0          UNIT      DOT           TEMP=URT.URI  (+2)                (PL 0D)
1002                     11,2052  43015 1          DAD       CLEAR
1003   REF  3 LAST 490   11,2053  03630 1                    COZY4
1004   REF  1            11,2054  03665 1                    NORMSW
1005   REF  4 LAST 491   11,2055  03630 1          STORE     COZY4
1006                     11,2056  43044 0  INITVEL2 BPL      SET
1007   REF  1            11,2057  22101 1                    INITVEL3      UN CALCULATED IN LAMBERT
1008   REF  2 LAST 491   11,2060  03465 0                    NORMSW
R1009      ROTATE RC INTO YC PLANE - SET UNIT NORMAL TO YC

1010                     11,2061  41575 0          VLOAD     PUSH                                            (PL 6D)
1011   REF  3 LAST 490   11,2062  02665 0                    R2VEC         RC TO 6D  (+29)
1012                     11,2063  63246 1          ABVAL     PDVL          RC TO MPAC, ABVAL(RC) (+29) TO 0D(PL 2D)
1013                     11,2064  46206 1          PUSH      VPROJ                                           (PL 8D)
1014   REF  3 LAST 491   11,2065  02676 1                    UN
1015                     11,2066  51352 1          VSL2      BVSU
1016                     11,2067  74256 0          UNIT      VXSC                                            (PL 0D)
1017                     11,2070  77772 0          VSL1
1018   REF  4 LAST 491   11,2071  02665 0          STORE     R2VEC
1019                     11,2072  67351 1          TLOAD     SLOAD
1020   REF  2 LAST  34   11,2073  11762 1                    ZEROVEC
1021   REF  2 LAST 490   11,2074  03505 1                    ITCTR
1022                     11,2075  77244 0          BPL       VLOAD
1023   REF  2 LAST 491   11,2076  22101 1                    INITVEL3
1024   REF  5 LAST 491   11,2077  02665 0                    R2VEC
1025   REF  7 LAST 491   11,2100  03604 0          STORE     RTARG1
1026                     11,2101  63345 0  INITVEL3 DLOAD     PDVL                                            (PL 2D)
1027   REF  1            11,2102  27740 1                    MUEARTH       POSITIVE VALUE
1028   REF  6 LAST 491   11,2103  02665 0                    R2VEC
102802                   11,2104  63256 0          UNIT      PDVL          2D = UNIT(R2VEC)                  (PL 8D)
102804 REF  5 LAST 490   11,2105  02657 1                    R1VEC
102806                   11,2106  41456 0          UNIT      PUSH          8D = UNIT(R1VEC)                  (PL14D)
102808                   11,2107  57435 1          VXV       VCOMP         -N = UNIT(R2VEC) X UNIT(R1VEC)
10281                    11,2110  00003 1                    2D
10282                    11,2111  77606 1          PUSH                                                      (PL20D)
10283                    11,2112  71350 1          LXA,1     DLOAD
10284  REF  3 LAST 468   11,2113  03745 1                    RTX1
10285                    11,2114  00023 0                    18D
10286                    11,2115  62040 1          BMN       INCR,1
10287                    11,2116  22120 1                    +2
```

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```
 10286                      11,2117  77767 1          DEC    -8
 10289                      11,2120  67310 1          INCR,1 SLOAD
 1029                       11,2121  00012 1                 10D
 10291  REF  4 LAST 475     11,2122  00047 1                 X1
 10292                      11,2123  77230 0          BHIZ   VLOAD                    (PL14D)
 10293                      11,2124  22126 1                 +2
 10294                      11,2125  41476 1          VCOMP  PUSH                     (PL20D)
 10295                      11,2126  77775 1          VLOAD                           (PL14D)
 10296                      11,2127  50235 0          VXV    DOT                      (PL 2D)
 1032                       11,2130  71244 0          BPL    DLOAD                    (PL 0D)
 1033   REF  1              11,2131  22133 0                 INITVEL4
 1034                       11,2132  41476 1          DCOMP  PUSH                     (PL 2D)
 1035                       11,2133  67154 0 INITVEL4 LXA,2  SXA,2
 1036                       11,2134  00000 1                 0D
 1037   REF  2 LAST 100     11,2135  02674 0                 GEOMSGN
R1038     SET INPUTS UP FOR LAMBERT

 1039                       11,2136  45150 1          LXA,1  CALL
 1040   REF  4 LAST 491     11,2137  03745 1                 RTX1
R1041       OPERATE THE LAMBERT CONIC ROUTINE (COASTFLT SUBROUTINE)

 1042   REF  1              11,2140  25255 1                 LAMBERT

 1045                       11,2141  77214 0          CLEAR  VLOAD
 1046   REF  2 LAST 490     11,2142  00675 0                 GUESSW
 1047   REF  4 LAST 468     11,2143  02746 0                 VVEC
R1048   STORE CALCULATED INITIAL VELOCITY REQUIRED IN VIPRIME
R1049
 1050   REF  4 LAST 468     11,2144  17612 1          STODL  VIPRIME          INITIAL VELOCITY REQUIRED  (+7)
R1051
R1052      IF NUMIT IS ZERO, CONTINUE AT INITVELB, OTHERWISE
R1053   SET UP INPUTS FOR ENCKE INTEGRATION (INTEGRVS).

 1054   REF  3 LAST 490     11,2145  02704 0                 VTARGTAG
 1055                       11,2146  45030 0          BHIZ   CALL
 1056   REF  1              11,2147  34003 0                 INITVEL7
 1057   REF  8 LAST 483     11,2150  27516 0                 INTSTALL
 1061                       11,2151  43135 1          SLOAD  CLEAR
 1062   REF  4 LAST 490     11,2152  03747 0                 RTX2
 1063   REF  5 LAST 483     11,2153  00263 0                 MOONFLAG
 1064                       11,2154  43030 0          BHIZ   SET
 1065   REF  1              11,2155  22157 1                 INITVEL5
 1066   REF  6 LAST 492     11,2156  00063 1                 MOONFLAG
 1067                       11,2157  77775 1 INITVEL5 VLOAD
 1068   REF  8 LAST 491     11,2160  03570 0                 RINIT
 1069   REF  6 LAST 491     11,2161  02657 1          STORE  RIVEC
 1070   REF  6 LAST 483     11,2162  25535 0          STOVL  RCV
 1071   REF  5 LAST 492     11,2163  03612 1                 VIPRIME
 1072   REF  6 LAST 483     11,2164  15543 1          STODL  VCV
 1073   REF  6 LAST 479     11,2165  03503 1                 INTIME
```

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1074  REF  8  LAST  483   11,2166  01517 0        STORE  TET
1075                       11,2167  43015 1        DAD    CLEAR
1076  REF  6  LAST  491   11,2170  03423 1               DELLT4
1077  REF  4  LAST  483   11,2171  01673 1               INTYPFLG
1078  REF  6  LAST  483   11,2172  34041 0        STCALL TDEC1
1079  REF  3  LAST  483   11,2173  27211 0               INTEGRVS
1080                       11,2174  77775 1        VLOAD
1081  REF  2  LAST  457   11,2175  00025 0               VATT1
1082  REF  2  LAST  100   11,2176  02705 1        STORE  VTARGET
R1083   IF ITERATION COUNTER (ITCTR) EQ NO. ITERATIONS (NUMIT), CONTINUE AT
R1084   INITVELC, OTHERWISE REITERATE LAMBERT AND ENCKE

1085                       11,2177  63154 1        LXA,2  INCR,2
1086  REF  3  LAST  491   11,2200  03504 0               ITCTR
1087                       11,2201  00001 0               1D              INCREMENT ITCTR
1088                       11,2202  55134 1        SXA,2  XSU,2
1089  REF  4  LAST  493   11,2203  03504 0               ITCTR
1090  REF  4  LAST  492   11,2204  02703 1               VTARGTAG
1091                       11,2205  46135 1        SLOAD  BHIZ            IF SP(MPAC) EQ 0, CONTINUE AT INITVELC
1092  REF  2  LAST  457   11,2206  00050 1               X2
1093  REF  1              11,2207  34000 0               INITVEL6
R1094
R1095     OFFSET CONIC TARGET VECTOR

1096                       11,2210  52375 1        VLOAD  VSU
1097  REF  8  LAST  491   11,2211  03604 0               RTARG1
1098  REF  2  LAST  457   11,2212  00017 1               RATT1
1099                       11,2213  77655 1        VAD
1100  REF  7  LAST  491   11,2214  02665 0               R2VEC
1101  REF  8  LAST  493   11,2215  16665 0        STODL  R2VEC
1102  REF  5  LAST  491   11,2216  03630 1               COZY4
1103                       11,2217  77650 1        GOTO
1104  REF  1              11,2220  22056 1               INITVEL2        CONTINUE ITERATING AT INITVEL2
11041 REF  1              16,2000                 SETLOC INITVEL1
11042                     16,2000                 BANK

11045 REF  1                                      COUNT* $$/INITV
R1105   COMPUTE THE DELTA VELOCITY

1106                       16,2000  77775 1 INITVEL6 VLOAD
1107  REF  9  LAST  493   16,2001  02665 0               R2VEC
1108  REF  9  LAST  493   16,2002  03604 0        STORE  RTARG1
1109                       16,2003  52375 1 INITVEL7 VLOAD  VSU
1110  REF  6  LAST  492   16,2004  03612 1               VIPRIME
1111  REF  7  LAST  491   16,2005  03576 0               VINIT
1112  REF  9  LAST  481   16,2006  27646 0        STOVL  DELVEET3         DELVEET3 = VIPRIME-VINIT  (+7)
1113  REF  3  LAST  493   16,2007  02705 1               VTARGET
1114  REF  6  LAST  484   16,2010  37620 1        STCALL VTPRIME
11141 REF  1              16,2011  22221 0               INITVEL8
11142 REF  2  LAST  490   11,2000                 SETLOC INTVEL
```

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```
11143                          11,2221                          BANK

11145  REF   2 LAST  490 TO  493:   145   145*                  COUNT* $$/INITV
1115                           11,2221   46135 1  INITVEL8 SLOAD  BHIZ
1116   REF   5  LAST  492     11,2222   03747 0                   RTX2
1117   REF   1                11,2223   22240 1                   INITVELX
11171                          11,2224   70575 1           VLOAD   VSR2
11172  REF   7  LAST  493     11,2225   03620 0                   VTPRIME
1118   REF   8  LAST  494     11,2226   27620 0           STOVL   VTPRIME
1119   REF   7  LAST  493     11,2227   03612 1                   VIPRIME
1120                           11,2230   77742 0           VSR2
1121   REF   8  LAST  494     11,2231   27612 1           STOVL   VIPRIME
1122   REF  10  LAST  493     11,2232   03604 0                   RTARG1
1123                           11,2233   77742 0           VSR2
1124   REF  11  LAST  494     11,2234   27604 0           STOVL   RTARG1
1125   REF  10  LAST  493     11,2235   03646 0                   DELVEET3
1126                           11,2236   77742 0           VSR2
1127   REF  11  LAST  494     11,2237   03646 0           STORE   DELVEET3
1128                           11,2240   77201 1  INITVELX SETPD   VLOAD
1129                           11,2241   00001 0                   0D
1130   REF  12  LAST  494     11,2242   03604 0                   RTARG1
1131   REF  10  LAST  490     11,2243   03415 1           STORE   RTARG
1132                           11,2244   77614 1           CLRGO
1133   REF   1                11,2245   01227 1                   XDELVFLG
 1134  REF  10  LAST  490     11,2246   01023 1                   NORMEX
R1135
R1136    ..... END OF INITVEL ROUTINE .....
```

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P1165 MIDDLE GIMBAL ANGLE COMPUTATION.

```
1166  REF  1                27,2000                          SETLOC MGIM
1167                        27,2442                          BANK

1168  REF  1                                                 COUNT* $$/MIDG

1169                        27,2442  20000 0  HALFREV        2DEC   1 B-1
1169                        27,2443  00000 1
1176                        27,2444  53575 0  GET+MGA        VLOAD  UNIT          (PL 0D) V (+7) TO MPAC, UNITIZE  UV (+1)
1177                        27,2445  72441 0                 DOT    SL1           DOT UV WITH Y(STABLE MEMBER) AND RESCALE
1178  REF  4 LAST  183      27,2446  01742 1                        REFSMMAT +6    FROM +2 TO +1 FOR ASIN ROUTINE
1179                        27,2447  51136 1                 ARCSIN BPL
1180  REF  1                27,2450  56454 1                        SETMGA
1181                        27,2451  43215 0                 DAD    DAD           CONVERT -MGA TO +MGA BY
1182  REF  1                27,2452  16443 0                        HALFREV       ADDING ONE REVOLUTION
1183  REF  2 LAST  495      27,2453  16443 0                        HALFREV
1184  REF  5 LAST  485      27,2454  03626 0  SETMGA         STORE  +MGA
1185                        27,2455  77616 0                 RVQ

1186  REF  1                04,2000                          SETLOC MIDDGIM
1187                        04,3200                          BANK

1188  REF  1                                                 COUNT* $$/MIDG
R1190 TRANSFORM INPUT VECTOR INTO LOCAL VERTICAL COORDINATES.

1191                        04,3200  53575 0  GET.LVC        VLOAD  UNIT          (PL 6D)   R (+29) IN MPAC, UNITIZE  UR
1192  REF  9 LAST  492      04,3201  03570 0                        RINIT
1193                        04,3202  77676 0                 VCOMP                U(-R)
1194                        04,3203  00023 0                 STORE  18D           U(-R) TO 18D
1195                        04,3204  53435 0                 VXV    UNIT          U(-R)*V EQ V*U(R), U(V*R)
1196  REF  8 LAST  493      04,3205  03576 0                        VINIT
1197                        04,3206  00015 0                 STORE  12D           U(V*R) TO 12D
1198                        04,3207  53435 0                 VXV    UNIT          U(V*R)*U(-R), U((V*R)*(-R))
1199                        04,3210  00023 0                        18D
1200                        04,3211  24007 0                 STOVL  6D            TRANSFORMATION MATRIX IS IN 6D (+1)
1201                        04,3212  00001 0                        0D            DELTA V (+7) IN 0D
1202                        04,3213  76521 0                 MXV    VSL1          CONVERT FROM INER COOR TO LV COOR (+8)
1203                        04,3214  00007 0                        6D             AND SCALE +7 IN MPAC
1204  REF 14 LAST  484      04,3215  03405 0                 STORE  DELVLVC       STORE IN DELVLVC (+7)
1205                        04,3216  77616 0                 RVQ
```

```
P1208
 1209                          04,3217  77160 0  SELECTMU AXC,1   AXT,2
 1210                          04,3220  00002 0                   2D
 1211                          04,3221  00000 1                   0D
 1212                          04,3222  77614 1           BOFF
 1213  REF  7  LAST  483       04,3223  04343 1                   CMOONFLG
 1214  REF  1                  04,3224  11230 0                   SETMUER
 1215                          04,3225  77160 0           AXC,1   AXT,2
 1216                          04,3226  00012 1                   10D
 1217                          04,3227  00002 0                   2D
 1218                          04,3230  66143 1  SETMUER  DLOAD*  SXA,1
 1219  REF  1                  04,3231  22305 1                   MUTABLE +4,1
 1220  REF  5  LAST  492       04,3232  03745 1                   RTX1
 1221  REF  2  LAST  130       04,3233  23752 0           STODL*  RTSR1/MU
 1222  REF  2  LAST  496       04,3234  22277 0                   MUTABLE -2,1
 1223                          04,3235  54214 1           BOFF    SR
 1224  REF  8  LAST  496       04,3236  04343 1                   CMOONFLG
 1225  REF  1                  04,3237  11241 0                   RTRNMU
 1226                          04,3240  20607 1                   6D
 1227  REF  2  LAST  130       04,3241  03750 0  RTRNMU   STORE   RTMU
 1228                          04,3242  43134 0           SXA,2   CLEAR
 1229  REF  6  LAST  494       04,3243  03746 1                   RTX2
 1230  REF  6  LAST  486       04,3244  01271 1                   FINALFLG
12302                          04,3245  52014 0           BON     GOTO
12304  REF  3  LAST  486       04,3246  05316 0                   PCFLAG
 1234  REF  1                  04,3247  45343 1                   P36A
 1235  REF  3  LAST  472       04,3250  73027 0                   VN1645
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P1236 ..... PERIAPO .....

R1237 MOD NO -1 LOG SECTION - P34-P35, P74-P75
R1238 MOD BY WHITE.P DATE 18JAN68

R1239 FUNCTIONAL DESCRIPTION

R1240 THIS SUBROUTINE COMPUTES THE TWO BODY APOCENTER AND PERICENTER
R1241 ALTITUDES GIVEN THE POSITION AND VELOCITY VECTORS FOR A POINT ON
R1242 THE TRAJECTORY AND THE PRIMARY BODY.

R1243 SETRAD IS CALLED TO DETERMINE THE RADIUS OF THE PRIMARY BODY.

R1244 APSIDES IS CALLED TO SOLVE FOR THE TWO BODY RADII OF APOCENTER AND
R1245 PERICENTER AND THE ECCENTRICITY OF THE TRAJECTORY.

R1246 CALLING SEQUENCE

R1247 L CALL
R1248 L+1 PERIAPO
R1249 L+2 (RETURN - ALWAYS)

R1250 INPUT

R1251 (1) RVEC POSITION VECTOR IN METERS
R1252 SCALE FACTOR - EARTH +29, MOON +27
R1253 (2) VVEC VELOCITY VECTOR IN METERS/CENTISECOND
R1254 SCALE FACTOR - EARTH +7, MOON +5
R1255 (3) X1 PRIMARY BODY INDICATOR
R1256 EARTH -2, MOON -1

R1257 OUTPUT

R1258 (1) 2D APOCENTER RADIUS IN METERS
R1259 SCALE FACTOR - EARTH +29, MOON +27
R1260 (2) 4D APOCENTER ALTITUDE IN METERS
R1261 SCALE FACTOR - EARTH +29, MOON P27
R1262 (3) 6D PERICENTER RADIUS IN METERS
R1263 SCALE FACTOR - EARTH +29, MOON +27
R1264 (4) 8D PERICENTER ALTITUDE IN METERS
R1265 SCALE FACTOR - EARTH +29, MOON +27
R1266 (5) ECC ECCENTRICITY OF CONIC TRAJECTORY
R1267 SCALE FACTOR - +3
R1268 (6) XXXALT RADIUS OF THE PRIMARY BODY IN METERS
R1269 SCALE FACTOR - EARTH +29, MOON +27
R1270 (7) PUSHLOC EQUALS 10D

R1271 SUBROUTINES USED

R1272 SETRAD

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```
R1273          APSIDES

 1274  REF   1              22,2000                          SETLOC APOPERI
 1275                       22,3172                          BANK

 1276  REF   1                                               COUNT* $$/PERAP

 1277                       22,3172   00302 0  RPAD      2DEC   6373338 B-29     STANDARD RADIUS  OF PAD 37-B
 1277                       22,3173   17755 0
A1278                                                                           = 20 909 901.57 FT

 1279                       22,3174   53754 1  PERIAPO1  LXA,2  VSR*
 1280  REF   7  LAST  496   22,3175   03746 1            RTX2
 1281                       22,3176   57176 0            0,2
 1282  REF   5  LAST  492   22,3177   26746 0            STOVL  VVEC
 1283                       22,3200   53750 0            LXA,1  VSR*
 1284  REF   6  LAST  496   22,3201   03745 1            RTX1
 1285                       22,3202   57176 0            0,2
 1286  REF   3  LAST  468   22,3203   02657 1            STORE  RVEC
 1287                       22,3204   45020 1  PERIAPO   STQ    CALL
 1288  REF  11  LAST  494   22,3205   01023 1            NORMEX
 1289  REF   1              22,3206   45222 1                   SETRAD
 1290  REF   2  LAST  126   22,3207   37456 1            STCALL XXXALT
 1291  REF   1              22,3210   25717 1                   APSIDES
 1292                       22,3211   41401 1  SETPD     PUSH   2D = APOCENTER RADIUS   B29 OR B27
 1293                       22,3212   00003 1            2D
 1294                       22,3213   65225 1  DSU       PDDL   4D = APOGEE ALTITUDE    B29 OR B27
 1295  REF   3  LAST  498   22,3214   03456 0            XXXALT
 1296                       22,3215   00001 0            0D
 1297                       22,3216   45206 1  PUSH      DSU    6D = PERICENTER RADIUS  B29 OR B27
 1298  REF   4  LAST  498   22,3217   03456 0            XXXALT
 1299                       22,3220   52006 0  PUSH      GOTO   8D = PERIGEE ALTITUDE   B29 OR B27
 1300  REF  12  LAST  498   22,3221   01023 1            NORMEX
```

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```
P1301   SETRAD
 1302                          22,3222  41545 0  SETRAD   DLOAD    PUSH
 1303   REF   1                22,3223  05173 1                   RPAD
 1304                          22,3224  63130 0           SXA,1    INCR,2
 1305   REF   3  LAST  493     22,3225  00047 1                    X2
 1306                          22,3226  00002 0                    2D
 1307                          22,3227  46135 1           SLOAD    BHIZ
 1308   REF   4  LAST  499     22,3230  00050 1                    X2
 1309   REF   1                22,3231  45235 1                    SETRADX
 1310                          22,3232  51575 1           VLOAD    ABVAL
 1311   REF   3  LAST  189     22,3233  02026 1                    RLS
 1312                          22,3234  77725 1           PDDL
 1313                          22,3235  43545 1  SETRADX  DLOAD    RVQ
```

```
P1314   PRECSET
 1315                       22,3236  77620 0  PRECSET  STQ
 1316   REF  13  LAST  498  22,3237  01023 1           NORMEX
 1317   REF   1             22,3240  36635 1           STCALL  TDEC2
 1318   REF   1             22,3241  27202 1           LEMCONIC        CONIC INTEG
 1319                       22,3242  77624 1           CALL
 1320   REF   1             22,3243  45300 0           LEMSTORE
 1321                       22,3244  77745 1           DLOAD
 1322   REF   2  LAST  500  22,3245  02635 0           TDEC2
 1323   REF   7  LAST  493  22,3246  34041 0           STCALL  TDEC1
 1324   REF   1             22,3247  27170 1           CSMCONIC        CONIC INTEG
 1325                       22,3250  77624 1           CALL
 1326   REF   1             22,3251  45310 1           CSMSTORE
13261                       22,3252  53575 0           VLOAD   UNIT
13262   REF   9  LAST  479  22,3253  03554 0           RPASS3
13263                       22,3254  53435 0           VXV     UNIT
13264   REF   9  LAST  479  22,3255  03562 0           VPASS3
13265   REF   2  LAST  105  22,3256  26611 0           STOVL   UP1             UNIT(RPASS3) X VPASS3
13266   REF  10  LAST  481  22,3257  03546 0           VACT3
13267                       22,3260  72441 0           DOT     SL1
13268   REF   3  LAST  500  22,3261  02611 0           UP1
13269   REF   3  LAST  221  22,3262  26603 0           STOVL   CMYDOT          -YDOT (CSM)
 1327   REF  18  LAST  483  22,3263  03540 0           RACT3
13271                       22,3264  72441 0           DOT     SL1
132715  REF   4  LAST  500  22,3265  02611 0           UP1
13272   REF   2  LAST   97  22,3266  26601 1           STOVL   AUTOY           -Y(CSM)
13273   REF  19  LAST  500  22,3267  03540 0           RACT3
13274                       22,3270  53435 0           VXV     UNIT
13275   REF  11  LAST  500  22,3271  03546 0           VACT3
13276   REF   9  LAST  483  22,3272  26617 0           STOVL   UNRM
13277   REF  10  LAST  500  22,3273  03562 0           VPASS3
13278                       22,3274  72441 0           DOT     SL1
13279   REF  10  LAST  500  22,3275  02617 0           UNRM            RACT3 X VACT3
132795  REF   2  LAST  221  22,3276  36605 1           STCALL  LMYDOT          -YDOT(LM)
 1328   REF  14  LAST  500  22,3277  01023 1           NORMEX
 1329                       22,3300  43175 0  LEMSTORE VLOAD   BOFF
 1330   REF   5  LAST  483  22,3301  00001 0           RATT
 1331   REF   3  LAST  220  22,3302  01352 1           AVFLAG
 1332   REF   2  LAST  476  22,3303  45314 0           PASSIVE
 1333   REF  20  LAST  500  22,3304  27540 0  ACTIVE   STOVL   RACT3
 1334   REF   3  LAST  479  22,3305  00007 0           VATT
 1335   REF  12  LAST  500  22,3306  03546 0           STORE   VACT3
 1336                       22,3307  77616 0           RVQ
 1337                       22,3310  43175 0  CSMSTORE VLOAD   BOFF
 1338   REF   6  LAST  500  22,3311  00001 0           RATT
 1339   REF   4  LAST  500  22,3312  01352 1           AVFLAG
 1340   REF   2  LAST  476  22,3313  45304 1           ACTIVE
 1341   REF  10  LAST  500  22,3314  27554 0  PASSIVE  STOVL   RPASS3
 1342   REF   4  LAST  500  22,3315  00007 0           VATT
 1343   REF  11  LAST  500  22,3316  03562 0           STORE   VPASS3
```

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1344 22,3317 77616 0 RVQ

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```
P1345   VECSHIFT
  1346                          22,3320  53754 1  VECSHIFT LXA,2   VSR*
  1347  REF   8 LAST  498      22,3321  03746 1                   RTX2
  1348                          22,3322  57176 0                   0,2
  1349                          22,3323  63350 1           LXA,1   PDVL
  1350  REF   7 LAST  498      22,3324  03745 1                   RTX1
  1351                          22,3325  63257 1           VSR*    PDVL
  1352                          22,3326  57176 0                   0,2
  1353                          22,3327  77616 0           RVQ
```

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```
P1354   SHIFTR1
 1355                        22,3330   53754 1  SHIFTR1  LXA,2  SL*
 1356   REF   9  LAST  502   22,3331   03746 1                  RTX2
 1357                        22,3332   57576 1                  0,2
 1358                        22,3333   77616 0           RVQ
```

```
P1359   PROGRAM DESCRIPTION
R1360   SUBROUTINE NAME        R36  OUT-OF-PLANE RENDEZVOUS ROUTINE
R1361   MOD NO. 3       DATE    18 NOVEMBER 1969
R1362   MOD BY   T.E.CROCKER
R1363   FUNCTIONAL DESCRIPTION

R1364   TO DISPLAY AT ASTRONAUT REQUEST LGC CALCULATED RENDEZVOUS
R1365             OUT-OF-PLANE PARAMETERS (YDOT CSM,YDOT LEM,Y).
R1366   CALLING SEQUENCE

R1367   ASTRONAUT REQUEST THROUGH DSKY  V 90 E

R1368   SUBROUTINES CALLED

R1369   EXDSPRET  TIMEOPT
R1370   GOMARKF   VEHOPT
R1371   CSMCONIC
R1372   LEMCONIC
R1374   LOADTIME

R1375   NORMAL EXIT MODES

R1376   ASTRONAUT REQUEST THROUGH DSKY TO TERMINATE PROGRAM V 34 E

R1377   ALARM OR ABORT EXIT MODES

R1378   NONE

R1379   OUTPUT

R1380   DECIMAL DISPLAY OF YDOT CSM, YDOT LEM, Y, TIME.
R1381   DISPLAYED VALUES YDOT, YDOT, Y ARE STORED IN ERASABLE
R1382   REGISTERS RRATE, RRATE2, RANGE RESPECTIVELY.
R1383   ERASABLE INITIALIZATION REQUIRED

R1384   CSM AND LEM STATE VECTORS

R1385   DEBRIS

R1386   CENTRALS A,Q,L

R1387   OTHER THOSE USED BY THE ABOVE LISTED SUBROUTINES

 1389   REF   1              24,2000                  SETLOC R36CM
 1390                       24,2000                  BANK

 1391   REF  23  LAST  486   E7,1412                  EBANK= TIG
 1392   REF   1                                       COUNT* $$/R36

 1393   REF  53  LAST  486   24,2000  0 6006 1  R36   TC     INTPRET
```

```
1394                                24,2001  45145 0          DLOAD   CALL
1395   REF  24  LAST  504           24,2002  03413 1                  TIG
1396   REF   1                     24,2003  46424 1                  TIMEOPT
1397                                24,2004  77624 1  R36A    CALL
1398   REF   2  LAST  500           24,2005  27202 1                  LEMCONIC
1399                                24,2006  63375 0          VLOAD   PDVL      VL TO PDL0
1400   REF   5  LAST  500           24,2007  00007 0                  VATT
1401   REF   7  LAST  500           24,2010  00001 0                  RATT
1402                                24,2011  63256 0          UNIT    PDVL      UNIT RL TO PDL0, VL TO MPAC
14021                               24,2012  77626 0          STADR
1403   REF   2  LAST   94           24,2013  75457 0          STORE   VPASS36   VL TO VPASS36
1404                                24,2014  53435 0          VXV     UNIT      VL(MPAC) X RL(PDL0)
1405                                24,2015  77626 0          STADR
1406   REF   2  LAST   94           24,2016  61451 0          STODL   UNP36     UNIT(VL X RL) TO UNP36
1407   REF   3  LAST  458           24,2017  00015 0                  TAT
1408   REF   8  LAST  500           24,2020  34041 0          STCALL  TDEC1
1409   REF   2  LAST  500           24,2021  27170 1                  CSMCONIC
1410                                24,2022  63375 0          VLOAD   PDVL      VC TO PDL0
1411   REF   6  LAST  505           24,2023  00007 0                  VATT
1412   REF   8  LAST  505           24,2024  00001 0                  RATT
1413                                24,2025  00007 0          STORE   6D        RC TO PDL6
1414                                24,2026  63256 0          UNIT    PDVL      UNIT(RC) TO PDL0, VC TO MPAC
14141                               24,2027  77626 0          STADR
1415                                24,2030  77762 1          STORE   12D       VC TO PDL12
1416                                24,2031  53435 0          VXV     UNIT      VC(MPAC) X RC(PDL0)
1417                                24,2032  77626 0          STADR
1418   REF   1                     24,2033  51443 0          STOVL   UNA36     UNIT(VC X RC) TO UNA36
1419                                24,2034  00007 0                  6D        RC TO MPAC
1420                                24,2035  72441 0          DOT     SL1
1421   REF   3  LAST  505           24,2036  02326 1                  UNP36     RC . UNIT(VL X RL)
1422   REF  10  LAST  295           24,2037  26312 0          STOVL   RANGE      EQUALS RANGE
1423                                24,2040  00015 0                  12D       VC TO MPAC
1424                                24,2041  72441 0          DOT     SL1
1425   REF   4  LAST  505           24,2042  02326 1                  UNP36     VC . UNIT(VL X RL)
1426   REF   7  LAST  295           24,2043  26314 0          STOVL   RRATE      EQUALS R. RATE OF CSM
1427   REF   3  LAST  505           24,2044  02320 1                  VPASS36   VL TO MPAC
1428                                24,2045  72441 0          DOT     SL1
1429   REF   2  LAST  505           24,2046  02334 1                  UNA36
1430   REF   2  LAST  295           24,2047  02316 1          STORE   RRATE2    VL . UNIT(VC X RC)
1431                                24,2050  77776 1          EXIT                EQUALS R. RATE OF LEM
1432   REF   1                     24,2051  3 2103 1         CAF     V06N96    DISPLAY Y, YDOTCM,YDOTLM
1433   REF  90  LAST  485           24,2052  0 4636 0         TC      BANKCALL
1434   REF   2  LAST  258           24,2053   20576 1         CADR    GOMARKF
1435   REF  21  LAST  429           24,2054  1 5524 0         TCF     ENDEXT    T OR
1436   REF  22  LAST  505           24,2055  1 5524 0         TCF     ENDEXT     P....EXIT R36
A1437                                                                           R...DISPLAY TIME
1472   REF  54  LAST  504           24,2056  0 6006 1         TC      INTPRET
14721                               24,2057   77624 1         CALL
14722  REF   2  LAST  505           24,2060   46425 0                 TIMEOPT +1
1473                                24,2061   77650 1         GOTO
```

```
 1474   REF   1              24,2062   50004 0                    R36A
 1482                        24,2063   01420 0  V06N16N  VN      0616
 148305                      24,2064   77420 1  VEHOPT   STQ     EXIT          ALLOW VEHICLE OPTION
 14831  REF   1              24,2065   00734 1                    VEHRET
 148315                      24,2066   0 0006 1          EXTEND
 14832  REF  26  LAST  450   24,2067   3 4770 0          DCA     TWO
 148325 REF   5  LAST  283   24,2070   53'256 0          DXCH    OPTIONX
 14833  REF   1              24,2071   3 2102 0          CAF     OPTIONVN
 148335 REF  91  LAST  505   24,2072   0 4636 0          TC      BANKCALL
 14834  REF  10  LAST  279   24,2073    20576 1          CADR    GOXDSPF
 148345 REF  23  LAST  505   24,2074   0 5524 1          TC      ENDEXT
 14835                       24,2075   0 2077 0          TC      +2
 148355                      24,2076   0 2071 0          TC      -5
A14836
 148365 REF  55  LAST  505   24,2077   0 6006 1          TC      INTPRET
 14837                       24,2100    77650 1          GOTO
 14838  REF   2  LAST  506   24,2101    00734 1                    VEHRET
 14839                       24,2102    01014 0  OPTIONVN VN      0412
 148395                      24,2103    01540 1  V06N96   VN      0696

 1484   REF   7  LAST  456   30,2000                     SBANK=  LOWSUPER
```

```
P3000
 3002   REF   1                31,2000                        SETLOC R31
 3003                          31,2000                        BANK

 3004   REF   1                                               COUNT* $$/R3134
 30041  REF   1                31,2000  3 5045 0  R31CALL    CAF    PRIO3
 30042  REF  20  LAST  438     31,2001  0 5135 0               TC     FINDVAC
 30043  REF  11  LAST  485     E4,1760                        EBANK= SUBEXIT
 30044  REF   2  LAST   35     31,2002   02031 1              2CADR  V83CALL
 30044                         31,2003   62064 1
 30046  REF  92  LAST  506     31,2004  0 4636 0  DSPDELAY   TC     BANKCALL
 30047  REF   2  LAST  485     31,2005   01730 1              CADR   1SECDELY
 30048  REF   7  LAST  250     31,2006  3 1247 1              CA     EXTVBACT
 300485 REF  21  LAST  379     31,2007  7 4755 0              MASK   BIT12
 30049                         31,2010  0 0006 1              EXTEND
 300495 REF   1                31,2011  1 2004 0              BZF    DSPDELAY

 3005   REF   6  LAST  275     31,2012  3 0105 0  DISPN5X     CA     FLAGWRD9      TEST R31FLAG (IN SUNDANCE R31FLAG WILL
 30051  REF   1                31,2013  7 4765 0              MASK   R31FLBIT      ALWAYS BE SET AS R34 DOES NOT EXIST
 300515                        31,2014  0 0006 1              EXTEND
 30052                         31,2015  1 2020 0              BZF    +3
 30053  REF   1                31,2016  3 2135 1              CAF    V16N54        R31    USE NOUN 54
 30054                         31,2017  0 2021 0              TC     +2
 30055  REF   1                31,2020  3 2136 1              CAF    V16N53        R34    USE NOUN 53
 3006   REF  93  LAST  507     31,2021  0 4636 0              TC     BANKCALL
 3007   REF   3  LAST  505     31,2022   20576 1              CADR   GOMARKF
 3008   REF   1                31,2023  0 5626 0              TC     B5OFF
 3009   REF   2  LAST  507     31,2024  0 5626 0              TC     B5OFF
 3010   REF   1                31,2025  1 2012 1              TCF    DISPN5X

 3014   REF  56  LAST  506     31,2026  0 6006 1  V83         TC     INTPRET
 3017                          31,2027   77650 1              GOTO
 3018   REF   1                31,2030   62177 1                     HAVEBASE      INTEG STATE VECTORS
 3019   REF  57  LAST  507     31,2031  0 6006 1  V83CALL     TC     INTPRET
 3020                          31,2032   77650 1              GOTO
 3021   REF   1                31,2033   62146 0                     STATEXTP      EXTRAPOLATE STATE VECTORS
 3022                          31,2034   52375 1  COMPDISP    VLOAD  VSU
 3023   REF   9  LAST  505     31,2035   00001 0                     RATT
 3024   REF   3  LAST   94     31,2036   02320 1                     RCNE
 3025                          31,2037   51406 1              PUSH   ABVAL         RATT-RONE TO OD               PD= 6
 3029   REF  11  LAST  505     31,2040   02312 0              STORE  RANGE         METERS B-29
 3030                          31,2041   77301 0              NORM   VLOAD
 3031   REF   5  LAST  492     31,2042   00047 1                     X1            RATT-RONE                     PD=
 30315                         31,2043   77762 1              VSR1
 3032                          31,2044   53457 1              VSL*   UNIT
 3033                          31,2045   20201 0                     0,1
 3034                          31,2046   52315 1              PDVL   VSU           UNIT(LOS) TO OD               PD= 6
 3035   REF   7  LAST  505     31,2047   00007 0                     VATT
 3036   REF   3  LAST   95     31,2050   02326 1                     VONE
 3037                          31,2051   77641 1              DOT                  (VATT-VONE).UNIT(LOS)         PD= 0
```

```
3039                          31,2052  77752 1          SL1
3040   REF   8  LAST  505     31,2053  36314 1          STCALL  RRATE          RANGE RATE M/CS B-7
3041   REF   1                31,2054  47530 1                  CDUTRIG        TO INITIALIZE FOR *NBSM*
30411                         31,2055  77624 1          CALL
30412  REF   1                31,2056  62317 0                  R34LOS         NOTE. PDL MUST = 0.
3042                          31,2057  53575 0  R34ANG  VLOAD   UNIT
3043   REF   4  LAST  507     31,2060  02320 1                  RONE
3044                          31,2061  77715 1          PDVL                    UR TO 0D                       PD= 6
3045   REF   1                31,2062  15334 1                  THISAXIS       UNITX FOR CM, UNITZ FOR LM
30452                         31,2063  77214 0          BON     VLOAD          CHK R31FLAG. ON=R31 THETA, OFF=R34 PHI
30454  REF   3  LAST  267     31,2064  04713 0                  R31FLAG
30455                         31,2065  62067 1                  +2                 R31-THETA
30456                         31,2066  00015 0                  12D
30458                         31,2067  77624 1          CALL
3046   REF   1                31,2070  47647 1                  *NBSM*
3047                          31,2071  41505 1          VXM     PUSH           UXORZ TO 6D                    PD=12D
3048   REF   5  LAST  495     31,2072  01734 0                  REFSMMAT
3049                          31,2073  72431 1          VPROJ   VSL2
3050                          31,2074  00001 0                  0D
3051                          31,2075  53445 1          BVSU    UNIT
3052                          31,2076  00007 0                  6D
3053                          31,2077  47315 0          PDVL    VXV            UP/2 TO 12D                    PD=18D
3054   REF   5  LAST  508     31,2100  02320 1                  RONE
3055   REF   4  LAST  507     31,2101  02326 1                  VONE
3056                          31,2102  47256 0          UNIT    VXV
3057   REF   6  LAST  508     31,2103  02320 1                  RONE
3058                          31,2104  63241 0          DOT     PDVL           SIGN TO 12D, UP/2 TO MPAC      PD=18D
3059                          31,2105  00015 0                  12D
3060                          31,2106  50372 1          VSL1    DOT            UP.UXORZ
3061                          31,2107  00007 0                  6D
3062                          31,2110  72565 1          SIGN    SL1
3063                          31,2111  00015 0                  12D
3064                          31,2112  77726 1          ACOS
3065   REF   8  LAST  292     31,2113  26316 1          STOVL   RTHETA
3066   REF   7  LAST  508     31,2114  02320 1                  RONE
3067                          31,2115  51041 0          DOT     BPL
3068                          31,2116  00007 0                  6D
3069                          31,2117  62124 1                  +5
3070                          31,2120  44345 0          DLOAD   BDSU           IF UXORZ.R NEG, RTHETA = 1 - RTHETA
3071   REF   9  LAST  508     31,2121  02316 1                  RTHETA
3072   REF   7  LAST  481     31,2122  15344 0                  DPPOSMAX
3073   REF  10  LAST  508     31,2123  02316 1          STORE   RTHETA          RTHETA BETWEEN 0 AND 1 REV.
3074                          31,2124  77776 1  +5      EXIT
3075   REF  20  LAST  447     31,2125  3 4764 0         CAF     BIT5           HAVE WE BEEN ANSWERED
30751  REF   8  LAST  507     31,2126  7 1247 0         MASK    EXTVBACT
3076                          31,2127  0 0006 1         EXTEND
3077   REF   1                31,2130  1 2137 1         BZF     ISITP79

3078   REF   9  LAST  508     31,2131  4 1247 0         CS      EXTVBACT
3079   REF  22  LAST  507     31,2132  7 4755 0         MASK    BIT12
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3080   REF  10  LAST  508   31,2133  27'247 0          ADS    EXTVBACT

30805  REF   1              31,2134  1 2026 0          TCF    V83
3081                        31,2135   04066 0  V16N54  VN     1654
3082                        31,2136   04065 0  V16N53  VN     1653
30821  REF  14  LAST  427   31,2137  0 5354 0  ISITP79 TC     CHECKMM
30822                       31,2140   00117 0          MM     79
30823  REF  24  LAST  506   31,2141  1 5524 0          TCF    ENDEXT       NO, DIE

30824  REF   4  LAST  241   31,2142  0 5527 1          TC     CLEARMRK
308241*REF  26  LAST  486   31,2143  0 5561 0          TC     DOWNFLAG
308242*REF   5  LAST  219   31,2144   00226 1          ADRES  PCMANFLG
30825  REF  13  LAST  485   31,2145  1 4103 0          TCF    GOTOPOOH
```

```
P3083   STATEXTP DOES AN INITIAL PRECISION EXTRAPOLATION OF THE
R30835  LEM STATE VECTOR TO PRESENT TIME OR TO PIPTIME IF AV G
R3084   IS ON AND SAVES AS BASE VECTOR. IF AV G IS ON RN + VN
R30845  ARE USED AS THE CM STATE VECTOR AND THE INITIAL R RDOT
R3085   RTHETA ARE COMPUTED WITH NO FURTHER INTEGRATION. IF AV
R3086   G IS OFF A PRECISION EXTRAPOLATION IS MADE OF THE CM
R3087   STATE VECTOR TO PRESENT TIME AND.....
R3088     THE CM + LM STATE VECTORS ARE INTEGRATED TO PRES TIME
R3089     USING PRECISION OR CONIC AS SURFFLAG IS SET OR CLEAR.
R30895    IF AV G IS ON THEN SUBSEQUENT PASSES WILL PROVIDE
R3090     USE OF RN + VN AS CM STATE VECTOR AND THE LM STATE
R30905    VECTOR WILL BE PRECISION INTEGRATED USING LEMPREC
R3091     IF SURFFLAG IS SET.
R30915      CM STATE VECTOR RONE VONE + LM STATE VECTOR RATT
R3092       VATT ARE USED IN COMPUTING R RDOT RTHETA.
R30925
 3093                          31,2146  43034 1  STATEXTP RTB     BOF             INITIAL INTEGRATION
 30933  REF   5  LAST  472    31,2147  51751 0                   LOADTIME
 30936  REF   1               31,2150  03751 1                   V37FLAG
 3094   REF   1               31,2151  62154 0                   BOTHGO          AV G OFF, USE PRESENT TIME
 30943                        31,2152  77624 1           CALL
 30946  REF   1               31,2153  62301 1                   GETRVN                ON,  USE RN, VN, PIPTIME
 3095   REF   1               31,2154  02334 1  BOTHGO   STORE   BASETIME
 3096   REF   9  LAST  505    31,2155  34041 0           STCALL  TDEC1
 3097   REF   2  LAST   34    31,2156  27161 1                   LEMPREC
 3098                        31,2157  77775 1           VLOAD                 BASE VECTOR, LM
 3099   REF   3  LAST  493    31,2160  00017 1                   RATT1
 3100   REF   1               31,2161  26224 1           STOVL   BASEOTP         POS.
 3101   REF   3  LAST  493    31,2162  00025 0                   VATT1
 3102   REF   1               31,2163  02240 0           STORE   BASEOTV         VEL.
 3103                        31,2164  71214 0           BON     DLOAD
 3104   REF   2  LAST  510    31,2165  03711 0                   V37FLAG
 3105   REF   1               31,2166  62034 1                   COMPDISP        COMPUTE R RDOT RTHETA FROM
R3106                                RONE(RN) VONE(VN) RATT+VATT(LEMPREC)
 3107   REF   4  LAST  505    31,2167  00015 0                   TAT
 3109   REF  10  LAST  510    31,2170  34041 0           STCALL  TDEC1
 31093  REF   2  LAST   35    31,2171  27145 1                   CSMPREC
 31096                        31,2172  77775 1           VLOAD                 BASE VECTOR, CM
 3110   REF   4  LAST  510    31,2173  00017 1                   RATT1
 31103  REF   1               31,2174  26254 0           STOVL   BASETHP         POS.
 31106  REF   4  LAST  510    31,2175  00025 0                   VATT1
 3111   REF   1               31,2176  02262 0           STORE   BASETHV         VEL.
 3112                        31,2177  47014 1  HAVEBASE BON     RTB             SUBSEQUENT INTEGRATIONS
 3113   REF   3  LAST  510    31,2200  03711 0                   V37FLAG
 3114   REF   1               31,2201  62264 0                   GETRVNS
 3115   REF   6  LAST  510    31,2202  51751 0                   LOADTIME
 3116   REF  11  LAST  510    31,2203  34041 0           STCALL  TDEC1           AV G OFF. SET INTEG. OF CM
 3117   REF   9  LAST  492    31,2204  27516 0                   INTSTALL
 3118                        31,2205  43175 0           VLOAD   CLEAR
 3119   REF   2  LAST  510    31,2206  02254 0                   BASETHP
```

3120	REF	7	LAST	492	31,2207	00263 0			MOONFLAG	
3121	REF	7	LAST	492	31,2210	25535 0		STOVL	RCV	
3122	REF	2	LAST	510	31,2211	02262 0			BASETHV	
3123	REF	7	LAST	492	31,2212	15543 1		STODL	VCV	
3124	REF	2	LAST	510	31,2213	02334 1			BASETIME	
3125					31,2214	43014 0		BOF	SET	GET APPROPRIATE MOONFLAG SETTING
3126	REF	4	LAST	275	31,2215	04343 1			MOONTHIS	
3127					31,2216	62220 0			+2	
3128	REF	8	LAST	511	31,2217	00063 1			MOONFLAG	
3129					31,2220	77614 1		CLEAR		
31293	REF	5	LAST	493	31,2221	01673 1			INTYPFLG	
31296					31,2222	43014 0		BON	SET	
3130	REF	3	LAST	277	31,2223	04307 1			SURFFLAG	
31303					31,2224	62226 0			+2	PREC. IF LM DOWN
31306	REF	6	LAST	511	31,2225	01473 0			INTYPFLG	CONIC IF LM NOT DOWN
3131	REF	9	LAST	493	31,2226	35517 1		STCALL	TET	
3132	REF	4	LAST	493	31,2227	27211 0			INTEGRVS	INTEGRATION --- AT LAST---
3133					31,2230	77775 1		VLOAD		
3134	REF	10	LAST	507	31,2231	00001 0			RATT	
3135	REF	8	LAST	508	31,2232	26320 1		STOVL	RONE	
3136	REF	8	LAST	507	31,2233	00007 0			VATT	
3137	REF	5	LAST	508	31,2234	16326 1		STODL	VONE	GET SET FOR CONIC EXTRAP.,OTHER
31395	REF	5	LAST	510	31,2235	00015 0			TAT	
3140					31,2236	45014 0		BON	CALL	
31405	REF	4	LAST	511	31,2237	04307 1			SURFFLAG	
3141	REF	1			31,2240	62275 0			GETRVN6	LEMPREC IF LM DOWN
31413	REF	10	LAST	510	31,2241	27516 0			INTSTALL	LEMCONIC IF NOT DOWN
31415					31,2242	77614 1		SET		
31417	REF	7	LAST	511	31,2243	01473 0			INTYPFLG	
3142	REF	12	LAST	510	31,2244	00041 1	OTHINT	STORE	TDEC1	ENTERED IF AV G ON TO INTEG LM
3143					31,2245	43175 0		VLOAD	CLEAR	
3144	REF	2	LAST	510	31,2246	02224 1			BASEOTP	
3145	REF	9	LAST	511	31,2247	00263 0			MOONFLAG	
3146	REF	8	LAST	511	31,2250	25535 0		STOVL	RCV	
3147	REF	2	LAST	510	31,2251	02240 0			BASEOTV	
3148	REF	8	LAST	511	31,2252	15543 1		STODL	VCV	
3149	REF	3	LAST	511	31,2253	02334 1			BASETIME	
3150					31,2254	43014 0		BOF	SET	
3151	REF	5	LAST	511	31,2255	04343 1			MOONTHIS	
3152					31,2256	62260 1			+2	
3153	REF	10	LAST	511	31,2257	00063 1			MOONFLAG	
3154	REF	10	LAST	511	31,2260	35517 1		STCALL	TET	
3155	REF	5	LAST	511	31,2261	27211 0			INTEGRVS	
3156					31,2262	77650 1		GOTO		
3157	REF	2	LAST	510	31,2263	62034 1			COMPDISP	COMPUTE R RDOT RTHETA
3158					31,2264	77624 1	GETRVN5	CALL		AV G ON
31585	REF	2	LAST	510	31,2265	62301 1			GETRVN	
31595					31,2266	45014 0		BON	CALL	
3160	REF	5	LAST	511	31,2267	04307 1			SURFFLAG	
31603	REF	2	LAST	511	31,2270	62275 0			GETRVN6	LM DOWN, LMPREC

```
31613  REF  11 LAST  511   31,2271   27516 0                 INTSTALL
31616                     31,2272   52014 0          CLEAR  GOTO          INTEGRVS (PREC) IF LM NOT DOWN
3162   REF   8 LAST  511   31,2273   01673 1                 INTYPFLG
31623  REF   1             31,2274   62244 1                 DTHINT
31626  REF  13 LAST  511   31,2275   34041 0  GETRVN6 STCALL TDEC1
3163   REF   3 LAST  510   31,2276   27161 1                 LEMPREC
31635                     31,2277   77650 1          GOTO
3164   REF   3 LAST  511   31,2300   62034 1                 COMPDISP       COMPUTE R RDOT RTHETA
31645                     31,2301   77620 0  GETRVN  STQ
31646                     31,2302   00000 1                 0D
31647                     31,2303   52175 0          VLOAD  GOTO           AV G UN, RONE = RN  VONE = VN
3165   REF   5 LAST  301  31,2304   01030 0                 RN              AND USE PIPTIME
31655                     31,2305   62306 0                 +1
3166   REF   9 LAST  511   31,2306   36320 0          STCALL RONE
3167                      31,2307   62310 1                 +1
3168                      31,2310   52175 0          VLOAD  GOTO
3169   REF   5 LAST  301  31,2311   01036 0                 VN
31695                     31,2312   62313 1                 +1
3170   REF   6 LAST  511   31,2313   16326 1          STODL  VONE
31705  REF   4 LAST  301   31,2314   01044 0                 PIPTIME
3171                      31,2315   77650 1          GOTO
31711                     31,2316   00000 1                 0D
3172   REF   1             31,2000                  SETLOC R34
3173                      31,2317                    BANK
31735  REF   2 LAST  507 TO  512:   207   207*               COUNT* $$/R3134
3174                      31,2317    77776 1  R34LOS  EXIT
3175   REF   8 LAST  294   31,2320   3 0036 1                 CA     CDUS
3176   REF   1             31,2321   50 120 1                 INDEX  FIXLOC
3177                      31,2322   54 011 0                 TS     SD
3178   REF   7 LAST  294   31,2323   3 0035 1                 CA     CDUT
3179   REF   2 LAST  512   31,2324   50 120 1                 INDEX  FIXLOC
3180                      31,2325   54 013 1                 TS     11D
3181   REF   3 LAST  512   31,2326   3 0120 1                 CA     FIXLOC
3182   REF  16 LAST  450   31,2327   6 6211 0                 AD     SIX
3183                      31,2330   4 0000 0                 COM
3184   REF   4 LAST  512   31,2331   50 120 1                 INDEX  FIXLOC
3185   REF   6 LAST  507   31,2332   54 046 1                 TS     X1
3186   REF  58 LAST  507   31,2333   0 6006 1                 TC     INTPRET
3187                      31,2334    77624 1                 CALL
3188   REF   1             31,2335    46000 0                 SXTNB
3189                      31,2336    34015 1          STCALL 12D
3190   REF   1             31,2337    62057 1                 R34ANG
```

L P76 USER'S PAGE NO. 1 E. S3

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P5000   1) PROGRAM NAME - TARGET DELTA V PROGRAM (P76).
R5001   2) FUNCTIONAL DESCRIPTION - UPON ENTRY BY ASTRONAUT ACTION, P76 FLASHES DSKY REQUESTS TO THE ASTRONAUT
R5003           TO PROVIDE VIA DSKY (1) THE DELTA V TO BE APPLIED TO THE OTHER VEHICLE STATE VECTOR AND (2) THE
R5005           TIME (TIG) AT WHICH THE OTHER VEHICLE VELOCITY WAS CHANGED BY  EXECUTION OF A THRUSTING MANEUVER. THE
R5007           OTHER VEHICLE STATE VECTOR IS INTEGRATED TO TIG AND UPDATED BY THE ADDITION OF DELTA V (DELTA V HAVING
R5009           BEEN TRANSFORMED FROM LV TO REF COSYS). USING INTEGRVS, THE    PROGRAM THEN INTEGRATES THE OTHER
R5011   VEHICLE STATE VECTOR TO THE STATE VECTOR OF THIS VEHICLE, THUS INSURING THAT THE W-MATRIX AND BOTH VEHICLE
R5013   STATES CORRESPOND TO THE SAME TIME.
R5014   3) ERASABLE INITIALIZATION REQUIRED - NONE.
R5015   4) CALLING SEQUENCES AND EXIT MODES - CALLED BY ASTRONAUT REQUEST THRU DSKY V 37 E 76 E.
R5017           EXITS BY TCF ENDOFJOB.
R5018   5) OUTPUT - OTHER VEHICLE STATE VECTOR INTEGRATED TO TIG AND INCREMENTED BY DELTA V IN REF COSYS.
R5020           THE PUSHLIST CONTAINS THE MATRIX BY WHICH THE INPUT DELTA V MUST BE POST-MULTIPLIED TO CONVERT FROM LV
R5022           TO REF COSYS.
R5023   6) DEBRIS - OTHER VEHICLE STATE VECTOR.
R5024   7) SUBROUTINES CALLED - BANKCALL,GOXDSPF,CSMPREC (OR LEMPREC),ATOPCSM (OR ATOPLEM),INTSTALL,INTWAKE, PHASCHNG
R5026           INTPRET, INTEGRVS, AND MINIRECT.

R5027   8) FLAG USE - MOONFLAG,CMOONFLAG,INTYPFLG,RASFLAG, AND MARKCTR.

 5029   REF   1                13,2000                        SETLOC P76LOC
 5030                          13,2071                        BANK

 5031   REF   1                                               COUNT* $$/P7677
 5032   REF  25  LAST  505     E7,1412                        EBANK= TIG

 50321  REF  10  LAST  487     13,2071   3 1214 1  P76ER77    CA     MODREG
 50322  REF  26  LAST  449     13,2072   7 4770 1             MASK   BIT1
 50323  REF   1                13,2073  55'545 0             TS     OPTFLAG        OPTFLAG = 0  LM (P76)
 5033                          13,2074   0 0006 1             EXTEND                        = 1 CSM (P77)
 5034   REF   4  LAST  486     13,2075   3 1450 1             DCA    NOMTIG
 50345  REF  26  LAST  513     13,2076  53'413 1             DXCH   TIG

 5035   REF   1                13,2077   3 5026 0             CAF    V06N33
 5040   REF  94  LAST  507     13,2100   0 4636 0             TC     BANKCALL       AND WAIT FOR KEYBOARD ACTION.
 5041   REF  11  LAST  485     13,2101    20743 0             CADR   GOFLASH
 5042   REF   1                13,2102   1 2234 1             TCF    ENDP76
 5043                          13,2103   0 2105 1             TC     +2             PROCEED
 5044                          13,2104   0 2077 0             TC     -5             STORE DATA AND REPEAT FLASHING
 50441  REF  27  LAST  486     13,2105   0 5402 1             TC     PHASCHNG
 50442                         13,2106    04024 0             OCT    04024
 50445  REF   2  LAST  513     13,2107  51'545 1             INDEX  OPTFLAG
 5045   REF   1                13,2110   3 2237 0             CAF    V06N84         FLASH V06 N84 OR N81
 5046   REF  95  LAST  513     13,2111   0 4636 0             TC     BANKCALL       AND WAIT FOR KEYBOARD ACTION.
 5047   REF  12  LAST  513     13,2112    20743 0             CADR   GOFLASH
 5048   REF   2  LAST  513     13,2113   1 2234 1             TCF    ENDP76
 5049                          13,2114   0 2116 0             TC     +2
 5050                          13,2115   0 2107 0             TC     -6             STORE DATA AND REPEAT FLASHING
 5051   REF  59  LAST  512     13,2116   0 6006 1             TC     INTPRET        RETURN TO INTERPRETIVE CODE
 5052                          13,2117    43145 0             DLOAD  SET            SET D(MPAC)=TIG IN CSEC 828
```

5053	REF	27	LAST	513	13,2120	03413	1			TIG
50535	REF	2	LAST	228	13,2121	01076	1			NODOFLAG
5054	REF	14	LAST	512	13,2122	00041	1		STORE	TDEC1
5055					13,2123	77711	0		CCALL	
50553	REF	3	LAST	513	13,2124	03546	0			OPTFLAG
50556	REF	1			13,2125	26241	1			INTADR
5056					13,2126	53575	0	COMPMAT	VLOAD	UNIT
5057	REF	11	LAST	511	13,2127	00001	0			RATT
5058					13,2130	77676	0		VCOMP	
5059					13,2131	00031	0		STORE	24D
5060					13,2132	53435	0		VXV	UNIT
5061	REF	9	LAST	511	13,2133	00007	0			VATT
5062					13,2134	00023	0		STORE	18D
5063					13,2135	53435	0		VXV	UNIT
5064					13,2136	00031	0			24D
5065					13,2137	00015	0		STORE	12D
50652					13,2140	46135	1		SLOAD	BHIZ
50654	REF	4	LAST	514	13,2141	03546	0			OPTFLAG
50656					13,2142	26146	0			+4
50658					13,2143	52175	0		VLOAD	GOTO
5066	REF	15	LAST	495	13,2144	03405	0			DELVLVC
50662	REF	1			13,2145	26150	1			DVTRANS
50664					13,2146	77775	1		VLOAD	
50666	REF	13	LAST	294	13,2147	03540	0			DELVQV
5067					13,2150	76505	0	DVTRANS	VXM	VSL1
5068					13,2151	00015	0			12D
5069					13,2152	77655	1		VAD	
5070	REF	10	LAST	514	13,2153	00007	0			VATT
5071					13,2154	00007	0		STORE	6
5072					13,2155	77624	1		CALL	
5073	REF	12	LAST	512	13,2156	27516	0			INTSTALL
5074					13,2157	77624	1		CALL	
5075	REF	1			13,2160	26245	0			P76SUB1
5076					13,2161	53775	1		VLOAD	VSR*
5077					13,2162	00007	0			6
5078					13,2163	57176	0			0,2
5079	REF	9	LAST	511	13,2164	25543	1		STOVL	VCV
5080	REF	12	LAST	514	13,2165	00001	0			RATT
5081					13,2166	77657	0		VSR*	
5082					13,2167	57176	0			0,2
5083	REF	9	LAST	511	13,2170	15535	0		STODL	RCV
5084	REF	28	LAST	514	13,2171	03413	1			TIG
5085	REF	11	LAST	511	13,2172	01517	0		STORE	TET
5086					13,2173	71214	0		CLEAR	DLOAD
5087	REF	9	LAST	512	13,2174	01673	1			INTYPFLG
5088	REF	1			13,2175	01571	0			TETTHIS
5089	REF	15	LAST	514	13,2176	34041	0	INTOTHIS	STCALL	TDEC1
5090	REF	6	LAST	511	13,2177	27211	0			INTEGRVS
5091					13,2200	77624	1		CALL	
5093	REF	13	LAST	514	13,2201	27516	0			INTSTALL

DISALLOW V37

U(-R)

U(-R) TO 24D

U(-R)XV = U(VXR)

U(VXR)XU(-R) = U((RXV)XR)

FROM CSM

FROM LM

V(MPAC)=DELTA-V IN REFCOSYS

V(PD6)=VATT + DELTA V

PREVENT WOULD-BE USER OF ORBITAL

INTEG FROM INTERFERING WITH UPDATING

```
50933                          13,2202  77624 1          CALL
50936  REF   2  LAST  514      13,2203  26245 0          P76SUB1     SET/CLEAR MOONFLAG
5094                           13,2204  77775 1          VLOAD
5095   REF   5  LAST  510      13,2205  00017 1          RATT1
5096   REF   2  LAST   89      13,2206  01503 0          STORE  RRECT
5097   REF  10  LAST  514      13,2207  15535 0          STODL  RCV
5098   REF   6  LAST  511      13,2210  00015 0          TAT
5099   REF  12  LAST  514      13,2211  25517 0          STOVL  TET
5100   REF   5  LAST  510      13,2212  00025 0          VATT1
5101                           13,2213  77624 1          CALL
5102   REF   1                 13,2214  23434 0          MINIRECT
5103                           13,2215  77776 1          EXIT
5104   REF  28  LAST  513      13,2216  0 5402 1         TC     PHASCHNG
5105                           13,2217  04024 0          OCT    04024

5109   REF  60  LAST  513      13,2220  0 6006 1         TC     INTPRET
5110                           13,2221  62214 1          SET    CCALL
51105  REF   1                 13,2222  05062 0          REINTFLG
51106  REF   5  LAST  514      13,2223  03546 0          OPTFLAG
5111   REF   1                 13,2224  26243 0          UPDATADR
5116                           13,2225  77624 1          CALL
5117   REF   2  LAST  274      13,2226  27525 0          INTWAKEO    PERMIT USE OF ORBITAL INTEGRATION
5121                           13,2227  77414 0  OUT     CLEAR  EXIT ALLOW V37. NO NEED TO CLEAR NODOFLAG AT
5122   REF   3  LAST  514      13,2230  01276 0          NODOFLAG     ENDP76 SINCE FLAG NOT SET WHEN DISPLAY
A5123                                                               RESPONSES TRANSFER THERE FROM P76+.
 5124  REF  10  LAST  313      13,2231  3 7702 0         CAF    NEGONE
51242  REF  24  LAST  452      13,2232  55'722 0         TS     MRKBUF1
51244  REF   2  LAST  486      13,2233  1 4105 0         TCF    MNKGOPOO

5127   REF  11  LAST  515      13,2234  3 7702 0 ENDP76  CAF    NEGONE
5128   REF  25  LAST  515      13,2235  55'722 0         TS     MRKBUF1     INVALIDATE MARK BUFFER

5129   REF  14  LAST  509      13,2236  1 4103 0         TCF    GOTOPOOH

5130                           13,2237  01524 0 V06N84   NV     0684
5131                           13,2240  01521 0          NV     0681        MUST BE EQUAL TO V06N84 +1
51312  REF   1                 13,2241  27161 1 INTADR   CADR   OTHPREC
51314  REF   1                 13,2242  27145 1          CADR   THISPREC    MUST BE EQUAL TO INTADR +1
51316  REF   1                 13,2243  27034 0 LPDATADR CADR   ATOPOTH
51318  REF   1                 13,2244  26761 0          CADR   ATOPTHIS    MUST BE EQUAL TO UPDATADR +1
5132                           13,2245  67214 1 P76SUB1  CLEAR  SLOAD
5133   REF  11  LAST  511      13,2246  00263 0          MOONFLAG
5134   REF   5  LAST  499      13,2247  00050 1          X2
5135                           13,2250  43030 0          BHIZ   SET  X2=0...CLEAR MOONFLAG
5136                           13,2251  26253 1          +2          =2..... SET MOONFLAG
5137   REF  12  LAST  515      13,2252  00063 1          MOONFLAG
5138                           13,2253  77616 0          RVQ
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L R30 USER'S PAGE NO. 1 ED S3

P5200 SUBROUTINE NAME: V82CALL
R5201 MOD NO: 0 DATE: 16 FEB 67
R5203 MOD BY: RR BAIRNSFATHER LOG SECTION: R30
R5205 MOD NO: 1 MOD BY: RR BAIRNSFATHER DATE: 11 APR 67 SR30.1 CHANGED TO ALLOW MONITOR OPERN
R5208 MOD NO: 2 MOD BY ALONSO DATE : 11 DEC 67 V82 PROGRAM REWRITTEN
R52095 MOD NO: 3 MOD BY ALONSO DATE: 26 MAR 68 PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R5210 MOD NO- 4 MOD BY CROCKER DATE- 27 AUG 69 PROG MOD FOR TIME OPTION.
R5211 NEW FUNCTIONAL DESCRIPTION- CALLED BY VERB 82 ENTER. PRIORITY 7
R52111 USED THROUGHOUT. CALCULATE AND DISPLAY ORBITAL PARAMETERS
R52119
R5212 1. IF AVERAGE G IS OFF:
R5213 FLASH DISPLAY V04N12. R2 INDICATES WHICH SHIP,S STATE VECTOR IS
R5214 TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1) ASTRONAUT
R5215 CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R5216 FLASH DISPLAY TIME V06N16. INITIAL CHOICE = 0 = PRESENT TIME.
R52161 ASTRONAUT CAN INSERT A TIME BY V25E, R1=HR R2=MIN R3=CSEC.
R52162 CHOSEN STATE VECTOR UPDATED TO CHOSEN TIME BY THISPREC/OTHPREC
R5217 CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R5218 RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R5219 HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R5220 HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R5221 INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R5222 FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R5223 NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R52235 IF P00 IS RUNNING, CALL DELRSPL SPLASH ERROR COMPUTATION.
R5224 ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R5225 DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R5226 ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R5227 2. IF AVERAGE G IS ON:
R5228 CALLS SR30.1 APPROX EVERY TWO SECS. STATE VECTOR IS ALWAYS
R5229 FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR. RESULTS
R5230 OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R5231 FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R5232 IF MODE IS P11, THEN CALL DELRSPL SO ASTRONAUT CAN MONITOR
R5233 RESULTS BY N50E. SPLASH COMPUTATION DONE ONCE PER TWO SECS.

R52331 ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R52332 ABOVE REMARKS.

R5234 CALLING SEQUENCE: VERB 82 ENTER.

R5235 SUBROUTINES CALLED: SR30.1, GOXDSPF
R5236 MAYBE - THISPREC, OTHPREC, LOADTIME, DELRSPL,
R52361 VEHOPT, TIMEOPT
R5237 NORMAL EXIT MODES: TC ENDEXT

R5238 ALARMS: NONE

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R5239   OUTPUT:  HAPOX     (-29) M
R5240            HPERX     (-29) M
R5241            RAPO      (-29) M EARTH
R52411                     (-27) M MOON
R5242            RPER      (-29) M EARTH
R52421                     (-27) M MOON
R5243            TFF       (-28) CS       CONTAINS NEGATIVE QUANTITY
R5244            -TPER     (-28) CS       CONTAINS NEGATIVE QUANTITY
R5245            RSP-RREC  (-29) M        IF DELRSPL CALLED

R5246   ERASABLE INITIALIZATION REQUIRED: STATE VECTOR.

R5247   DEBRIS:  QPRET, RONE, VONE,TFF/RTMU, HPERMIN, RPADTEM, V82EMFLG.
R5248            MAYBE: TSTART82, V82FLAGS, TDEC1.


  5249  REF   5  LAST  291   E4,1742                          EBANK= HAPOX
  52495 REF   3  LAST  276   40,2000                         SBANK= PINSUPER
  5251  REF   1              23,2000                         SETLOC R30LOC
  5252                       23,2330                         BANK
  5253  REF   1                                              COUNT* $$/R30

  5254  REF  61  LAST  515   23,2330  0 6006 1  V82CALL  TC      INTPRET
  5255                       23,2331   45014 0             BON     CALL
  5256  REF   1              23,2332   00716 1             AVEGFLAG
  5257  REF   1              23,2333   46551 1             V82GON          IF AVERAGE G ON
  5258  REF   1              23,2334   50064 0             VEHOPT          IF OFF, ALLOW VEHICLE OPTION
  5270                       23,2335   77776 1  EXIT
  5271  REF  23  LAST  391   23,2336  3 4765 1             CAF     BIT4    80 MS
  5272  REF  11  LAST  419   23,2337  0 5233 0             TC      WAITLIST
  5273  REF   4  LAST  292   E4,1734                        EBANK=  TFF
  5274  REF   1              23,2340   02514 0             2CADR   TICKTEST
  5274  REF   1              23,2341   46104 0
  5275                       23,2342  0 0003 1             RELINT
  52755 REF   8  LAST  506   30,2000                        SBANK=  LOWSUPER
  5276  REF   1              23,2343  3 2372 0  V82GOFLP   CAF     TFFBANK MAJOR RECYCLE LOOP ENTRY
  5277  REF  13  LAST  428   23,2344  54 003 0             TS      EBANK
  5278  REF 106  LAST  456   23,2345  3 4772 1             CAF     ZERO
  5279  REF   3  LAST   95   23,2346  55'733 0             TS      V82FLAGS        ZERO FLAGS FOR TICKTEST. INHIBITS
A5280                                                                             DECREMENTING OF TFF AND -TPER.
  5281  REF   5  LAST  276   23,2347  3 5051 0             CAF     PRIO7
  5282  REF  21  LAST  507   23,2350  0 5135 0             TC      FINDVAC         V82GOFF1 WILL EXECUTE STATE VECTOR
  5283  REF   5  LAST  517   E4,1734                        EBANK=  TFF             UPDATE AND ORBIT CALCULATIONS FOR
  5284  REF   1              23,2351   02373 1             2CADR   V82GOFF1        SELECTED VEHICLE ABOUT PROPER BODY.
  5284  REF   1              23,2352   46064 1
  5285                       23,2353  0 0003 1             RELINT
  5286  REF  17  LAST  395   23,2354  3 6214 0  V82STALL   CAF     THREE           STALL IN THIS LOOP AND WITHOLD V 16 N 44
  5287  REF   4  LAST  517   23,2355  7 1733 0             MASK    V82FLAGS        UNTIL STATE VECTOR UPDATE SETS ONE OF
  5288  REF 138  LAST  448   23,2356  10 000 0             CCS     A               OUR FLAG BITS.
  5289  REF   1              23,2357  0 2363 0             TC      FLAGGON         EXIT FROM STALL LOOP.
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5291   REF  96  LAST  513   23,2360  0 4636 0            TC      BANKCALL
5292   REF   3  LAST  507   23,2361   01730 1            CADR    1SECDELY
5293   REF   1               23,2362  0 2354 1           TC      V82STALL

5294   REF   1               23,2363  3 2371 0  FLAGGON  CAF     V16N44      MONITOR HAPO,HPER,TFF.
5295   REF  97  LAST  518   23,2364  0 4636 0            TC      BANKCALL
5296   REF  11  LAST  506   23,2365    20576 1           CADR    GOXDSPF
5297   REF   3  LAST  507   23,2366  0 5626 0            TC      B5OFF       TERM  THIS TELLS TICKTEST TO KILL ITSELF
5298   REF   4  LAST  518   23,2367  0 5626 0            TC      B5OFF       PROCEED  DITTO
5299   REF   1               23,2370  0 2343 1           TC      V82GOFLP    RECYCLE  RECOMPUTE STATE VECT + DISPLAY

5301                         23,2371    04054 1  V16N44  VN      1644
5302   REF   6  LAST  517   23,2372    02334 1  TFFBANK ECADR   TFF

5303   REF  62  LAST  517   23,2373  0 6006 1  V82GOFF1 TC     INTPRET
5304                         23,2374    45145 0           DLOAD   CALL
53045  REF  10  LAST  483   23,2375    15336 0                   ZEROVECS    INITIAL TIME = 0 = PRES. TIME
5305   REF   3  LAST  505   23,2376    46424 1                   TIMEOPT     ALLOW TIME SELECTION
5307   REF   1               23,2377    16316 1           STODL   TSTART82    TIME FOR INTERNAL USE (=TDEC1 TIME)
5309   REF   1               23,2400    01257 0                   OPTIONEV
5310                         23,2401    46142 1           SR1     BHIZ
5312   REF   1               23,2402    46420 0                   THISSHIP
5314                         23,2403    77624 1           CALL                CALL STATE VECTOR UPDATE FOR OTHER SHIP.
5315   REF   2  LAST  515   23,2404    27161 1                   CTHPREC
5316                         23,2405    77775 1  BOTHSHIP VLOAD             MOVE RESULTS INTO TFFCONIC STORAGE AREAS
5317   REF  13  LAST  514   23,2406    00001 0                   RATT         TO BE CALLED BY SR30.1.
5318   REF  10  LAST  512   23,2407    26320 1           STOVL   RONE        RATT AT (-29)M FOR EARTH OR MOON
5321   REF  11  LAST  514   23,2410    00007 0                   VATT
5322   REF   7  LAST  512   23,2411    16326 1           STODL   VONE
5323   REF   6  LAST  515   23,2412    00050 1                   X2
5329                         23,2413    45030 0           BHIZ    CALL
5331   REF   1               23,2414    46457 0                   EARTHPAD
5332   REF   1               23,2415    46635 0                   MOONGON
5333                         23,2416    77650 1           GOTO
53335  REF   1               23,2417    46461 0                   BOTHPAD
5335                         23,2420    77624 1  THISSHIP CALL              CALL STATE VECTOR UPDATE FOR THIS SHIP.
5336   REF   2  LAST  515   23,2421    27145 1                   THISPREC
5337                         23,2422    77650 1           GOTO
5338   REF   1               23,2423    46405 1                   BOTHSHIP

53380  REF   3  LAST  283   23,2424    01255 1  TIMEOPT  STORE   DSPTEMX
53381                        23,2425    77420 1    +1     STQ     EXIT
53382  REF   3  LAST  506   23,2426    00734 1                   VEHRET
53383  REF   1               23,2427  3 2446 0           CAF     V06N16X
53383  REF  98  LAST  518   23,2430  0 4636 0            TC      BANKCALL
53384  REF  12  LAST  518   23,2431    20576 1           CADR    GOXDSPF
53384  REF  25  LAST  509   23,2432  0 5524 1            TC      ENDEXT
53385                        23,2433  0 2435 1            TC      +2
53385                        23,2434  0 2427 1            TC      -5
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53386  REF  63  LAST  518   23,2435  0 6006 1            TC      INTPRET
533865                      23,2436   53145 1            DLOAD   BZE
53387  REF   4  LAST  518   23,2437   01255 1                    DSPTEMX
533875 REF   1              23,2440   46443 0                    GETNOW
53388  REF  16  LAST  514   23,2441   34041 0  STRTDEC1  STCALL  TDEC1
533883 REF   4  LAST  518   23,2442   00734 1                    VEHRET
533886                      23,2443   52034 1  GETNOW    RTB     GOTO
53389  REF   7  LAST  510   23,2444   51751 0                    LOADTIME
533893 REF   1              23,2445   46441 1                    STRTDEC1
533896                      23,2446   01420 0  V06N16X   VN      0616
R5339   THE FOLLOWING CONSTANTS ARE PAIRWISE INDEXED. DO NOT SEPARATE PAIRS.

5340                        23,2447   27533 1  1/RTMUM   2DEC*   .45162595 E-4 B14*
5340                        23,2450   07571 0
5341                        23,2451   25004 1  1/RTMUE   2DEC*   .50087529 E-5 B17*
5341                        23,2452   06702 1
5342                        23,2453   00001 0  MINPERM   2DEC    10668 B-27      35 KFT MIN PERIGEE HEIGHT FOR MOON(-27)M
5342                        23,2454   11530 1
5343                        23,2455   00002 0  MINPERE   2DEC    91440 B-29      300 KFT (-29)M FOR EARTH
5343                        23,2456   31230 1

5344                        23,2457   77624 1  EARTHPAD  CALL
5345   REF   1              23,2460   46647 0                    EARTHGUN
5350   REF   2  LAST   94   23,2461   36314 1  BOTHPAD   STCALL  RPADTEM
5352   REF   1              23,2462   46660 0                    SR30.1          CALCULATE ORBITAL PARAMETERS
53521                       23,2463   46135 1            SLOAD   BHIZ
53522  REF  11  LAST  513   23,2464   01215 0                    MCDREG          ARE WE IN POO
53524  REF   1              23,2465   46611 0                    CANDEL          YES, DO DELRSPL
5353                        23,2466   45234 0  SPLRET1   RTB     DSU
5354   REF   8  LAST  519   23,2467   51751 0                    LOADTIME
5356   REF   2  LAST  518   23,2470   02316 1                    TSTART82        PRESENT TIME - TIME V82GOFF1 BEGAN
5357   REF   3  LAST  519   23,2471   16316 1            STODL   TSTART82                SAVE IT.
5358   REF   3  LAST  284   23,2472   02337 1                    -TPER           SR30.1 SETS -TPER=0 IF HPER L/
5359                        23,2473   77654 0            BZE              HPERMIN (300 OR 35) KFT.
5360   REF   1              23,2474   46504 1                    TICKTFF         (-TPER = 0)
5361                        23,2475   43345 1  TICKTPER  DLOAD   DAD             (-TPER NON ZERO)  TFF WAS NOT COMPUTED,
5362   REF   4  LAST  519   23,2476   02337 1                    -TPER           BUT WAS SET TO 59M59S.DONT TICK TFF, DO
5363   REF   4  LAST  519   23,2477   02316 1                    TSTART82        TICK -TPER. DISPLAY BOTH.
5364   REF   5  LAST  519   23,2500   02337 1            STORE   -TPER           -TPER CORRECTED FOR TIME SINCE V82GOFF1
5365                        23,2501   77776 1            EXIT                    BEGAN.
5366   REF  27  LAST  513   23,2502  3 4770 0            CAF     BIT1            INFORMS TICKTEST TO INCREMENT ONLY -TPER
5368   REF   2  LAST  519   23,2503  0 2512 0            TC      TICKTFF +6
5369                        23,2504   43345 1  TICKTFF   DLOAD   DAD             (-TPER=0)  TFF WAS COMPUTED.TICK TFF.
5370   REF   7  LAST  518   23,2505   02335 0                    TFF             DO NOT TICK -TPER.DISPLAY TFF, BUT NOT
5371   REF   5  LAST  519   23,2506   02316 1                    TSTART82        -TPER.
5372   REF   8  LAST  519   23,2507   02335 0            STORE   TFF             TFF CORRECTED FOR TIME SINCE V82GOFF1
5373                        23,2510   77776 1            EXIT                    BEGAN.
5374   REF  21  LAST  456   23,2511  3 4767 0            CAF     BIT2
5375   REF   5  LAST  517   23,2512   55'733 0    +6      TS      V82FLAGS        INFORMS TICKTEST TO INCREMENT ONLY TFF.
5376   REF  51  LAST  458   23,2513  0 5205 0            TC      ENDOFJOB
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5377   REF  21  LAST  508   23,2514   3 4764 0  TICKTEST CAF    BIT5      THIS WAITLIST PROGRAM PERPETUATES ITSELF
5378   REF  11  LAST  509   23,2515   7 1247 0           MASK   EXTVBACT  ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
5379   REF 139  LAST  517   23,2516  10 000 0           CCS    A
5380   REF   1              23,2517   0 2525 1           TC     DOTICK
5381   REF   1              23,2520   3 7647 0           CAF    PRIO25
5382   REF   8  LAST  365   23,2521   0 5121 0           TC     NOVAC     TERMINATE V 82.CANT CALL ENDEXT IN RUPT
5383   REF  12  LAST  520      1247                     EBANK= EXTVBACT
5384   REF  26  LAST  518   23,2522    05524 1           2CADR  ENDEXT
5384                        23,2523    04062 1
5385   REF  18  LAST  438   23,2524   0 5314 1           TC     TASKOVER
5386   REF   8  LAST  432   23,2525   3 5016 0  DOTICK   CAF    1SEC      RE-REQUEST TICKTEST.
5387   REF  12  LAST  517   23,2526   0 5233 0           TC     WAITLIST
5388   REF   9  LAST  519   E4,1734                    EBANK= TFF
5389   REF   2  LAST  517   23,2527    02514 0           2CADR  TICKTEST
5389                        23,2530    46064 1
5390   REF  18  LAST  517   23,2531   3 6214 0           CAF    THREE
5391   REF   6  LAST  519   23,2532   7 1733 0           MASK   V82FLAGS
5392   REF 140  LAST  520   23,2533  50 000 1           INDEX  A
5393                        23,2534   0 2535 0           TC     +1
5394   REF  19  LAST  520   23,2535   0 5314 1           TC     TASKOVER  IF NO FLAGBITS SET DONT CHANGE TFF OR
A5395                                                                   -TPER, BUT CONTINUE LOOP.
5396   REF   1              23,2536   0 2544 0           TC     TPERTICK  ONLY BIT 1 SET. INCR -TPER BY 1 SEC.
5397   REF   9  LAST  520   23,2537   3 5016 0  TFFTICK   CAF    1SEC      ONLY BIT 2 SET. INCR TFF BY 1 SEC.
5398   REF  62  LAST  449   23,2540  54 001 1           TS     L
5399   REF 107  LAST  517   23,2541   3 4772 1           CAF    ZERO
5400   REF  10  LAST  520   23,2542  21'735 0           DAS    TFF
5401   REF  20  LAST  520   23,2543   0 5314 1           TC     TASKOVER
5402   REF  10  LAST  520   23,2544   3 5016 0  TPERTICK CAF    1SEC
5403   REF  63  LAST  520   23,2545  54 001 1           TS     L
5404   REF 108  LAST  520   23,2546   3 4772 1           CAF    ZERO
5405   REF   6  LAST  519   23,2547  21'737 1           DAS    -TPER
5406   REF  21  LAST  520   23,2550   0 5314 1           TC     TASKOVER
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 5407                          23,2551   77776 1  V82GON   EXIT                AVERAGE G ON. USE CURRENT STATE VECTOR
A5408                                                                          FOR ORBITAL PARAMETER CALCULATIONS.
 5409  REF   6  LAST  517      23,2552   3 5051 0           CAF     PRIO7      LESS THAN LAMBERT
 5410  REF  22  LAST  517      23,2553   0 5135 0           TC      FINDVAC    V82GON1 WILL PERFORM ORBIT CALCULATIONS
 5411  REF  11  LAST  520      E4,1734                      EBANK=  TFF        ABOUT PROPER BODY APPROX ONCE PER SEC.
 5412  REF   1                23,2554    02567 1           2CADR   V82GON1
 5412  REF   1                23,2555    46064 1
 5413                          23,2556   0 0003 1           RELINT
 5414  REF   4  LAST  250      23,2557   10 067 1           CCS     NEWJOB     WITHOLD V16 N44 UNTIL FIRST ORBIT CALC
 5415  REF   2  LAST  250      23,2560   0 5152 1           TC      CHANG1     IS DONE. NOTE: V82GON1 (PRIO7, FINDVAC
A5416                                                                          JOB) IS COMPLETED BEFORE V82GON (PRIO7,
A54161                                                                         NOVAC JOB).
 5417  REF   2  LAST  518      23,2561   3 2371 0  V82REDSP CAF     V16N44     MONITOR HAPO, HPER, TFF
 5418  REF  99  LAST  518      23,2562   0 4636 0           TC      BANKCALL
 5419  REF  13  LAST  518      23,2563    20576 1           CADR    GOXDSPF
 5420  REF   5  LAST  518      23,2564   0 5626 0           TC      B5OFF      TERM THIS TELLS V82GON1 TO KILL ITSELF.
 5421  REF   6  LAST  521      23,2565   0 5626 0           TC      B5OFF      PROC DITTO.
 5422  REF   1                23,2566   0 2561 1           TC      V82REDSP   RECYCLE

 5423  REF  64  LAST  519      23,2567   0 6006 1  V82GON1  TC      INTPRET    THIS EXEC PROGRAM PERPETUATES ITSELF
A5424                                                                          ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
 5425                          23,2570    52175 0           VLOAD   GOTO       HOLDS OFF CCS NEWJOB BETWEEN RN AND
 5426  REF   6  LAST  512      23,2571    01030 0                   RN           VN FETCH SO RN , VN ARE FROM SAME
 5427  REF   1                23,2572    46573 1                   NEXTLINE     STATE VECTOR UPDATE.
 5428  REF  11  LAST  518      23,2573    26320 1  NEXTLINE STOVL   RONE        RN AT (-29)M FOR EARTH OR MOON
 5429  REF   6  LAST  512      23,2574    01036 0                   VN
 5430  REF   8  LAST  518      23,2575    02326 1           STORE   VONE       VN AT (-7)M/CS FOR EARTH OR MOON
 5431                          23,2576    45014 0           BON     CALL
 5432  REF   1                23,2577    00315 0                   AMOONFLG   FLAG INDICATES BODY ABOUT WHICH ORBITAL
 5433  REF   1                23,2600    46631 1                   MOONGONA     CALCULATIONS ARE TO BE PERFORMED.
 5434  REF   2  LAST  519      23,2601    46647 0                   EARTHGON     IF SET - MOON , IF RESET - EARTH.

 5451  REF   3  LAST  519      23,2602    36314 1  V82GON2  STCALL  RPADTEM     COMMON CODE FOR EARTH & MOON.
 5453  REF   2  LAST  519      23,2603    46660 0                   SR30.1
 5454                          23,2604    77776 1           EXIT
 5455  REF  15  LAST  509      23,2605   0 5354 0           TC      CHECKMM
 5456                          23,2606    00013 0           DEC     11
 5457  REF   1                23,2607   0 2622 0           TC      V82GON3    NOT IN MODE 11.
 5458  REF  65  LAST  521      23,2610   0 6006 1           TC      INTPRET    IN MODE 11 OR P00
54581                          23,2611    77624 1  CANDEL   CALL
54582  REF  14  LAST  514      23,2612    27516 0                   INTSTALL   DELRSPL DOES INTWAKE
 5459                          23,2613    45145 0           DLOAD   CALL
 5460  REF  12  LAST  521      23,2614    02335 0                   TFF
 5461  REF   1                23,2615    64027 0                   DELRSPL    RETURN IS TO NEXT LINE ( SPLRET ).
 5462                          23,2616    46135 1  SPLRET   SLOAD   BHIZ
54621  REF  12  LAST  519      23,2617    01215 0                   MODREG
54623  REF   1                23,2620    46466 1                   SPLRET1
54624                          23,2621    77776 1           EXIT
 5463  REF  22  LAST  520      23,2622   3 4764 0  V82GON3  CAF     BIT5
 5464  REF  13  LAST  520      23,2623   7 1247 0           MASK    EXTVBACT   SEE IF ASTRONAUT HAS SIGNALLED TERMINATE
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5465                                23,2624  0 0006 1           EXTEND
5466   REF  27  LAST  520           23,2625  1 5524 0           BZF     ENDEXT      YES, TERMINATE V8 82 LOOP
5469   REF 100  LAST  521           23,2626  0 4636 0           TC      BANKCALL    WAIT ONE SECOND BEFORE REPEATING
5470   REF   4  LAST  518           23,2627   01730 1           CADR    1SECDELY       ORBITAL PARAMETER COMPUTATION.
5471   REF   2  LAST  521           23,2630  0 2567 1           TC      V82GON1

5500                                23,2631   77624 1 MOONGONA CALL
5501   REF   2  LAST  518           23,2632   46635 0                   MOONGON
5502                                23,2633   77650 1           GOTO
5503   REF   1                     23,2634   46602 1                   V82GON2
5504                                23,2635   71214 0 MOONGON   SET     DLOAD
5505   REF   1                     23,2636   04462 0                   V82EMFLG    INDICATES LUNAR SCALING FOR SR30.1
5506   REF   1                     23,2637   06450 0                   1/RTMUM     LUNAR PARAMETERS LOADED HERE FOR SR30.1
5507   REF   1                     23,2640   14037 0           STODL   TFF/RTMU
5508   REF   1                     23,2641   06454 1                   MINPERM
5509   REF   2  LAST   94          23,2642   26312 0           STOVL   HPERMIN
5510   REF   4  LAST  499          23,2643   02026 1                   RLS         SCALED AT (-27)M.
5511                                23,2644   77646 0           ABVAL
55112                               23,2645   43414 1           SET     RVQ
55114  REF   5  LAST  459          23,2646   01463 1                   LUNAFLAG    FOR LAT-LONG SUBROUTINE
5512                                23,2647   71214 0 EARTHGON  CLEAR   DLOAD
5513   REF   2  LAST  522          23,2650   04662 1                   V82EMFLG    INDICATE EARTH SCALING FOR SR30.1
5514   REF   1                     23,2651   06452 1                   1/RTMUE     EARTH PARAMETERS LOADED HERE FOR SR30.1
5515   REF   2  LAST  522          23,2652   14037 0           STODL   TFF/RTMU
5516   REF   1                     23,2653   06456 0                   MINPERE
5517   REF   3  LAST  522          23,2654   16312 0           STODL   HPERMIN
5518   REF   2  LAST  499          23,2655   05173 1                   RPAD
5519                                23,2656   43414 1           CLEAR   RVQ
5520   REF   6  LAST  522          23,2657   01663 0                   LUNAFLAG    FOR LAT-LONG SUBROUTINE
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L R30 USER'S PAGE NO. 8 E4 S3

P5548 SUBROUTINE NAME: SR30.1
R5549 MOD NO: 0 DATE: 16 FEB 67
R5551 MOD BY: RR BAIRNSFATHER LOG SECTION: R32

R5553	MOD NO: 1	MOD BY: RR BAIRNSFATHER	DATE: 11 APR 67	SR30.1 CHANGED TO ALLOW MONITOR OPERN
R5555	MOD NO: 2	MOD BY: RR BAIRNSFATHER	DATE: 14 APR 67	ADD OVFL CK FOR RAPO
R5557	MOD NO: 3	MOD BY ALONSO	DATE: 11 DEC 67	SUBROUTINE REWRITTEN
R55585	MOD NO: 4	MOD BY ALONSO	DATE: 26 MAR 68	PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R5559	MOD NO: 5	MOD BY: RR BAIRNSFATHER	DATE: 6 AUG 68	OVFL CK FOR HAPO & HPER.VOIDS MOD #2.

R5561

R5562 NEW FUNCTIONAL DESCRIPTION: ORBITAL PARAMETERS DISPLAY FOR NOUNS 32 AND 44.
R5564 SR30.1 CALLS TFFCONMU AND TFFRP/RA TO CALCULATE RPER (PERIGEE RADIUS),
R5565 RAPO (APOGEE RADIUS), HPER (PERIGEE HEIGHT ABOVE LAUNCH PAD OR LUNAR
R5566 LANDING SITE), HAPO (APOGEE HEIGHT AS ABOVE), TPER (TIME TO PERIGEE),
R5567 TFF (TIME TO INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R5568 IF HPER IS GREATER THAN OR EQUAL TO HPERMIN, CALCULATES TPER AND STORES
R5569 NEGATIVE IN -TPER. OTHERWISE STORES +0 IN -TPER. WHENEVER TPER IS
R5570 CALCULATED, TFF IS NOT COMPUTABLE AND DEFAULTS TO -59MIN 59SEC. IF HAPO
R5571 WOULD EXCEED 9999.9 NM, IT IS LIMITED TO THAT VALUE FOR DISPLAY.

R5572 ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R5573 ABOVE REMARKS.

R5574 CALLING SEQUENCE: CALL
R5575 SR30.1
R5576 SUBROUTINES CALLED: TFFCONMU, TFFRP/RA, CALCTPER, CALCTFF
R5577 NORMAL EXIT MODE: CALLING LINE +1 (STILL IN INTERPRETIVE MODE)
R5578 ALARMS: NONE

R5579	OUTPUT:	RAPO	(-29) M EARTH	APOGEE RADIUS	EARTH CENTERED COORD.
R5580			(-27) M MOON		MOON CENTERED COORD.
R5581		RPER	(-29) M EARTH	PERIGEE RADIUS	EARTH CENTERED COORD.
R5582			(-27) M MOON		MOON CENTERED COORD.
R5583		HAPOX	(-29) M	APOGEE ALTITUDE	ABOVE PAD OR LAND. SITE MAX VALUE LIMITED TO 9999.9 NM.
R5585		HPERX	(-29) M	PERIGEE ALT.	ABOVE PAD OR LAND. SITE MAX VALUE LIMITED TO 9999.9 NM.
R5587		TFF	(-28) CS	TIME TO 300KFT OR 35KFT ALTITUDE	
R5588		-TPER	(-28) CS	TIME TO PERIGEE	
R5589	ERASABLE	INITIALIZATION REQUIRED-			
R5590		TFF/RTMU	(+17) EARTH	RECIPROCAL OF PROPER GRAV CONSTANT FOR	
R5591			(+14) MOON	EARTH OR MOON = 1/SQRT(MU).	
R5592		RONE	(-29) M	STATE VECTOR	
R5593		VONE	(-7) M/CS	STATE VECTOR	
R5594		RPADTEM	(-29) M EARTH	RADIUS OF LAUNCH PAD OR LUNAR LANDING	
R5595			(-27) M MOON	SITE.	
R5596		HPERMIN	(-29) M EARTH	(300 OR 35)KFT MINIMUM PERIGEE ALTITUDE	
R5597			(-27) M MOON	ABOVE LAUNCH PAD OR LUNAR LANDING SITE.	
R5598		V82EMFLG	(INT SW BIT)	RESET FOR EARTH, SET FOR MOON.	

R5599 DEBRIS: QPRET, POL, S2

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 5600   REF   1                                        COUNT* $$/SR30S

 5601                        23,2660   44001 0  SR30.1  SETPD   STQ          INITIALIZE PUSHDOWN LIST.
 5602                        23,2661   00001 0           0
 5603   REF   4  LAST  449   23,2662   00051 0           S2
A5604                                                                  SR30.1 INPUT: RONE AT (-29)M EARTH/MOON
A5605                                                                                VONE AT (-7)M/CS
A5606                                                                  TFFCONMU,TFFRP/RA,CALCTPER AND CALCTFF
A5607                                                                  CALLS REQUIRE :
A5608                                                                  EARTH CENTERED (NO RESCALING REQUIRED)
A5609                                                                                RONE SCALED TO B-29 M
A5610                                                                                VONE SCALED TO B-7 M/CS
A5611                                                                  MOON CENTERED  (RESCALING REQUIRED)
A5612                                                                                RONE SCALED TO B-27 M
A5613                                                                                VONE SCALED TO B-5  M/CS
 5614                        23,2663   77214 0           BOFF    VLOAD
 5615   REF   3  LAST  522   23,2664   04742 1           V82EMFLG        OFF FOR EARTH ,  ON FOR MOON.
 5616   REF   1             23,2665   46674 0           TFFCALLS
 5617   REF  12  LAST  521   23,2666   02320 1           RONE
 5618                        23,2667   77752 1           VSL2
 5619   REF  13  LAST  524   23,2670   26320 1           STOVL   RONE
 5620   REF   9  LAST  521   23,2671   02326 1           VONE
 5621                        23,2672   77752 1           VSL2
 5622   REF  10  LAST  524   23,2673   02326 1           STORE   VONE
 5623                        23,2674   77624 1  TFFCALLS CALL
 5624   REF   1             23,2675   57152 0                   TFFCONMU
 5625                        23,2676   77624 1           CALL                  TFFRP/RA COMPUTES RAPO,RPER.
 5626   REF   1             23,2677   57220 0                   TFFRP/RA
A5627                                                                  RETURNS WITH RAPO IN D(MPAC).
 5628                        23,2700   77625 0           DSU
 5629   REF   4  LAST  521   23,2701   02314 0           RPADTEM
 5630                        23,2702   64414 1           BOFF    SR2R          NEED HAPO AT (-29)M FOR DISPLAY.
A5631                                                                  IF MOON CENTERED, RESCALE FROM (-27)M
A5632                                                                   IF EARTH CENTERED ALREADY AT (-29)M.
 5633   REF   4  LAST  524   23,2703   04742 1           V82EMFLG        OFF FOR EARTH , ON FOR MOON.
 5634                        23,2704   46705 1           +1
 5635                        23,2705   77624 1           CALL          IF HAPO > MAXNM, SET HAPO =9999.9 NM
 5636   REF   1             23,2706   46745 0           MAXCHK        OTHERWISE STORE (RAPO-RPADTEM) IN HAPO.
 5637   REF   6  LAST  517   23,2707   16343 1  STORHAPO STODL   HAPOX
 5638   REF   1             23,2710   00017 1           RPER
 5639                        23,2711   77625 0           DSU
 5640   REF   5  LAST  524   23,2712   02314 0           RPADTEM       GIVES HPER AT (-29)M EARTH, (-27)M MOON
 5641   REF 229  LAST  490   23,2713   00161 1           STORE   MPAC +4  SAVE THIS FOR COMPARISON TO HPERMIN.
 5642                        23,2714   64414 1           BOFF    SR2R          NEED HPER AT (-29)M FOR DISPLAY.
A5643                                                                  IF MOON CENTERED, RESCALE FROM (-27)M.
A5644                                                                  IF EARTH CENTERED ALREADY AT (-29)M.
 5645   REF   5  LAST  524   23,2715   04742 1           V82EMFLG      OFF FOR EARTH,  ON FOR MOON.
 5646                        23,2716   46717 1           +1
 5647                        23,2717   77624 1           CALL          IF HPER > MAXNM, SET HPER = 9999.9 NM
 5648   REF   2  LAST  524   23,2720   46745 0           MAXCHK
```

```
5649  REF   5  LAST  292   23,2721  16345 1  STORHPER STODL  HPERX          STORE (RPER - RPADTEM) INTO HPERX.
5650  REF 230  LAST  524   23,2722  00161 1                  MPAC +4
5651                       23,2723  51025 1           DSU    BPL           HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
5652  REF   4  LAST  522   23,2724  02312 0                  HPERMIN       IF HPER L/   HPERMIN (300 OR 35)KFT,
5653  REF   1               23,2725  46731 0                  DOTPER         THEN ZERO INTO -TPER.
5654                       23,2726  52145 0           DLOAD  GOTO           OTHERWISE CALCULATE TPER.
5655  REF   1               23,2727  15336 0                  HI6ZEROS
5656  REF   1               23,2730  46735 1                  SKIPTPER
5657                       23,2731  45145 0  DOTPER   DLOAD  CALL
5658  REF   2  LAST  524   23,2732  00017 1                  RPER
5659  REF   1               23,2733  57256 1                  CALCTPER
5660                       23,2734  77676 0           DCOMP
5661  REF   7  LAST  520   23,2735  16337 1  SKIPTPER STODL  -TPER          TPER IS PUT NEG INTO -TPER.
5662  REF   5  LAST  525   23,2736  02312 0                  HPERMIN       HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
5663                       23,2737  45015 1           DAD    CALL
5664  REF   6  LAST  524   23,2740  02314 0                  RPADTEM       RPADTEM AT (-29)M FOR EARTH, (-27)M MOON
5665  REF   1               23,2741  57261 0                  CALCTFF       GIVES 59M59S FOR TFF IF RPER G/
5666                       23,2742  77676 0           DCOMP                  HPERMIN + RPADTEM. (TPER WAS NON ZERO)
5667  REF  13  LAST  521   23,2743  36335 1           STCALL TFF            OTHERWISE COMPUTES TFF.      (GOTO)
5668  REF   5  LAST  524   23,2744  00051 0                  S2

5669                       23,2745  51025 1  MAXCHK   DSU    BPL           IF C(MPAC) > 9999.9 NM, MPAC = 9999.9 NM
5670  REF   1               23,2746  06755 0                  MAXNM
5671                       23,2747  46752 0                  +3            OTHERWISE C(MPAC) = B(MPAC).
5672                       23,2750  43415 0           DAD    RVQ
5673  REF   2  LAST  525   23,2751  06755 0                  MAXNM
5674                       23,2752  43545 1  +3       DLOAD  RVQ                  (USED BY P30 - P37 ALSO)
5675  REF   3  LAST  525   23,2753  06755 0                  MAXNM

5676                       23,2754  01065 0  MAXNM    2OCT   01065 05603
5676                       23,2755  05603 1
```

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*** END OF MEDUSA .035 ***

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R0500   P15 TLI INITIATE/CUTOFF

R0505           DISPLAYS N33 : TIME OF SIVB INJECTION SEQUENCE START (TB6)
R0510           ESTABLISHES T6SET TO BE EXECUTED AT TB6 TIME
R0515           SETS TLITIG = TB6 + 9:37.6
R0520           DISPLAYS N14 : INERTIAL VELOCITY MAGNITUDE AT TLI C/O
R0525           DISPLAYS N95 : TFI - TIME FROM TLITIG (DECREASING)
R0530                          VG  - VELOCITY-TO-BE-GAINED
R0535                          V   - INERTIAL VELOCITY MAGNITUDE
R0540           T6SET : SETS THE SIVB INJECTION SEQUENCE START BIT,
R0545           ESTABLISHES T6RESET (DT = 10 SECS), AND
R0550           TURNS ON THE UPLINK ACTIVITY LIGHT
R0555           T6RESET : CLEARS THE SIVB I.S.S. BIT AND
R0560           TURNS OFF THE UPLINK ACTIVITY LIGHT
R0565           P40S/SV : CALLS MIDTOAV1 TO INTEGRATE THE CSM
R0570           STATE VECTOR TO TLITIG - 100 AND
R0575           ESTABLISHES TIGBLNK AT TLITIG - 105
R0580           TIGBLNK : BLANKS THE DSKY FOR 5 SECS AND
R0585           ESTABLISHES TIGAVEG FOR TLITIG - 100
R0590           TIGAVEG : STARTS READACCS AND REDISPLAYS
R0595           N95 (VG AND V NOW DYNAMIC)
R0600           SIVBCOMP : UPDATES VG AND V AND
R0605           AFTER TLITIG + 10 CALCULATES TGO AND
R0610           CHANGES THE N95 R1 DISPLAY TO TFC
R0615           WHEN TGO < 4 SECS, SIVBCOMP ESTABLISHES SIVBOFF (DT = TGO)
R0620           SIVBOFF : SHUTS DOWN THE SIVB AND CALLS POSTTLI
R0625           POSTTLI : FLASHES N95 TO INDICATE TLI IS COMPLETED
R0630           P15 EXITS VIA GOTOPOOH
 0900   REF  1                  33,2000                 SETLOC  P15LOC1
 0901                           33,3455                 BANK
 0902   REF  1                                          COUNT*  $$/P15
 1000   REF 29  LAST  514       E7,1412                 EBANK=  TIG
 1001   REF  2  LAST  513       33,3455  3 5026 0 P15JOB CAF     V06N33          DISPLAY TB6 TIME
 1002   REF  9  LAST  484       33,3456  0 5535 1       TC      VNFLASH
 1004   REF 66  LAST  521       33,3457  0 6006 1       TC      INTPRET
 1005                           33,3460   43345 1       DLOAD   CAD
 1006   REF 30  LAST  527       33,3461   03413 1               TIG
 1007   REF  1                  33,3462   27533 1               TLIDT
 1008   REF  1                  33,3463   03464 1       STORE   TLITMP
 1002                           33,3464   44234 1       RTB     BDSU
 1003   REF  9  LAST  519       33,3465   51751 0               LOADTIME
 1004   REF 31  LAST  527       33,3466   03413 1               TIG
 1005   REF 10  LAST  234       33,3467   03673 0       STORE   P40TMP          TIG-TIME2
 1006                           33,3470   77776 1       EXIT                    .TO P40TMP
 1007   REF 231 LAST  525       33,3471  52 155 1       DXCH    MPAC            ..AND A,L
 1008   REF  2  LAST  428       33,3472  0 5332 0       TC      LONGCALL
 1009   REF 11  LAST  527       E7,1672                 EBANK=  P40TMP
 1010   REF  3  LAST  232       33,3473   02311 0       2CADR   T6SET
 1010                           33,3474   40067 1
 1011   REF  3  LAST  435       33,3475  0 5362 0       TC      2PHSCHNG
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1012                                33,3476   00153 0                OCT     00153          A,3.15=T6SET IN P4CTMP CSEC
1013                                33,3477   24024 1                OCT     24024          C,JOB BELOW,LONGBASE FOR A ABOVE
10135  REF   1                     01,2077             3P15SPT1 =     3.15SPOT
1014                                33,3500   0 0006 1               EXTEND
1015   REF   2  LAST  527          33,3501   3 1464 0               DCA     TLITMP
1016   REF  32  LAST  527          33,3502   53'413 1               DXCH    TIG            TLITIG = TB6 + 9:37.6
1017   REF   1                     33,3503   3 3536 1   DISP14      CAF     V06N14         DISPLAY V AT TLI C/O
1018   REF  10  LAST  527          33,3504   0 5535 1               TC      VNFLASH
1019   REF  67  LAST  527          33,3505   0 6006 1               TC      INTPRET
1020                                33,3506    51575 1               VLOAD   ABVAL
1021   REF   1                     33,3507    01563 0                       VRECTCSM       M/CS B+7
1022   REF   2  LAST  295          33,3510    03723 1               STORE   VNOW
1023                                33,3511    43021 0               BDSU    SET
1024   REF   2  LAST  283          33,3512    02356 0                       VC/O                B+7
1025   REF   2  LAST  486          33,3513    03464 1                       TIMRFLAG       ENABLE CLOKTASK
1026   REF   3  LAST  295          33,3514    17725 1               STODL   VGTLI          VGTLI = VC/O - |VRECTCSM| B+7
1027   REF   1                     33,3515    27535 1                       S4BCOMP
1028   REF   3  LAST   79          33,3516    01062 1               STORE   AVEGEXIT       SET AVERAGEG EXIT TO SIVBCOMP
1029                                33,3517    77776 1               EXIT
1030   REF   1                     33,3520   3 3537 0               CAF     V06N95
10301  REF   1                     33,3521   54 777 1               TS      NVWORD1        ENABLE CLOCKJOB
10302  REF  55  LAST  456          33,3522   3 4770 0   CLOKNOW     CAF     ONE
10303  REF  13  LAST  520          33,3523   0 5233 0               TC      WAITLIST
10304  REF  33  LAST  528          E7,1412                          EBANK=  TIG
10305  REF   3  LAST  236          33,3524    03225 1               2CADR   CLOKTASK
10305                               33,3525    50067 0
10306  REF   4  LAST  527          33,3526   0 5362 0               TC      2PHSCHNG
10307                               33,3527    40036 0               OCT     40036          6.3SPOT FOR CLOKTASK
10308                               33,3530    00004 0               OCT     00004          KILL GROUP 4
103085 REF   2  LAST  230          01,2325             6P3SPT4 =      6.3SPOT
10309  REF  52  LAST  519          33,3531   1 5205 1               TCF     ENDOFJOB

10314                               33,3532    00003 1   TLIDT       2DEC    57760          9 MIN 37.6 SEC (TB6 + TLIDT = TLITIG)
10314                               33,3533    20640 1
10316  REF  34  LAST  528          E7,1412                          EBANK=  TIG
10317  REF   1                     33,3534    03540 0   S4BCOMP     2CADR   SIVBCOMP
10317  REF   1                     33,3535    66067 0
10318                               33,3536    01416 0   V06N14      VN      0614
10319                               33,3537    01537 1   V06N95      VN      0695


1032   REF   1                     20,2000                          SETLOC  P15LOC
10322                               20,2311                          BANK
10324  REF  35  LAST  528          E7,1412                          EBANK=  TIG
10326  REF   1                                                      COUNT*  $$/P15
1033                                20,2311   0 0006 1   T6SET       EXTEND
10335  REF  14  LAST  420          20,2312   3 0025 0               DCA     TIME2
1034   REF   5  LAST  183          20,2313   53'022 1               DXCH    TEVENT
1035   REF   1                     20,2314   3 2330 0               CAF     10SEC          T6RESET IN 10 SEC.
1036   REF   7  LAST  437          20,2315   0 5223 1               TC      TWIDDLE
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1037  REF   2  LAST  231   20,2316   02331 1          ADRES   T6RESET
1038  REF  29  LAST  515   20,2317   0 5402 1         TC      PHASCHNG
1039                       20,2320    40023 1         OCT     40023          A,3.2=T6CHNSET IMMED.,
A1040                                                                        T6RESET IN 10 SEC,TBASE NOW

10405 REF   3  LAST  230   01,2052                    3P2SPT1 =       3.2SPOT
1041  REF  22  LAST  351   20,2321   3 4754 0  T6CHNSET CAF     BIT13
1042                       20,2322   0 0006 1         EXTEND                 SIVB INJECTION
1043  REF  28  LAST  391   20,2323   05 012 1         WOR     CHAN12          SEQUENCE START
1044  REF  22  LAST  386   20,2324   3 4766 1         CAF     BIT3
1045                       20,2325   0 0006 1         EXTEND
10455 REF  17  LAST  392   20,2326   05 011 1         WOR     DSALMOUT       UPLINK ACTIV. ON
1046  REF  22  LAST  520   20,2327   0 5314 1         TC      TASKOVER

10465                      20,2330    01750 1  10SEC   DEC     1000

1047  REF  23  LAST  529   20,2331   4 4754 1  T6RESET CS      BIT13          PROTECTED BY GROUP 3
1048                       20,2332   0 0006 1         EXTEND                 CLEAR SIVB ISS
1049  REF  29  LAST  529   20,2333   03 012 1         WAND    CHAN12
1050  REF  23  LAST  529   20,2334   4 4766 0         CS      BIT3           TURN OFF UPLINK ACTIVITY
1051                       20,2335   0 0006 1         EXTEND
1052  REF  18  LAST  529   20,2336   03 011 1         WAND    DSALMOUT
1053  REF   5  LAST  528   20,2337   0 5362 0         TC      2PHSCHNG
1054                       20,2340    00003 1         OCT     00003          KILL GROUP 3
1055                       20,2341    05014 1         OCT     05014
1056                       20,2342    77777 0         DEC     -0             GROUP 4 CONTINUES BELOW
1057                       20,2343   0 0006 1  P15INTEG EXTEND
1058  REF   1              20,2344   3 2354 1         DCA     100SEC
1059  REF   3  LAST  234   20,2345   53'460 0         DXCH    AVEGDT         START AVERAGEG AT TIG - 100.00
1060  REF   2  LAST  194   20,2346   3 4664 1         CAF     PRIO12
1061  REF  23  LAST  521   20,2347   0 5135 0         TC      FINDVAC
1062  REF  36  LAST  528   E7,1412                    EBANK=  TIG
1063  REF   2  LAST  233   20,2350    02523 1         2CADR   P40S/SV        COMMON CODE IN P40
1063                       20,2351    50067 0
1064  REF  23  LAST  529   20,2352   1 5314 0         TCF     TASKOVER

1065                       20,2353    00000 1  100SEC  2DEC    10000
1065                       20,2354    23420 0
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P1066   SIVB SHUTDOWN COMPUTATIONS

R1067   CALLED VIA AVEGEXIT EVERY 2 SECS STARTING AT TLITIG - 100
R1068           VG AND V (N95) ARE ALWAYS UPDATED
R1069           TGO CALCULATIONS FOR TLI SHUTDOWN AND TTOGO (N95)
R1070           ARE ENABLED (STEERSW = 1) AT TLITIG + 10
 1071   REF   2  LAST  527   33,2000                        SETLOC  P15LOC1
 1072                        33,3540                        BANK
 1073   REF  37  LAST  529   E7,1412                        EBANK=  TIG
10735   REF   2 LAST  527 TO  528:     51     51*          COUNT*  $$/P15
 1074   REF  68  LAST  528   33,3540  0 6006 1  SIVBCOMP   TC      INTPRET
 1075                        33,3541   45345 1              DLOAD   DSU
 1076   REF   8  LAST  295   33,3542   03661 0                      TTOGO
 1077   REF   1              33,3543   27667 0                      TENSEC      TFI > +10 ? (TFC CAN NEVER EXCEED +2)
 1078                        33,3544   43040 1              BMN     SET         YES, SET STEERSW TO ENABLE TGO CALC
 1079                        33,3545   67547 0                      +2          NO
 1080   REF   1              33,3546   01064 1                      STEERSW
 1081                        33,3547   77624 1              CALL
 1082   REF   1              33,3550   70537 1                      S11.1       VMAG, HDOT, AND H FOR N62
 1083                        33,3551   44345 0              DLOAD   BDSU
 1084   REF   3  LAST  528   33,3552   03723 1                      VNOW        VMAG       M/CS B+7 FOR N95
 1085   REF   3  LAST  528   33,3553   02356 0                      VC/D        VMAG(C/D) M/CS B+7
 1086   REF   4  LAST  528   33,3554   17725 1              STODL   VGTLI       VG = VC/D - VNOW FOR N95
 1087   REF   4  LAST  530   33,3555   03723 1                      VNOW
 1088                        33,3556   45214 1              BOFF    DSU
 1089   REF   2  LAST  530   33,3557   01344 0                      STEERSW
 1090   REF   1              33,3560   67605 0                      SETVPAST    STEERSW = 0, EXIT
 1091   REF   2  LAST  128   33,3561   03462 1                      VPAST       MPAC = VNOW - VPAST (DV FOR LAST 2 SECS)
 1092                        33,3562   41440 1              BMN     PUSH        OOD = DV FOR LAST 2 SECS
 1093   REF   2  LAST  530   33,3563   67605 0                      SETVPAST    DV NEGATIVE, EXIT
 1094                        33,3564   54345 1              DLOAD   SR
 1095   REF   5  LAST  530   33,3565   03725 1                      VGTLI       B+7
 1096                        33,3566   20612 0                      C9D         SR9 NOW B+16
 1097                        33,3567   77671 1              DDV                 B+16 / B+7 NOW B+9
 1098                        33,3570   41200 0              BOV     DMP
 1099   REF   3  LAST  530   33,3571   67605 0                      SETVPAST    OVERFLOW, EXIT
 1100   REF   1              33,3572   27671 1                      200B+19     B+9 X B+19 NOW B+28
 1101                        33,3573   67206 1              PUSH    SLOAD       OOD = TGO WITHOUT TAILOFF EFFECTS
 1102   REF   2  LAST   96   33,3574   02355 0                      DTF         TLI TAILOFF CONSTANT B+14
 1103                        33,3575   44261 1              SR      BDSU        COMPENSATE FOR TAILOFF
 1104                        33,3576   20617 0                      14D         B+28
 1105                        33,3577   43206 1              PUSH    DAD         OOD = COMPENSATED TGO
 1106   REF   5  LAST  512   33,3600   01044 0                      PIPTIME
 1107   REF  38  LAST  530   33,3601   17413 1              STODL   TIG         FOR CLOKTASK (N95)
 1108                        33,3602   50025 0              DSU     BMN         TGO FROM OOD
 1109   REF   1              33,3603   27665 1                      4SEC        TGO < 4 SECS ?
 1110   REF   1              33,3604   67611 0                      KILLSIVB    YES : SET UP SIVB SHUTDOWN
 1111                        33,3605   77745 1  SETVPAST  DLOAD
 1112   REF   5  LAST  530   33,3606   03723 1                      VNOW
 1113   REF   3  LAST  530   33,3607   37462 0              STCALL  VPAST       VPAST = VNOW
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 1114   REF   1                 33,3610   51603 0                    SERVXT1        ** NO RETURN ** SAME AS GOTO SERVXT1


 1115   REF  39  LAST  530      E7,1412                              EBANK= TIG
 1116                           33,3611    77776 1  KILLSIVB       EXIT
 1117                           33,3612   0 0004 0                  INHINT
 1118                           33,3613   0 0006 1                  EXTEND
 1119   REF  40  LAST  531      33,3614   3 1413 0                  DCA    TIG
 1120  *REF 232  LAST  527      33,3615   52 155 1                  DXCH   MPAC
 1121                           33,3616   0 0006 1                  EXTEND
 1122   REF  15  LAST  528      33,3617   4 0025 1                  DCS    TIME2
 1123  *REF 233  LAST  531      33,3620   20 155 1                  DAS    MPAC
11235  *REF   4  LAST  363      33,3621   0 7224 1                  TCR    DPAGREE
 1124  *REF 234  LAST  531      33,3622   30 155 0                  CAE    MPAC +1        DT TO C/O = TIG - TIME2 (< 4 SECS TO GO)
A1125                                                                                      PIPTIME + TGO - TIME2
 1126                           33,3623   0 0006 1                  EXTEND                DT <= 0 ?
 1127                           33,3624   6 3626 0                  BZMF   +2             YES
 1128   *                       33,3625   1 3627 0                  TCF    +2             NO
 1129   REF  56  LAST  528      33,3626   3 4770 0                  CAF    ONE
 1130   REF   4  LAST  529      33,3627   55'460 0                  TS     AVEGDT +1
 1131   REF   8  LAST  528      33,3630   0 5223 1                  TC     TWIDDLE
 1132   REF   2  LAST  234      33,3631    03637 0                  ADRES  SIVBOFF
 1133   REF   6  LAST  529      33,3632   0 5362 0                  TC     2PHSCHNG
 1134                           33,3633    40614 0                  OCT    40614          4.61 SIVBOFF IN (AVEGDT+1) CS
 1135                           33,3634    10035 0                  OCT    10035

11352   REF   1                 01,2231                 4P61SPT1 =      4.61SPOT
11354   REF   2  LAST  230      01,2250                 5P3SPT16 =      5.3SPOT
 1136   REF  37  LAST  453      33,3635   0 4655 0                  TC     POSTJUMP
 1137   REF   1                 33,3636    51134 0                  CADR   CLEARSTR

 1138   REF   4  LAST  242      E7,1777                              EBANK= WHOCARES
 1139   REF  29  LAST  388      33,3637   3 4753 1  SIVBOFF        CAF    BIT14
 1140                           33,3640   0 0006 1                  EXTEND
 1141   REF  30  LAST  529      33,3641   05 012 1                  WOR    CHAN12         SHUTDOWN THE SIVB
 1142                           33,3642   0 0006 1                  EXTEND
 1143   REF  16  LAST  531      33,3643   3 0025 0                  DCA    TIME2
 1144   REF   6  LAST  528      33,3644   53'022 1                  DXCH   TEVENT         SET TEVENT
 1145   REF   1                 33,3645   0 5255 0                  TC     FIXDELAY
 1146                           33,3646    00372 1                  DEC    250            DELAY 2.5 SECS
 1147   REF 109  LAST  520      33,3647   3 4772 1                  CAF    ZERO
 1148   REF   2  LAST  528      33,3650   54 777 1                  TS     NVWORD1        ZERO NVWORD1 IN CASE CLOCKJOB WAITING
 1149   REF   1                 33,3651   4 4756 0                  CS     TIMRBIT
 1150   REF   2  LAST  210      33,3652   7 0103 1                  MASK   FLAGWRD7
 1151   REF   3  LAST  531      33,3653   54 103 1                  TS     FLAGWRD7       DISABLE CLOKTASK
 1152   REF  30  LAST  529      33,3654   0 5402 1                  TC     PHASCHNG
 1153                           33,3655    05014 1                  OCT    05014
 1154                           33,3656    77777 0                  DEC    -0             START BELOW
 1155   REF   3  LAST  529      33,3657   3 4664 1                  CAF    PRIO12
 1156   REF   9  LAST  520      33,3660   0 5121 0                  TC     NOVAC
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1157   REF   5  LAST  531   E7,1777                          EBANK=  WHOCARES
1158   REF   1               33,3661   02012 0               2CADR   POSTTLI
1158   REF   1               33,3662   74067 0
1159   REF  24  LAST  529    33,3663   0 5314 1              TC      TASKOVER

1160                          33,3664   00000 1  4SEC         2DEC    400
1160                          33,3665   00620 0
1161                          33,3666   00000 1  TENSEC       2DEC    1000
1161                          33,3667   01750 1
1162                          33,3670   00006 1  200B+19      2DEC    200 B-19
1162                          33,3671   10000 0


1163   REF   1               36,2000                          SETLOC  P15LOC2
1164                         36,2012                          BANK
1165   REF   6  LAST  532    E7,1777                          EBANK=  WHOCARES

11655  REF   1                                                COUNT*  $$/P15
1166   REF   1               36,2012   3 2015 1  POSTTLI     CAF     V16N95
1167   REF  11  LAST  528    36,2013   0 5535 1              TC      VNFLASH
1169   REF  15  LAST  515    36,2014   1 4103 0              TCF     GOTOPOOH


1170                         36,2015   04137 0  V16N95       VN      1695
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R0001   EARTH ORBIT INSERTION MONITOR PROGRAM
R0002   ************************************

R0003   PROGRAM DESCRIPTION -P11-

R0004       MOD NO. 1
R0005       MOD BY ELIASSEN

R0006   FUNCTIONAL DESCRIPTION

R0007       P11 IS INITIATED BY

R0008           A) GYROCOMPASS PRG P02 WHEN LIFTOFF DISCRETE IS RECEIVED OR
R0009           B) BACKUP THRU VERB 75 ENTER

R0010       PROGRAM WILL
R0011           1. ZERO CMC CLOCK AT LIFTOFF (OR UPON RECEIPT OF BACKUP)
R0012           2. UPDATE TEPHEM TO TIME CMC CLOCK WAS ZEROED
R0013           3. INITIATE SERVICER AT PREREAD1
R0014           4. CHANGE MAJOR MODE TO 11
R0015           5. CLEAR DSKY IN CASE OF V 75
R0016           6. STORE LIFTOFF IMU-CDU ANGLES FOR ATT. ERROR DISPLAY
R0017           7. TERMINATE GYROCOMPASSING - -
R0018           8. COMPUTE INITIAL VECTORS  RN, VN                - - -
R0019           9. COMPUTE REFSMMAT FOR PRELAUNCH ALIGNMENT WHERE U ,U ,U  ARE
R0020                -       -                                     X  Y  Z
R0021               U =UNIT(-R) LOCAL VERTICAL AT TIME OF LIFTOFF
R0022                Z
R0023               -       -   -
R0024               U =UNIT (A), A=HOR VECTOR AT LAUNCH AZIMUTH
R0025                X
R0026               -  -   -
R0027               U =U * U
R0028                U  Z  X

R0029          10. SET REFSMMAT KNOWN FLAG
R0030          11. SET AVGEXIT IN SERVICER TO VHHDOT TO
R0031              COMPUTE AND DISPLAY NOUN 62 EVERY 2 SECONDS

R0032              R1  V1  - INTERTIAL VELOCITY MAGNITUDE IN FPS
R0033              R2  HDOT - RATE OF CHANGE OF VEHICLE VEL IN FPS
R0034              R3  H    - VEHICLE ALTITUDE ABOVE PAD IN NM

R0035          12. DISPLAY BODY AXES ATT. ERRORS ON FDAI NEEDLES

R0036              A) FROM L.O. TO RPSTART (APPROX. 0 TO +10SECS AFTER L.O.)
R0037                 DESIRED ATTITUDE IS AS STORED AT L.O.
R0038              B) FROM RPSTART TO POLYSTOP(APPROX.+10 TO +133SECS AFTER LO)
R0039                 DESIRED ATTITUDE IS SPECIFIED BY CMC PITCH AND ROLL
R0040                 POLYNOMIALS  DURING SATURN ROLLOUT AND PITCHOVER
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R0041               THE DISPLAY IS RUN AS LOW PRIORITY JOB APPROX.
R0042               EVERY 1/2 SEC OR LESS AND IS DISABLED UPON OVFLO OF TIME1

R0057   SUBROUTINES CALLED

R0058           2PHSCHNG  BANKCALL  CALCGRA   CDUTRIG   CLEANDSP  DANZIG
R00581          DELAYJOB  EARTHR    ENDOFJOB  FINDVAC   IBNKCALL
R00582          INTPRET   LALOTORV  NEEDLER   NEWMODEX  PHASCHNG
R0059           POSTJUMP  POWRSERS  PREREAD1  REGODSPR  S11.1
R00591          SERVEXIT  TASKOVER  TCDANZIG  VIST02S   WAITLIST

R0060   ASTRONAUT REQUESTS (IF ALTITUDE ABOVE 300,000 FT)

R0061       DSKY -
R0062           MONITOR DISPLAY OF TIME TO PERIGEE R1 HOURS
R0063                                             R2 MINUTES

R0064       DSKY -
R0065           MONITOR DISPLAY OF R1 APOGEE ALTITUDE IN NAUTICAL MILES
R0066                              R2 PERIGEE ALTITUDE IN NAUTICAL MILES
R0067                              R3 TFF IN MINUTES/SECS

R0068       IF ASTRONAUT HAS REQUESTED ANY OF THESE DISPLAYS HE MUST
R0069   HIT PROCEED TO RETURN TO NORMAL NOUN 62 DISPLAY
R0070   NORMAL EXIT MODE

R0071       ASTRONAUT  VERB 37 ENTER 00 ENTER

R0072   ALARM MODES - NONE

R00721  ABORT EXIT MODES -

R0073   OUTPUT

R0074       TLIFTOFF (DP)  TEPHEM (TP)
R0075       REFSMMAT
R0076       DSKY DISPLAY
R0077       FDAI DISPLAY

R0078   ERASABLE INITIALIZATION

R0079       AZO, AXO, -AYO
R0080       LATITUDE
R0081       PADLONG
R0082       TEPHEM
R0083       PGNCSALT
R0084       POLYNUM THRU POLYNUM +14D)
R00841      RPSTART
R00842      POLYSTOP
R0085   FLAGS SET OR RESET
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R0086       SET REFSMFLG
R0087       SET DVMON IDLE FLAG
R0088       CLEAR ERADFLAG

R0089  DEBRIS

R0090       LIFTTEMP
R0091       POLYNUM THRU POLYNUM +7
R0092       SPOLYARG
R0093       BODY1, BODY2, BODY3
R0094       VMAG2, ALTI, HDOT
R0095       CENTRALS, CORE SET AND VAC AREAS
 0097  REF   1                5010          BITS5-6  =       SUPER011
 0099  REF   1              34,2000                   SETLOC  P11ONE
 0100                       34,2000                   BANK

 01005 REF   1                                        COUNT*  $$/P11
 0101  REF   5  LAST  236    E3,1706                   EBANK=  TEPHEM
 0102  REF   4  LAST  223    34,2000  3 5024 1  P11    CA      EBANK3
 0103  REF  14  LAST  517    34,2001  54 003 0          TS      EBANK

 0104                       34,2002  0 0006 1          EXTEND
 0105  REF   1              34,2003  3 2274 1          DCA     REP11S       DIRECT RESTARTS TO REP11
 0106  REF   2  LAST  196    34,2004  53'162 1          DXCH    -PHASE3
 01065 REF   1              01,2071          3P11SPT1  =       3,11SPOT
 01061 REF 110  LAST  531    34,2005  4 4772 0          CS      ZERO
 01062                      34,2006  22 007 0          ZL
 0107  REF   2  LAST   80    34,2007  55'126 1          TS      LIFTTEMP
 0108  REF   2  LAST  197    34,2010  53'166 0          DXCH    -PHASE5      INACTIVE GROUP 5, PRELAUNCH PROTECTION
 0111                       34,2011  0 0006 1  P11+7    EXTEND
 0112  REF   1              34,2012  3 2276 0          DCA     REP11SA
 0113  REF   1              34,2013  53'022 1          DXCH    TLIFTOFF

 0114                       34,2014  0 0006 1          EXTEND
 0115  REF  17  LAST  531    34,2015  3 0025 0  ZROCLOCK DCA     TIME2
 0116  REF   3  LAST  536    34,2016  53'127 0          DXCH    LIFTTEMP     FOR RESTARTS

 0117  REF 111  LAST  536    34,2017  3 4772 1    -5    CAF     ZERO
 0118                       34,2020  22 007 0          ZL
 0119  REF  18  LAST  536    34,2021  52 025 1          DXCH    TIME2
 0120  REF   2  LAST  536    34,2022  53'022 1  REP11A-2 DXCH    TLIFTOFF
 0121  REF   3  LAST  536    34,2023  53'162 1  REP11A-1 DXCH    -PHASE3      RESET PHASE

 01215 REF   1              01,2074          3P13SPT1  =       3,13SPOT
 0122                       34,2024  0 0004 0  REP11A   INHINT
 0123                       34,2025  0 0006 1           EXTEND
 0124  REF   6  LAST  536    34,2026  3 1710 0          DCA     TEPHEM  +1
 0125  REF   3  LAST   80    34,2027  53'132 1          DXCH    TEPHEM1 +1
 0126  REF   7  LAST  536    34,2030  3 1706 1          CA      TEPHEM
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0127   REF   4  LAST  536   34,2031  57'130 1          XCH     TEPHEM1

0128                       34,2032  0 0006 1          EXTEND
0129   REF   3  LAST  536   34,2033  3 1022 0          DCA     TLIFTOFF
0130   REF   5  LAST  537   34,2034  21'132 1          DAS     TEPHEM1 +1
0131   REF   6  LAST  537   34,2035  27'130 0          ADS     TEPHEM1         CORRECTOFOR OVERFLOW

0132   REF  31  LAST  531   34,2036  0 5402 1          TC      PHASCHNG
0133                       34,2037   05023 0          OCT     05023
0134                       34,2040   22000 1          OCT     22000

0135                       34,2041  0 0004 0          INHINT
0136                       34,2042  0 0006 1          EXTEND
0137   REF   7  LAST  537   34,2043  3 1131 0          DCA     TEPHEM1
0138   REF   8  LAST  536   34,2044  53'707 1          DXCH    TEPHEM
0139   REF   8  LAST  537   34,2045  3 1132 0          CA      TEPHEM1 +2
0140   REF   9  LAST  537   34,2046  57'710 0          XCH     TEPHEM  +2

0141   REF   2  LAST  217   34,2047  3 5046 0          CAF     EBANK7
0142   REF  15  LAST  536   34,2050  54 003 0          TS      EBANK
01421  REF   7  LAST  294   E7,1425                    EBANK=  DVTOTAL
0143   REF  19  LAST  422   34,2051  0 4714 1          TC      IBNKCALL
0144   REF   1              34,2052   76630 0          CADR    PREREAD1        ZERO PIPS AND INITIALIZE AVERAGEG

0145   REF  32  LAST  537   34,2053  0 5402 1          TC      PHASCHNG
0146                       34,2054   05023 0          OCT     05023           CONTINUE HERE ON RESTART
0147                       34,2055   22000 1          OCT     22000

0148   REF   4  LAST  448   34,2056  3 5011 1          CAF     .5SEC           START ATT ERROR DISPLAY
0150   REF  14  LAST  528   34,2057  0 5233 0          TC      WAITLIST        IN .5 SEC
0151   REF   4  LAST  262   E6,1704                    EBANK=  SPOLYARG
0152   REF   2  LAST  234   34,2060   02315 1          2CADR   ATERTASK
0152                       34,2061   70066 0

0153   REF   4  LAST  451   34,2062  0 5344 1          TC      NEWMODEX        DISPLAY MM 11
0154                       34,2063   00013 0          MM      11

01541  REF  31  LAST  486   34,2064  0 5547 1          TC      UPFLAG
01542  REF   1              34,2065   00022 1          ADRES   NODOP01

01543  REF   1              34,2066  3 6214 0          CA      POWDNCOD        SWITCH TO POWERED FLIGHT DOWNLIST
01545  REF   6  LAST  212   34,2067  54 332 1          TS      DNLSTCOD

0155   REF 101  LAST  522   34,2070  0 4636 0          TC      BANKCALL
0156   REF   2  LAST  453   34,2071   20715 0          CADR    CLEANDSP        CLEAR DSKY IN CASE OF V75

0157   REF   7  LAST  531   34,2072  0 5362 0          TC      2PHSCHNG
0158                       34,2073   40514 0          OCT     40514           PROTECT ATERTASK
0159                       34,2074   00073 0          OCT     00073
01592  REF   1              01,2066                3P7SPT1  =       3.7SPOT
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01594  REF   1                    01,2215                  4P51SPT1 =      4,51SPOT
0160   REF   2  LAST  255         34,2075   3 5043 0               CAF     EBANK5
0161   REF  16  LAST  537         34,2076   54 003 0               TS      EBANK

01611  REF   3  LAST  432         E5,1426                          EBANK=  QPLACES
016111 REF   1                    34,2077   3 2277 1               CA      P11XIT        SET EXIT FROM PROUT IN EARTHR
016112 REF   4  LAST  538         34,2100   55'426 1               TS      QPLACES
0162   REF  69  LAST  530         34,2101   0 6006 1               TC      INTPRET
0163                              34,2102    64375 1               VLOAD   MXV
0164   REF   2  LAST  103         34,2103    02467 0                       THETAN
0165   REF  24  LAST  450         34,2104    02672 0                       XSM
0166                              34,2105    53372 1               VSL1    VAD
0167   REF   3  LAST  448         34,2106    02650 0                       ERCOMP
0168   REF   4  LAST  538         34,2107    16650 0               STODL   ERCOMP
0169   REF   4  LAST  537         34,2110    01022 0                       TLIFTOFF
0170                              34,2111    52131 0               SSP     GOTO
0171   REF   6  LAST  525         34,2112    00052 0                       S2
0172   REF   1                    34,2113    66202 1               CADR    PROUT         RETURN FROM EARTHR
0173   REF   2  LAST  431         34,2114    66151 1                       EARTHR +3
01731                             34,2115   22 007 0  MATRXJOB    ZL                    STORE DP GIMBAL ANGLES FOR ATTITUDE
01732  REF  10  LAST  442         34,2116   3 0032 0               CA      CDUX                ERROR DISPLAY AFTER LIFTOFF
01733  REF  14  LAST  451         34,2117   53'760 0               DXCH    OGC
01734                             34,2120   22 007 0               ZL
01735  REF   4  LAST  423         34,2121   3 0033 1               CA      CDUY
01736  REF   4  LAST  184         34,2122   53'762 1               DXCH    IGC
01737                             34,2123   22 007 0               ZL
01738  REF   8  LAST  423         34,2124   3 0034 0               CA      CDUZ
01739  REF   3  LAST  184         34,2125   53'764 1               DXCH    MGC
0174   REF  70  LAST  538         34,2126   0 6006 1               TC      INTPRET                 -
017403                            34,2127    74575 0               VLOAD   VSR1          SCALE OGC  B-1
017405 REF  15  LAST  538         34,2130    02760 1                       OGC
017407 REF  16  LAST  538         34,2131    02760 1               STORE   OGC
01741                             34,2132    77731 1               SSP                   ZERO RTX2
01742  REF  10  LAST  503         34,2133    03747 0                       RTX2          FOR
01743                             34,2134    00000 1                       0             EARTH
0175                              34,2135    65345 0               DLOAD   PDDL
0176   REF   2  LAST   80         34,2136    01134 0                       PGNCSALT      ALTITUDE OF PGNCS
0177   REF   1                    34,2137    01136 1                       PADLONG       LONGITUDE
0178                              34,2140    55525 0               PDDL    VDEF
0179   REF   3  LAST  431         34,2141    02403 1                       LATITUDE      GEODETIC LATITUDE
0180   REF   7  LAST  293         34,2142    14747 0               STODL   LAT           LAT,LONG,ALT ARE CONSECUTIVE
0181   REF   2  LAST  525         34,2143    15336 0                       HI6ZEROS      TIME = 0
0182                              34,2144    45014 0               CLEAR   CALL
0183   REF   3  LAST  459         34,2145    00662 0                       ERADFLAG
0184   REF   1                    34,2146    26524 0                       LALOTORV      CONVERT TO POSITION VECTOR IN REF.COORDS

0185   REF   2  LAST   79         34,2147    35071 1               STCALL  RN1                   -
01851  REF   1                    34,2150    70331 1                       GETDOWN       RETURN WITH VECTOR FOR DOWN DIRECTION
01852                             34,2151    53476 1               VCOMP   UNIT
01853  REF   6  LAST  508         34,2152    25750 1               STOVL   REFSMMAT +12D UNITZ = UNIT(GRAV)
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01854  REF   3  LAST  538   34,2153  01071 0            RN1
0186                       34,2154  74235 0     VXV    VXSC
0187   REF   5  LAST  305   34,2155  01712 1            UNITW          SCALED AT 1
0188   REF   1              34,2156  30301 0            -ERTHRATE      V = EARTHRATE X R
0189                       34,2157  77712 0     VSL4                  SCALE TO 2(7) M/CS
0190   REF   2  LAST   79   34,2160  25077 0     STOVL  VN1
0191   REF   7  LAST  538   34,2161  01750 1            REFSMMAT +12D
0209                       34,2162  53435 0     VXV    UNIT
0210   REF   6  LAST  539   34,2163  01712 1            UNITW          (REF3 X UNITW) = EAST
0211                       34,2164  47206 0     PUSH   VXV
0212   REF   8  LAST  539   34,2165  01750 1            REFSMMAT +12D  (EAST X REF3) = -SOUTH
0213                       34,2166  65256 0     UNIT   PDDL
0214   REF   5  LAST  453   34,2167  02634 1            LAUNCHAZ       COS(AZ)*SOUTH
0215                       34,2170  74346 0     COS    VXSC
0216                       34,2171  77626 0     STADR
0217   REF   9  LAST  539   34,2172  62043 1     STODL  REFSMMAT       TEMPORARY STORAGE
0218   REF   6  LAST  539   34,2173  02634 1            LAUNCHAZ
0219                       34,2174  74356 1     SIN    VXSC           SIN(AZ)*EAST
0220                       34,2175  53455 0     VAD    UNIT           SIN(AZ)*EAST - COS(AZ)*SOUTH = REF1
0221   REF  10  LAST  539   34,2176  01734 0            REFSMMAT
0222   REF  11  LAST  539   34,2177  01734 0     STORE  REFSMMAT

0223                       34,2200  53435 0     VXV    UNIT           (REF1 X REF3) = -REF3
0224   REF  12  LAST  539   34,2201  01750 1            REFSMMAT +12D
0225                       34,2202  77676 0     VCOMP
0226   REF  13  LAST  539   34,2203  01742 1     STORE  REFSMMAT +6
02261                      34,2204  45345 1  TRNVNREF DLOAD  DSU
02262  REF  13  LAST  475   34,2205  15334 1            DPHALF         1/2 REV
02263  REF   7  LAST  539   34,2206  02634 1            LAUNCHAZ
02264                      34,2207  65215 1     DAD    PDDL
02265  REF   3  LAST  427   34,2210  02401 0            AZIMUTH
02266  REF   2  LAST  118   34,2211  03301 0            SATRLRT        SET  SATRLRT = -SATRLRT IF
02267                      34,2212  45565 0     SIGN   STADR          (1/2REV -LAVNCHAZ +AZIMUTH) IS NEGATIVE
02268  REF   3  LAST  539   34,2213  74476 1     STORE  SATRLRT        FOR ROLL CALC IN FDAI ATT. ERROR DISPLAY
0227                       34,2214  77414 0     SET    EXIT
0228   REF   2  LAST  485   34,2215  01462 0            REFSMFLG       SET REFSMMAT KNOWN FLAG

0229   REF  33  LAST  537   34,2216  0 5402 1    TC     PHASCHNG
0230                       34,2217   04023 1    OCT    04023

0231                       34,2220  0 0006 1    EXTEND
0232   REF   1              34,2221  3 2303 0    DCA    P11SCADR
0233   REF   1              34,2222  53'062 0    DXCH   AVGEXIT        SET AVGEXIT

0234   REF   2  LAST  317   34,2223  3 7652 1    CA     PRIO31         2 SECONDS AT 2(+8)
0235   REF   8  LAST  444   34,2224  55'277 0    TS     1/PIPADT

0236   REF   6  LAST  422   E6,1501             EBANK= RCSFLAGS
0237   REF   6  LAST  261   34,2225  0 4611 0    TC     E6SETTER
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0239                              34,2226  0 0004 0          INHINT
0246   REF 112  LAST  536         34,2227  4 4772 0          CS     ZERO
0247   REF   1                    34,2230  55'267 1          TS     TBASE5          RESTART READACCS 2 SECONDS AFTER LIFTOFF

0248   REF  14  LAST  438         34,2231  4 0025 1          CS     TIME1
0249   REF   1                    34,2232  6 5017 1          AD     2SECS           DO READACCS 2 SECONDS AFTER LIFTOFF

0250   REF 141  LAST  520         34,2233  10 000 0          CCS    A               CHECK TO INSURE DT IS POSITIVE
0251                              34,2234  1 2237 1          TCF    +3              TIME POSITIVE
0252                              34,2235  1 2237 1          TCF    +2              CANNOT GET HERE
0253   REF 113  LAST  540         34,2236  3 4772 1          CA     ZERO            TIME NEGATIVE - SET TO 1
0254   REF  57  LAST  531         34,2237  6 4770 0          AD     ONE             RESTORE TIME  -  OR MAKE POSITIVE

0255   REF  15  LAST  537         34,2240  0 5233 0          TC     WAITLIST
0256   REF  12  LAST  236         E6,1661                    EBANK= ACG
0257   REF   1                    34,2241   02652 1         2CADR  READACCS
0257   REF   1                    34,2242   76066 0
0258   REF   8  LAST  537         34,2243  0 5362 0          TC     2PHSCHNG
0259                              34,2244   00003 1          OCT    00003           TURN OFF GROUP 3
0260                              34,2245   00025 0          OCT    00025           PROTECT NORMLIZE AND READACCS

02605  REF   2  LAST  230         01,2234            5P2SPT1 =      5.2SPOT
0261   REF  38  LAST  531         34,2246  0 4655 0          TC     POSTJUMP
0262   REF   2  LAST  234         34,2247   77154 1          CADR   NORMLIZE        DO NORMLIZE AND ENDOFJOB

0263   REF  10  LAST  537         E3,1706                    EBANK= TEPHEM
0264                              34,2250  0 0004 0  REP11    INHINT
0265   REF   1                    34,2251  11'166 0          CCS    PHASE5
0266   REF  53  LAST  528         34,2252  0 5205 0          TC     ENDOFJOB

0267   REF   4  LAST  536         34,2253  11'126 1          CCS    LIFTTEMP
0268                              34,2254  1 2260 0          TCF    +4
0269                              34,2255  1 2260 0          TCF    +3
0270                              34,2256  1 2260 0          TCF    +2
0271   REF   1                    34,2257  1 2011 1          TCF    P11+7

0272   REF   5  LAST  538         34,2260  4 1021 1          CS     TLIFTOFF
0273                              34,2261  0 0006 1          EXTEND
0274   REF   1                    34,2262  6 2270 0          BZMF   ENDREP11

0275   REF  19  LAST  536         34,2263  10 024 0          CCS    TIME2           **TIME2 MUST BE NON-ZERO AT LIFTOFF**
0276   REF   2  LAST  232         34,2264  1 2017 1          TCF    REP11A -5       T2,T1 NOT YET ZEROED, GO AND DO IT

0277                              34,2265  0 0006 1          EXTEND                 T2,T1 ZEROED, SET TLIFTOFF
0279   REF   5  LAST  540         34,2266  3 1127 1          DCA    LIFTTEMP
0280   REF   1                    34,2267  1 2022 1          TCF    REP11A-2

0281                              34,2270  0 0006 1  ENDREP11 EXTEND
0282   REF   2  LAST  536         34,2271  3 2276 0          DCA    REP11SA
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0283   REF   1              34,2272  1 2023 0          TCF    REP11A-1


0284                        34,2273   77766 0  REP11S   2OCT   77766 00011
0284                        34,2274   00011 1
0285                        34,2275   77764 1  REP11SA  2OCT   77764 00013
0285                        34,2276   00013 0


02851  REF   1              34,2277   02225 0  P11XIT   GENADR P11OUT
0286                        34,2300   71704 1  -ERTHRAT 2DEC*  -7.292115138 E-7 B18*   - EARTH RATE AT 2(18)
0286                        34,2301   41735 0
0288   REF   5  LAST  537   E6,1704                     EBANK=  SPOLYARG
0289   REF   1              34,2302   02304 1  P11SCADR 2CADR  VHHDOT
0289   REF   1              34,2303   70066 0
02891  REF  19  LAST  520      6214             POWDNCOD EQUALS THREE


0290   REF   6  LAST  541   E6,1704                     EBANK=  SPOLYARG
R0295  VHHDOT IS EXECUTED EVERY 2 SECONDS TO DISPLAY ON DSKY
R0296                      VI INERTIAL VELOCITY MAGNITUDE
R0297                      HDOT  RATE OF CHANGE OF ALT ABOVE L PAD RADIUS
R0298                      H   ALTITUDE ABOVE L PAD RADIUS

0299   REF  71  LAST  538   34,2304  0 6006 1  VHHDOT   TC     INTPRET
0300                        34,2305   77624 1             CALL
0301   REF   2  LAST  530   34,2306   70537 1                    S11.1          LOAD VMAGI, ALTI,
0302                        34,2307   77776 1             EXIT                   HDOT FOR DISPLAY
03021  REF  34  LAST  539   34,2310  0 5402 1             TC     PHASCHNG
03022                       34,2311   00035 1             OCT    00035


03025  REF   3  LAST  531   01,2250                5P3SPT1  =      5.3SPOT
0303   REF   1              34,2312  3 2617 0             CAF    V06N62         DISPLAY IN R1   R2    R3
0304   REF 102  LAST  537   34,2313  0 4636 0             TC     BANKCALL                VI   HDOT  H
0305   REF   1              34,2314   20721 1             CADR   REGODSP


0308   REF   1              34,2315  3 4757 0  ATERTASK CAF    PRIO1          ESTABLISH JOB TO DISPLAY ATT ERRORS
0309   REF  24  LAST  529   34,2316  0 5135 0             TC     FINDVAC        COMES HERE AT L.O. + .33 SEC
0310   REF   7  LAST  541   E6,1704                     EBANK=  SPOLYARG
0311   REF   1              34,2317   02342 0             2CADR  ATERJOB
0311   REF   1              34,2320   70066 0
03111  REF   7  LAST  539   34,2321  4 1501 0             CS     RCSFLAGS       SET BIT3 FOR
03112  REF  24  LAST  529   34,2322  7 4766 0             MASK   BIT3           NEEDLER
03113  REF   8  LAST  541   34,2323  27'501 0             ADS    RCSFLAGS       INITIALIZATION PASS
03114  REF  20  LAST  537   34,2324  0 4714 1             TC     IBNKCALL       AND GO
03115  REF   1              34,2325   42425 1             CADR   NEEDLER        DO IT
03116  REF  28  LAST  519   34,2326  3 4770 0             CA     BIT1           SET SW
03117  REF   2  LAST  119   34,2327  55'714 0             TS     SATSW          FOR DISPLAY
0312   REF  25  LAST  532   34,2330  0 5314 1             TC     TASKOVER
03121                       34,2331   40220 0  GETDOWN  STQ    SETPD
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 03122  REF   1                  34,2332   02241 1                 INCORPEX
 03123                           34,2333   00001 0                 0D
 03124                           34,2334   77745 1           DLOAD
 03125  REF   3  LAST  538       34,2335   15336 0                 HI6ZEROS
 03126                           34,2336   14007 0           STODL 6D
 03127  REF  14  LAST  539       34,2337   15334 1                 DPHALF
 03128                           34,2340   34011 0           STCALL 8D
 03129  REF   2  LAST  538       34,2341   26531 1                 LALOTORV +5
R0313   THIS SECTION PROVIDES ATTITUDE ERROR DISPLAYS TO THE FDAI DURING SONE BOOST

A0315                          COMPUTE DESIRED PITCH W.R.T. PAD LOCAL VERTICAL AT LIFTOFF
A0316                                                2    3    4    5    6
A03161                         PITCH= A0+A1T+A2T +A3T +A4T +A5T +A6T
A0317                                SCALED TO 32 REVS.                          -14
A0318                          IF TL = TIME IN SECS FROM L.O., THEN   T = 100(TL-RPSTART)2
A0319                          WHERE    TL GE RPSTART
A0320                                   TL LE (-POLYSTOP + RPSTART)
A0321                          COMPUTE DESIRED ROLL WHERE ROLL EQUALS ANGLE FROM
A0322                          LAUNCHAZ TO -Z(S/C) AS SEEN FROM X(S/C).
A0323                          ROLL = LAUNCHAZ-AZIMUTH-.5 +SATRLRT*T      IN REV
A0324                          SATRLRT = RATE OF ROLL IN REV/CENTI-SEC
A0325                          T,IN CENTI-SEC,IS DEFINED AS ABOVE,INCLUSIVE OF TIME RESTRICTIONS

A0326                          FOR SIMPLICITY, LET   P = 2*PI*PITCH
A0327                                                R = 2*PI*ROLL

A0328                          CONSTRUCT THE TRANSFORMATION MATRIX, TSMV, GIVING DESIRED S/C AXES IN
A0329                          TERMS OF SM COORDINATES. LET THE RESULTING ROWS EQUAL THE VECTORS XDC,
A0330                          YDC,AND ZDC.

A0331                                  *     (    SIN(P)          0        -COS(P)     )   (XDC)
A0332                          TSMV = (-SIN(R)*COS(P)    -COS(R)    -SIN(R)*SIN(P)) = (YDC)
A0333                                 (-COS(R)*COS(P)     SIN(R)    -COS(R)*SIN(P))   (ZDC)

A0334                          XDC,YDC,ZDC ARE USED AS INPUT TO CALCGTA FOR THE EXTRACTION OF THE
A0335                          EULER SET OF ANGLES WHICH WILL BRING THE SM INTO THE DESIRED
A0336                          ORIENTATION. THIS EULER SET, OGC, IGC, AND MGC, MAY BE IDENTIFIED
A0337                          AS THE DESIRED CDU ANGLES.

A0338                          (XDC)                        (OGC)
A0339                          (YDC) ---) CALCGTA ---)      (IGC)
A0340                          (ZDC)                        (MGC)

A0341                                  -
A0342                          DEFINE THE VECTOR DELTACDU.

A0343                                  -          (OGC)   (CDUX)
A0344                          DELTACDU = (IGC) - (CDUY)
A0345                                     (MGC)   (CDUZ)
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A0346
A0347                          COMPUTE ATTITUDE ERRORS, A, WHERE   A = TGSC*DELTACDU

A0348                           *     (1          SIN(CDUZ)            0     )   THE GIMBAL ANGLES
A0349                          TGSC = (0   COS(CDUX)*COS(CDUZ)   SIN(CDUX)) =   TO SPACECRAFT AXES
A0350                                 (0  -SIN(CDUX)*COS(CDUZ)   COS(CDUX))     CONVERSION MATRIX

A0351
A0352                          THE ATTITUDE ERRORS, A, ARE STORED ONE HALF SINGLE PRECISION IN
A0353                          THE REGISTERS AK, AK1, AK2 AS INPUT TO NEEDLER, THE FDAI ATTITUDE
A0354                          ERROR DISPLAY ROUTINE.

 0355  REF  11  LAST  265   34,2342  30 102 1  ATERJOB  CAE    FLAGWRD6      CHECK FLAGWRD6
 03551 REF   9  LAST  265   34,2343  7 4076 0            MASK   DPCONFIG      BITS 14,15
 03552                      34,2344  0 0006 1            EXTEND
 03553                      34,2345  1 2347 1            BZF    +2            OK - CONTINUE
 03554 REF  54  LAST  540   34,2346  0 5205 0            TC     ENDOFJOB      SATURN STICK ON - KILL JOB
 0356  REF  21  LAST  392   34,2347  3 4757 0            CAF    BIT10         CHECK IF S/C CONTROL
 03561                      34,2350  0 0006 1            EXTEND               OF SATURN PANEL
 03562 REF   6  LAST  447   34,2351  02 030 0            RAND   CHAN30        SWITCH IS ON
 0357                       34,2352  0 0006 1            EXTEND
 0358  REF   1              34,2353  1 2505 1            BZF    STRSAT        IT IS - GO STEER
 0360  REF   3  LAST  541   34,2354  11'714 0            CCS    SATSW         IT IS NOT - WAS IT ON LAST CYCLE
 0361  REF   1              34,2355  1 2360 1  WASIU     TCF    ATTDISP       NO - CONTINUE
 0362  REF   1              34,2356  1 2510 0  WASINIT   TCF    ATRESET       YES - REINITIALIZE NEEDLER (2ND PASS)
 0363  REF   2  LAST  543   34,2357  1 2510 0  WASCMC    TCF    ATRESET       YES - REINITIALIZE NEEDLER

 0364  REF   2  LAST  118   34,2360  4 1702 1  ATTDISP   CS     RPSTART       PITCH/ROLL START TIME
 0365  REF  15  LAST  540   34,2361  6 0025 0            AD     TIME1
 03651                      34,2362  0 0006 1            EXTEND
 03652 REF   1              34,2363  6 2612 0            BZMF   NOPOLY        IF MINUS THEN ATTITUDE HOLD
 0366  REF 235  LAST  531   34,2364  54 154 0            TS     MPAC          MPAC=TIME1-RPSTART
 03661 REF   8  LAST  541   34,2365  55'704 1            TS     SPOLYARG      SAVE FOR USE IN ROLL CALUCLATION
 03662 REF   2  LAST  119   34,2366  6 1703 1            AD     POLYSTOP      NEG PITCHOVER TIME IN CSECS
 03663                      34,2367  0 0006 1            EXTEND
 0367                       34,2370  6 2372 0            BZMF   +2
 0368  REF   2  LAST  543   34,2371  0 2612 0  POSTPOLY  TC     NOPOLY        GO TO ATTITUDE HOLD
 0369  REF  20  LAST  540   34,2372  3 0024 1            CA     TIME2
 0370                       34,2373  0 0006 1            EXTEND
 0371                       34,2374  6 2376 1            BZMF   +2
 03711 REF   3  LAST  543   34,2375  0 2612 0            TC     NOPOLY        GO TO ATTITUDE HOLD
 0372  REF   3  LAST  118   34,2376  31'661 1            CAE    POLYNUM
 0373  REF  64  LAST  520   34,2377  54 001 1            TS     L
 0374  REF   1              34,2400  3 2616 1            CAF    COEFPOLY      EVALUATE PITCH POLYNOMIAL
 0375  REF   1              34,2401  0 7164 0            TC     POWRSERS      SCALED TO 32 REVOLUTIONS

 0387  REF 114  LAST  540   34,2402  3 4772 1            CA     ZERO          RETURN WITH PITCH(32REV)
 0388  REF   3  LAST  312   34,2403  54 163 1            TS     MODE          STORED IN MPAC, MPAC +1
 0389  REF  72  LAST  541   34,2404  0 6006 1            TC     INTPRET
 0390                       34,2405   54201 0            SETPD  SL            32(PITCH(32REV))=PITCH(REV)
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0391                        34,2406  00001 0                  0
0392                        34,2407  20206 1                  5
0393                        34,2410  77606 1          PUSH                LET P(RAD)=2.PI.PITCH(REV)
0394                        34,2411  77650 1          GOTO
0395  REF  1                34,2412  67672 0                   ATTDISP1   AROUND SETLOC
A0396                                                        *
A0397                                      CONSTRUCT SM TO S/C MATRIX, TSMV

0398  REF  1                33,2000                  SETLOC   P11TWO
0399                        33,3672                  BANK                 36 IN COL., 34 IN DISK

0400  REF  1                                         COUNT*   $$/P11
0401                        33,3672  57546 1 ATTDISP1 COS     DCOMP
0402                        33,3673  14017 1          STODL   14D          -.5*COS(P)
0403                        33,3674  77756 0          SIN
0404                        33,3675  14013 0          STODL   10D          .5*SIN(P)
0405  REF 11 LAST 518       33,3676  15336 0                  ZEROVECS
0406                        33,3677  00015 0          STORE   12D          0

A0407                                      EVALUATE ROLL = LAUNCHAZ-AZIMUTH-.5+SATRLRT*T
0409                        33,3700  41335 1          SLOAD   DMP
0410  REF  9 LAST 543       33,3701  03305 1                  SPOLYARG     TIME1 - RPSTART ,CSECS B-14.
0411  REF  4 LAST 539       33,3702  03301 0                  SATRLRT
0412                        33,3703  45261 0          SL      DSU
0413                        33,3704  20217 1                  14D
0414  REF 15 LAST 542       33,3705  15334 1                  DPHALF
0415                        33,3706  45215 0          DAD     DSU          ASSUMING X(SM) ALONG LAUNCH AZIMUTH,
0416  REF  8 LAST 539       33,3707  02634 1                  LAUNCHAZ     LAUNCHAZ = ANGLE FROM NORTH TO X(SM).
0417  REF  4 LAST 539       33,3710  02401 0                  AZIMUTH      AZIMUTH = -ANGLE FROM NORTH TO Z(S/C)
0418                        33,3711  77634 0          RTB                  DETERMINE IF ROLLOUT
0419  REF  1                33,3712  70601 1                  RLTST        IS COMPLETED
0421                        33,3713  71406 0 ATTDISPR PUSH    COS          CONTINUE COMPUTING TSMV
0422                        33,3714  77606 1          PUSH                 LET  R(RAD) = 2*PI*ROLL(REV)
0423                        33,3715  72405 0          DMP     SL1
0424                        33,3716  00017 1                  14D
0425                        33,3717  14027 1          STODL   22D          -.5*COS(R)*COS(P)
0426                        33,3720  77676 0          DCOMP
0427                        33,3721  00023 0          STORE   18D          -.5*COS(R)
0428                        33,3722  72405 0          DMP     SL1
0429                        33,3723  00013 0                  10D
0430                        33,3724  14033 1          STODL   26D          -.5*COS(R)*SIN(P)
0431                        33,3725  41556 1          SIN     PUSH
0432                        33,3726  00031 0          STORE   24D          .5*SIN(R)
0433                        33,3727  72405 0          DMP     SL1
0434                        33,3730  00017 1                  14D
0435                        33,3731  14021 1          STODL   16D          -.5*SIN(R)*COS(P)
0436                        33,3732  77676 0          DCOMP
0437                        33,3733  72405 0          DMP     SL1
0438                        33,3734  00013 0                  10D
0439                        33,3735  24025 0          STOVL   20D          -.5*SIN(R)*SIN(P)
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                                                33,3736   00013 0                 10D

A0441                                   FROM TSMV FIND THE HALF UNIT VECTORS  XDC,YDC,ZDC = INPUT TO CALCGTA

                                                33,3737   77656 1         UNIT
0443  REF   3  LAST   99                      33,3740   26714 1         STOVL   XDC             XDC = .5*UNIT(SIN(P),0,-COS(P))
0444                                          33,3741   00021 1                 16D
                                                33,3742   77656 1         UNIT
0446  REF   3  LAST   99                      33,3743   26722 1         STOVL   YDC             YDC = .5*UNIT(-SIN(R)*COS(P),-COS(R),
0447                                          33,3744   00027 1                 22D                             -SIN(R)*SIN(P))
                                                33,3745   77656 1         UNIT
0449  REF   3  LAST   99                      33,3746   36730 0         STCALL  ZDC             ZDC = .5*UNIT(-COS(R)*COS(P),SIN(R),
0450  REF   2  LAST  451                      33,3747   47240 1                 CALCGTA                         -COS(R)*SIN(P))

A0451                                   CALL CALCGTA TO COMPUTE DESIRED SM ORIENTATION  OGC,IGC,AND MGC
A0452                                                                                    -   -   -
A0453                                   FIND DIFFERENCE VECTOR   DELTACDU = OGC-CDUX

A04531                                  ENTER HERE IF ATTITUDE HOLD

                                                33,3750   41575 0 NOPOLYM VLOAD   PUSH                    OGC     IGC
0455  REF  17  LAST  538                      33,3751   02760 1                 OGC             CHANGE IGC  TO  MGC FOR COMPATIBILITY
0456                                          33,3752   45006 0         PUSH    CALL                    MGC     OGC
0457  REF   2  LAST  508                      33,3753   47530 1                 CDUTRIG         WITH Y,Z,X ORDER OF CDUSPOT
0458                                          33,3754   47175 1         VLOAD   RTB             -       DPHI    OGC-CDUX ,PD4
0459                                          33,3755   00003 1                 2               DELTACDU = DTHETA = IGC-CDUY ,   0
0460  REF   3  LAST  418                      33,3756   45644 0                 V1STO2S                 DPSI    MGC-CDUZ ,   2
0461  REF   2  LAST  119                      33,3757   27306 1         STOVL   BCOSTEMP
0462  REF  12  LAST  544                      33,3760   15336 0                 ZEROVECS
0463                                          33,3761   24001 0         STOVL   0
0464  REF   4  LAST   81                      33,3762   01172 1                 CDUSPOT
0465                                          33,3763   47034 0         RTB     RTB
0466  REF   4  LAST  545                      33,3764   45644 0                 V1STO2S
0467  REF   1                                 33,3765   70561 1                 DELSTOR
0468                                          33,3766   14013 0         STODL   10D
0469  REF   1                                 33,3767   01144 1                 SINCDUZ
0470                                          33,3770   72405 0         DMP     SL1
0471                                          33,3771   00001 0                 0
0472                                          33,3772   60415 1         DAD     SR2             CHANGE SCALE OF AK TO 2REVS
0473                                          33,3773   00005 1                 4
0474                                          33,3774   77650 1         GOTO
0475  REF   1                                 33,3775   70413 0                 ATTDISP2

0476  REF   2  LAST  536                      34,2000                   SETLOC  P11ONE
0477                                          34,2413                   BANK
0478  REF   2 LAST  536 TO  544:    267   267*                         COUNT*  $$/P11
0479                                          34,2413   14021 1 ATTDISP2 STODL  16D             16D,  .5(DPHI + DTHETA*SIN(CDUZ))
0480  REF   1                                 34,2414   01152 0                 COSCDUZ
0481                                          34,2415   41405 0         DMP     PUSH
0482                                          34,2416   00001 0                 0
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0483                          34,2417  72405 0          DMP     SL1
0484   REF    1               34,2420  01154 0          ""      COSCDUX
0485                          34,2421  41325 0          PDDL    DMP
0486   REF    1               34,2422  01146 0          ""      SINCDUX
0487                          34,2423  00003 1          ""      2
0488                          34,2424  72415 1          DAD     SL1
0489                          34,2425  77626 0          STADR
0490                          34,2426  63755 0          STODL   17D          17D,  .5(DTHETA*COS(CDUX)*COS(CDUZ)
0491                          34,2427  72405 0          DMP     SL1                        +DPSI*SIN(CDUX))
0492   REF    2  LAST  546    34,2430  01146 0          ""      SINCDUX
0493                          34,2431  41325 0          PDDL    DMP
0494   REF    2  LAST  546    34,2432  01154 0          ""      COSCDUX
0495                          34,2433  00003 1          ""      2
0496                          34,2434  72425 1          DSU     SL1
0497                          34,2435  77626 0          STADR
0498                          34,2436  77754 1          STORE   18D          18D,  .5(-DTHETA*SIN(CDUX)*COS(CDUZ)
0499                          34,2437  77751 1          TLOAD                      +DPSI*COS(CDUX))
0500                          34,2440  00021 1          ""      16D
0501   REF    9  LAST  261    34,2441  03077 1          STORE   AK           STORE ATTITUDE ERRORS IN AK,AK1,AK2
0502                          34,2442  77776 1          EXIT

050201 REF    4  LAST  543    34,2443  3 1714 1         CA      SATSW
050202 REF  142  LAST  540    34,2444  10 000 0         CCS     A            CHK TAKEOVER STATUS
050203 REF    1               34,2445  0 2466 1         TC      SATOUT       POS - DISPLAY ONLY
050204 REF    1               34,2446  0 2474 1         TC      AKLOAD       0      STORE BIAS
05021  REF   73  LAST  543    34,2447  0 6006 1  STEERSAT TC     INTPRET      NEG    STEER L/V
050211                        34,2450   76351 1         TLOAD   TAD
050212 REF    2  LAST  119    34,2451   03316 0         ""      BIASAK
050213 REF   10  LAST  546    34,2452   03077 1         ""      AK
050214 REF   11  LAST  546    34,2453   03077 1         STORE   AK           AKS = AKS - STORED BIAS
050215                        34,2454   77776 1         EXIT
05022  REF   12  LAST  546    34,2455  3 1476 0         CA      AK
050221 REF    1               34,2456  0 2620 1         TC      RESCALES
050222 REF   13  LAST  546    34,2457  55'476 1         TS      AK
050223 REF    3  LAST  182    34,2460  3 1477 1         CA      AK1
050224 REF    2  LAST  546    34,2461  0 2620 1         TC      RESCALES
050225 REF    4  LAST  546    34,2462  55'477 0         TS      AK1
050226 REF    3  LAST  182    34,2463  3 1500 0         CA      AK2
050227 REF    3  LAST  546    34,2464  0 2620 1         TC      RESCALES
050228 REF    4  LAST  546    34,2465  55'500 1         TS      AK2
A0503                                 DISPLAY ATTITUDE ERRORS ON FDAI VIA NEEDLER

 0504  REF  103  LAST  541    34,2466  0 4636 0  SATOUT TC      BANKCALL
 0505  REF    2  LAST  541    34,2467   42425 1         CADR    NEEDLER
 0506  REF    3  LAST  437    34,2470  3 4125 0  ATERSET CAF     OCT31        DELAY .25 SEC
 0507  REF  104  LAST  546    34,2471  0 4636 0         TC      BANKCALL     EXECUTION + DELAY =.56SEC APPROX
 0508  REF    3  LAST  390    34,2472   01731 0         CADR    DELAYJOB
 0509  REF    2  LAST  541    34,2473  0 2342 0         TC      ATERJOB      END OF ATT ERROR DISPLAY CYCLE

 0510  REF   14  LAST  546    34,2474  4 1476 1  AKLOAD CS      AK           STORE AKS
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0511	REF	3	LAST	546	34,2475	55'715	1		TS	BIASAK	INTO BIAS
0512	REF	5	LAST	546	34,2476	4 1477	0		CS	AK1	COMPLEMENTED
0513	REF	4	LAST	547	34,2477	55'716	1		TS	BIASAK +1	
0514	REF	5	LAST	546	34,2500	4 1500	1		CS	AK2	
05141	REF	5	LAST	547	34,2501	55'717	0		TS	BIASAK +2	
05142	REF	29	LAST	541	34,2502	4 4770	1		CS	BIT1	SET SW
05143	REF	5	LAST	546	34,2503	55'714	0		TS	SATSW	TO STEER
05144	REF	1			34,2504	0 2447	1		TC	STEERSAT	GO STEER
0515	REF	6	LAST	547	34,2505	3 1714	1	STRSAT	CA	SATSW	CHECK IF NEEDLER
05151					34,2506	0 0006	1		EXTEND		HAS BEEN INITIALIZED
051511	REF	2	LAST	543	34,2507	6 2360	0		BZMF	ATTDISP	YES - CONTINUE
051512	REF	9	LAST	541	34,2510	4 1501	0	ATRESET	CS	RCSFLAGS	NO - SET
051513	REF	25	LAST	541	34,2511	7 4766	0		MASK	BIT3	INITIALIZATION SW
05152	REF	10	LAST	547	34,2512	27'501	0		ADS	RCSFLAGS	FOR NEEDLER
051521	REF	105	LAST	546	34,2513	0 4636	0		TC	BANKCALL	AND GO
051522	REF	3	LAST	546	34,2514	42425	1		CADR	NEEDLER	DO IT
051523	REF	1			34,2515	3 6211	0		CAF	REVCNT	OCT 6
051524	REF	106	LAST	547	34,2516	0 4636	0		TC	BANKCALL	DELAY JOB
051525	REF	4	LAST	546	34,2517	01731	0		CADR	DELAYJOB	60 MS -WAIT TILL IMUERRCNTR ZEROED
051527	REF	7	LAST	547	34,2520	11'714	0		CCS	SATSW	CHECK SW STATUS
051528	REF	1			34,2521	0 2531	1		TC	TAKEON	POS STEER INIT.
051529					34,2522	0 2523	1		TC	+1	0 RETURN TO DISPLAY
05153	REF	30	LAST	547	34,2523	3 4770	0		CA	BIT1	NEG RETURN TO DISPLAY
051531	REF	8	LAST	547	34,2524	55'714	0		TS	SATSW	SW = DISPLAY ONLY
051532	REF	16	LAST	262	34,2525	4 4760	0		CS	BIT9	DISABLE
051533					34,2526	0 0006	1		EXTEND		SIVB
051534	REF	31	LAST	531	34,2527	03 012	1		WAND	CHAN12	TAKEOVER
051535	REF	2	LAST	546	34,2530	0 2466	1		TC	SATOUT	DISPLAY
051536	REF	17	LAST	547	34,2531	3 4760	1	TAKEON	CAF	BIT9	ENABLE
051537					34,2532	0 0006	1		EXTEND		SIVB
051538	REF	32	LAST	547	34,2533	05 012	1		WOR	CHAN12	TAKEOVER
05154	REF	115	LAST	543	34,2534	3 4772	1		CA	ZERO	INDICATE NEEDLER
051541	REF	9	LAST	547	34,2535	55'714	0		TS	SATSW	WAS INITIALIZED
051542	REF	3	LAST	547	34,2536	0 2466	1		TC	SATOUT	
0516					34,2537	51575	1	S11.1	VLOAD	ABVAL	
0517	REF	7	LAST	521	34,2540	01036	0			VN	
0518	REF	10	LAST	293	34,2541	27723	1		STOVL	VMAGI	VI SCALED 2(7) IN METERS/CSEC
0519	REF	7	LAST	521	34,2542	01030	0			RN	
0524					34,2543	50256	0		UNIT	DOT	
0525	REF	8	LAST	547	34,2544	01036	0			VN	
0526					34,2545	77752	1		SL1		
0527	REF	2	LAST	293	34,2546	17741	0		STODL	HDOT	
05271	REF	3	LAST	522	34,2547	05173	1			RPAD	
05272					34,2550	77214	0		BOF	VLOAD	
05273	REF	2	LAST	521	34,2551	00355	1			AMOONFLG	
05274	REF	1			34,2552	70555	0			EARTHALT	
05275	REF	5	LAST	522	34,2553	02026	1			RLS	
05276					34,2554	60446	1		ABVAL	SR2	
05277					34,2555	77621	1	EARTHALT	BDSU		
05278					34,2556	00045	0			36D	

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C5279  REF   3  LAST  293   34,2557   03737 1          STORE   ALTI
C528                       34,2560   77616 0          RVQ
C529   REF   3  LAST  545   34,2561   3 1705 1 DELSTOR CA      BOOSTEMP
C530                       34,2562   0 0006 1         EXTEND                 STORE DELTACDU INTO PDL 0,2,4
C531   REF 236  LAST  543   34,2563   20 154 0         MSU     MPAC
C532   REF   5  LAST  512   34,2564   50 120 1         INDEX   FIXLOC
C533                       34,2565   54 000 0         TS      0
C534   REF   4  LAST  548   34,2566   3 1706 1         CA      BOOSTEMP +1
C535                       34,2567   0 0006 1         EXTEND
C536   REF 237  LAST  548   34,2570   20 155 1         MSU     MPAC +1
C537   REF   6  LAST  548   34,2571   50 120 1         INDEX   FIXLOC
C538                       34,2572   54 002 1         TS      2
C539   REF   5  LAST  548   34,2573   3 1707 0         CA      BOOSTEMP +2
C540                       34,2574   0 0006 1         EXTEND
C541   REF 238  LAST  548   34,2575   20 156 1         MSU     MPAC +2
C542   REF   7  LAST  548   34,2576   50 120 1         INDEX   FIXLOC
C543                       34,2577   54 004 1         TS      4
C544   REF   3  LAST  297   34,2600   1 6030 0         TCF     DANZIG
C545   REF 239  LAST  548   34,2601   3 0154 1 RLTST   CA      MPAC           DETERMINE IF ROLLOUT
C5451                      34,2602   0 0006 1         EXTEND                 IS COMPLETED
C5452  REF   5  LAST  544   34,2603   7 1701 1         MP      SATRLRT +1
C5453                      34,2604   0 0006 1         EXTEND
C5454  REF   4  LAST  548   34,2605   6 6030 1         BZMF    DANZIG         UNLIKE SIGNS  STILL ROLLING
C546                       34,2606   22 007 0         ZL                     ROLLOUT COMPLETED
C5461  REF 116  LAST  547   34,2607   3 4772 1         CAF     ZERO           ZERO OUT ROLL CONTRIBUTION
C5462  REF 240  LAST  548   34,2610   52 155 1         DXCH    MPAC
C5463  REF   5  LAST  548   34,2611   0 6030 1         TC      DANZIG
C5464  REF  74  LAST  546   34,2612   0 6006 1 NOPOLY  TC      INTPRET        COMES HERE IF
C5465                      34,2613   52001 1          SETPD   GOTO           ATTITUDE HOLD
C5466                      34,2614   00001 0          0
C5467  REF   1             34,2615   67750 1                  NOPOLYM
C547   REF   1             34,2616   01673 1 COEFPOLY ADRES   POLYLOC
C548                       34,2617   01476 0 V06N62   VN      0662
C549                       34,2620   0 0006 1 RESCALES EXTEND                RESCALE AK S FOR
C5491  REF   1             34,2621   7 1720 1         MP      SATSCALE       NEW HARDWARE
C5492                      34,2622   20 001 1         DDOUBL                 SCALING FOR
C5493                      34,2623   20 001 1         DDOUBL                 STEERING
C5494  REF 128  LAST  448   34,2624   0 0002 0         TC      Q              SATURN
R0552  SATURN TAKEOVER FUNCTION
R0553  ************************

R0554  PROGRAM DESCRIPTION

R0555       MOD NUMBER 1
R0556       MOD BY ELIASSEN

R0557  FUNCTIONAL DESCRIPTION

R0558       DURING THE COASTING PHASE OF SIVB ATTACHED, THE
R0559       ASTRONAUT MAY REQUEST SATURN TAKEOVER THROUGH
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RC560       EXTENDED VERB 46 (BITS 13,14 OF DAPDATR1 SET ).
RC561       THE CMC REGARDS RHC COMMANDS AS BODY-AXES RATE
RC562       COMMANDS AND IT TRANSMITS THESE TO SATURN AS DC
RC563       VOLTAGES. THE VALUE OF THE CONSTANT RATE COMMAND
RC564       IS 0.5 DEG/SEC. AN ABSENCE OF RHC ACTIVITY RE-
RC565       SULTS IN A ZERO RATE COMMAND.

RC566       THE FDAI ERROR NEEDLES WILL INDICATE THE VALUE
RC567       OF THE RATE COMMAND.

RC568   CALLING SEQUENCE

RC569       DAPFIG +9D  TC      POSTJUMP
RC570                   CADR    SATSTKON

RC571   SUBROUTINES CALLED

RC572       ENDEXT
RC573       IBNKCALL
RC574       STICKCHK
RC575       NEEDLER
RC576       TSRUPT
RC577       RESUME

RC578   ASTRONAUT REQUESTS

RC579       ENTRY -  VERB 46 ENTER
RC580                (CONDITION - BITS 13, 14 OF DAPDATR1 SET)

RC581       EXIT  -  VERB 48 ENTER  (FLASH V06N46)
RC582                VERB 21 ENTER  AXXXX ENTER WHERE  A=0 OR 1
RC583                VERB 34 ENTER
RC584                VERB 46 ENTER

RC585   NORMAL EXIT MODE

RC586                VERB 46 ENTER  (SEE ASTRONAUT ABOVE)

RC587   ALARM OR ABORT EXIT MODES

RC588       NONE

RC589   OUTPUT

RC590       SATURN RATES IN  CDUXCMD, CDUYCMD, CDUZCMD

RC591   ERASABLE INITIALIZATION

RC592       DAPDATR1  (BITS 13,14 MUST BE SET)
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R0593 DEBRIS

R0594 CENTRALS
R0595 CDUXCMD, CDUYCMD, CDUZCMD

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 C0164 REF   1                 26,2000                    SETLOC  P11FOUR
 C0166                         26,2000                    BANK

 C6018 REF   1                                            COUNT*  $$/P11
 C602  REF   3  LAST  243      26,2000  22 016 0  REDOSAT  LXCH    BANKRUPT    ALSO COMES HERE FOR RESTARTS
 C6021                         26,2001  0 0006 1          EXTEND
 C6022 REF   3  LAST  243      26,2002  22 012 1          QXCH    QRUPT
 C6023 REF  11  LAST  547      26,2003  4 1501 0          CS      RCSFLAGS    TURN ON BIT3 OF RCSFLAGX
 C6024 REF  26  LAST  547      26,2004  7 4766 0          MASK    BIT3        FOR
 C6025 REF  12  LAST  550      26,2005  27'501 0          ADS     RCSFLAGS    NEEDLER INITIALIZATION
 C603  REF  21  LAST  541      26,2006  0 4714 1          TC      IBNKCALL
 C604  REF   4  LAST  547      26,2007   42425 1          CADR    NEEDLER     DISABLE IMU ERR COUNTERS ETC.
 C605  REF  18  LAST  547      26,2010  3 4760 1          CAF     BIT9        SIVB
 C606                          26,2011  0 0006 1          EXTEND              TAKEOVER
 C607  REF  33  LAST  547      26,2012  05 012 1          WOR     CHAN12      ENABLE
 C608                          26,2013  0 0006 1          EXTEND              SET UP T5 CYCLE
 C609  REF   1                 26,2014  3 4541 0          DCA     2SATSTCK
 C610  REF   6  LAST  263      26,2015  52 113 0          DXCH    T5LOC
 C611  REF   1                 26,2016  3 7661 1          CAF     100MST5     IN 100 MSECS
 C612  REF   4  LAST  262      26,2017  54 030 0          TS      TIME5
 C613  REF  20  LAST  248      26,2020  1 5323 1          TCF     RESUME      END OF SATURN STICK INITIALIZATION

AC614                                  THIS SECTION IS EXECUTED EVERY 100 MSECS

 C6145 REF   1                 21,2000                    SETLOC  P11THREE
 C6146                         21,2000                    BANK

 C6148 REF   1                                            COUNT*  $$/P11
 C615  REF   4  LAST  550      21,2000  22 016 0  SATSTICK LXCH    BANKRUPT
 C616                          21,2001  0 0006 1          EXTEND
 C617  REF   4  LAST  550      21,2002  22 012 1          QXCH    QRUPT

 C618  REF   2  LAST  550      21,2003  3 4540 1          CAF     2SATSTCK    SET UP RUPT
 C619  REF   7  LAST  550      21,2004  54 112 1          TS      T5LOC       LO ORDER LOC SET
 C620  REF   2  LAST  550      21,2005  3 7661 1          CAF     100MST5     100 MSECS
 C621  REF   5  LAST  550      21,2006  54 030 0          TS      TIME5
 C622  REF   1                 21,2007  3 2031 1          CAF     STIKBITS
 C623                          21,2010  0 0006 1          EXTEND
 C624  REF   1                 21,2011  06 031 0          RXOR    CHAN31      CHECK IF MAN ROT BITS SAME
 C625  REF   2  LAST  550      21,2012  7 2031 0          MASK    STIKBITS
 C626  REF  22  LAST  550      21,2013  0 4714 1          TC      IBNKCALL    SET RATE INDICES
 C627  REF   1                 21,2014   43152 0          CADR    STICKCHK    FOR PITCH YAW AND ROLL

 C628  REF   2  LAST  114      21,2015  51'656 0          INDEX   RMANNDX      SET SATURN RATES
 C629  REF   2  LAST  119      21,2016  3 1710 0          CA      SATRATE
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0630   REF  15  LAST  546   21,2017  55'476 1          TS      AK                      ROLL
0631   REF   2  LAST  114   21,2020  51'657 1          INDEX   PMANNDX
0632   REF   3  LAST  550   21,2021  3 1710 0          CA      SATRATE
0633   REF   6  LAST  547   21,2022  55'477 0          TS      AK1                     PITCH
0634   REF   2  LAST  118   21,2023  51'660 0          INDEX   YMANNDX
0635   REF   4  LAST  551   21,2024  3 1710 0          CA      SATRATE
0636   REF   6  LAST  547   21,2025  55'500 1          TS      AK2                     YAW

0637   REF  23  LAST  550   21,2026  0 4714 1          TC      IBNKCALL        FOR SATURN INTERFACE AND FDAI DISPLAY
0638   REF   5  LAST  550   21,2027   42425 1          CADR    NEEDLER
0639   REF  21  LAST  550   21,2030  1 5323 1 STICKOUT TCF     RESUME          END OF SATURN STICK CONTROL


0644                       21,2031   00077 1 STIKBITS OCT     00077
0645   REF   1              7661             100MST5  =       CCT37766
0645.5 REF   1              4000             SETLOC   FFTAG2
0646                        4540             BANK

0645.8 REF   1                               COUNT*   $$/P11
0646   REF  10  LAST  544   E6,1704                   EBANK=   SPOLYARG
0647   REF   1              4540   02000 0 2SATSTCK 2CADR    SATSTICK
0647   REF   1              4541   42066 1
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P0001   RENDEZVOUS NAVIGATION PROGRAM 20
R0002   PROGRAM DESCRIPTION
R0003   MOD NO -1
R0004   MOD BY - N.BRODEUR
R0005
R0006   FUNCTIONAL DESCRIPTION
R0007
R0008   TO INITIALIZE THE RENDEZVOUS NAVIGATION SUBROUTINES R22, R61CSM, AND
R0009   R52, WHICH IN TURN CONTROL THE CSM ATTITUDE AND OPTICS POSITIONING,
R0010   PROCESS BOTH OPTICS AND VHF TRACKING DATA, AND UPDATE EITHER THE LM
R0011   OR THE CSM STATE VECTORS.
R0012
R0013   CALLING SEQUENCE
R0014     V37E20E
R0015
R0016   SUBROUTINES CALLED
R0017     R22 (RENDEZVOUS TRACK DATA PROCESSING)
R0018     R52 (AUTO OPTICS POSITIONING)
R0019     R61CSM (PREFERRED TRACKING ATTITUDE)
R0020     R02BOTH          BANKCALL         UPFLAG
R0021     DOWNFLAG         2PHSCHNG         LOADTIME
R0022     PRIOCHNG         UPSTATE          INTPRET
R0023     ENDOFJOB         MKRLEES          FINDVAC
R0024
R0025   NORMAL EXIT MODES
R0026     RENDEZVOUS NAVIGATION MAY BE TERMINATED BY THE SELECTION OF
R0027     P00, P06, P22, P23, V34E FROM R60, AND V56E
R0028
R0029   ALARM OR ABORT EXIT MODES
R0030     NONE DIRECTLY FROM P20
R0031
R0032   OUTPUT
R0033     NONE DIRECTLY FROM P20
R0034
R0035   FLAGS SET + RESET
R0036     RNDVZFLG, VEHUPFLG, UPDATFLG, TRACKFLG, TARG1FLG
R0037     PRFTRKAT, V50N18FL
R0038
 0040   REF   1                36,2000                    SETLOC P20S7
 0041                          36,2016                    BANK

 0042   REF  10  LAST  422     E6,1774                    EBANK= R61CNTR
 0043   REF   1                                           COUNT* $$/P20

 0044   REF 107  LAST  547     36,2016  0 4636 0  PROG20  TC      BANKCALL
 0045   REF   1                36,2017   03731 1          CADR    R02BOTH        IMU STATUS CHECK
A0046                                                                            BLOCKING OF UPLINK IS DONE BY UPLINK PRG
 0462   REF   2  LAST  114     36,2020  3 1655 0          CA      ADB
 0464   REF   3  LAST  294     36,2021  55'773 1          TS      DBPTC
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0047  REF  75  LAST  548   36,2022  0 6006 1          TC      INTPRET
0048                       36,2023   43014 0          CLEAR   SET
0049  REF   2  LAST  271   36,2024   00667 0                  VEHUPFLG        UPDATE LM
0050  REF   3  LAST  261   36,2025   01460 1                  V50N18FL
0051                       36,2026   66214 0          SET     SSP
0052  REF   6  LAST  456   36,2027   00472 0                  TRACKFLG
0056  REF   5  LAST  456   36,2030   00777 0                  OPTION2
0057                       36,2031   00000 1                  0
0064                       36,2032   77414 0          BON     EXIT
0065  REF  10  LAST  486   36,2033   05310 0                  AUTOSEQ
0066  REF   1              36,2034   74050 1                  PRELOD78        MINKEY  (PRELOAD N78)
0069  REF   6  LAST  253   36,2035  3 4124 1          CAF     OCT24
0070  REF 108  LAST  552   36,2036  0 4636 0          TC      BANKCALL
0071  REF   2  LAST  456   36,2037   21074 1          CADR    GOPERF4
0072  REF  16  LAST  532   36,2040  0 4103 1          TC      GOTOPOOH
0073                       36,2041  1 2043 0          TCF     +2
0074                       36,2042  1 2035 1          TCF     -5

0075  REF   6  LAST  553   36,2043  3 0776 1          CA      OPTION2
0076  REF  20  LAST  541   36,2044  7 6214 1          MASK    THREE
0077  REF 143  LAST  546   36,2045  10 000 0          CCS     A
0078  REF   1              36,2046  0 2061 1          TC      DOV6N78         OPTIONS 1,2,5  (DO NOT PRELOAD N78)
0079  REF  76  LAST  553   36,2047  0 6006 1          TC      INTPRET         OPTIONS 0,4            (PRELOAD N78)
0080                       36,2050   77745 1 PRELOD78 DLOAD
0081  REF   1              36,2051   34467 0                  35DEGANG
0082  REF   4  LAST  294   36,2052   17740 1          STODL   UTPIT
0083  REF  13  LAST  545   36,2053   15336 0                  ZEROVECS
0084  REF   4  LAST  294   36,2054   03742 0          STORE   UTYAW
0085  REF   3  LAST  294   36,2055   01353 0          STORE   AZIMANGL
0086                       36,2056   77414 0          BON     EXIT
0087  REF  11  LAST  553   36,2057   05310 0                  AUTOSEQ
0088  REF   1              36,2060   74104 1                  P20OPT          MINKEY, BYPASS V04N06 AND V06N78
0089  REF   1              36,2061  3 2470 0 DOV6N78  CAF     V06N78OUT
0090  REF  12  LAST  532   36,2062  0 5535 1          TC      VNFLASH
0091  REF   1              36,2063  3 2472 1          CAF     V06N79OUT
0092  REF   2  LAST  458   36,2064  0 5540 0          TC      VNFLASHR

0093  REF   1              36,2065  1 2075 0          TCF     ENDV6N79

0094  REF   7  LAST  553   36,2066  3 0776 1          CA      OPTION2
0095  REF  22  LAST  519   36,2067  7 4767 1          MASK    BIT2
0096  REF 144  LAST  553   36,2070  10 000 0          CCS     A
0097  REF  55  LAST  543   36,2071  0 5205 0          TC      ENDOFJOB        OPTION 2, BLANK ONLY R31
0098  REF  10  LAST  458   36,2072  3 4773 0          CAF     FIVE            BLANK BOTH R1,R3
0099  REF   2  LAST  458   36,2073  0 5516 0          TC      BLANKET
0100  REF  56  LAST  553   36,2074  0 5205 0          TC      ENDOFJOB
0101  REF   8  LAST  553   36,2075  3 0776 1 ENDV6N79 CA      OPTION2
0102  REF  27  LAST  550   36,2076  7 4766 0          MASK    BIT3
0103                       36,2077  0 0006 1          EXTEND
0104  REF   1              36,2100  1 2105 0          BZF     NOAZIM
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0105   REF  32  LAST  537   36,2101  0 5547 1            TC      UPFLAG
0106   REF   2  LAST  216   36,2102   00254 1            ADRES   AZIMFLAG

0107   REF   1              36,2103  1 2107 1            TCF     COMAZM

0108                        36,2104   77776 1  P20OPT     EXIT
0109   REF  27  LAST  509   36,2105  0 5561 0  NOAZIM    TC      DOWNFLAG
0110   REF   3  LAST  554   36,2106   00254 1            ADRES   AZIMFLAG

0111   REF   9  LAST  553   36,2107  3 0776 1  COMAZM    CA      OPTION2
0112   REF  21  LAST  553   36,2110  7 6214 1            MASK    THREE
0113   REF 145  LAST  553   36,2111  10 000 0            CCS     A
0114   REF   1              36,2112  1 2220 1            TCF     UTKINPUT
0115   REF  28  LAST  554   36,2113  0 5561 0            TC      DOWNFLAG
0116   REF   5  LAST  270   36,2114   00176 1            ADRES   UTFLAG

0117   REF  33  LAST  554   36,2115  0 5547 1            TC      UPFLAG
0118   REF   4  LAST  486   36,2116   00027 1            ADRES   UPDATFLG

0121   REF   9  LAST  540   36,2117  0 5362 0  NOUTINPT  TC      2PHSCHNG
0122                        36,2120   00004 0            OCT     00004
0123                        36,2121   05022 1            OCT     05022
0124                        36,2122   26000 0            OCT     26000
0125   REF   8  LAST  395   36,2123  3 4760 1            CAF     UTBIT
0126   REF  18  LAST  421   36,2124  7 0104 0            MASK    FLAGWRD8
0127   REF 146  LAST  554   36,2125  10 000 0            CCS     A
0128   REF   1              36,2126  1 2150 0            TCF     INTSETUP

0129   REF  77  LAST  553   36,2127  0 6006 1            TC      INTPRET
0130                        36,2130   77634 0            RTB
0131   REF  10  LAST  527   36,2131   51751 0                    LOADTIME
0132   REF   3  LAST  137   36,2132   35062 0            STCALL  MARKTIME
0133   REF   1              36,2133   60435 0                    UPSTATE
0134                        36,2134   77776 1            EXIT

01343  REF  34  LAST  554   36,2135  0 5547 1            TC      UPFLAG
01346  REF   4  LAST  270   36,2136   00010 0            ADRES   RNDVZFLG

0135   REF   3  LAST  421   36,2137  3 7650 0            CAF     PRIO26
0136   REF  25  LAST  541   36,2140  0 5135 0            TC      FINDVAC
0137   REF  26  LAST  515   E7,1722                      EBANK=  MRKBUF1
0138   REF   2  LAST  231   36,2141   02625 1            2CADR   R22
0138                        36,2142   70067 1
0139   REF  10  LAST  554   36,2143  0 5362 0            TC      2PHSCHNG
0140                        36,2144   00072 1            OCT     00072
0141                        36,2145   00111 0            OCT     00111
01412  REF   2  LAST  415   01,2025              1P11SPT3 =       1,11SPOT
01414  REF   1              01,2041              2P7SPT1  =       2,7SPOT
0142   REF   2  LAST  206   36,2146  0 4112 1            TC      AUTOCHK
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0143   REF   2  LAST  230   36,2147  1 2157 1          TCF     PIKUP20

0144   REF   6  LAST  276   36,2150  3 5047 1  INTSETUP CAF     PRIO5
0145   REF  26  LAST  554   36,2151  0 5135 0          TC      FINDVAC
0146   REF   5  LAST  231   E3,1554                    EBANK=  RRECTCSM
0147   REF   2  LAST  231   36,2152   02711 1          2CADR   STATINT1
0147                        36,2153   26063 0
0148   REF  11  LAST  554   36,2154  0 5362 0          TC      2PHSCHNG
0149                        36,2155   00052 0          OCT     0052
0150                        36,2156   00111 0          OCT     00111

01502  REF   3  LAST  554   01,2025                    1P11SPT4 =      1.11SPOT
01504  REF   3  LAST  213   01,2036                    2P5SPT3  =      2.5SPOT
0151   REF   3  LAST  422   36,2157  3 5053 1  PIKUP20 CAF     PRIO14     ALLOW HIGHER PRIO THAN LAMBERT
0152   REF   6  LAST  448   36,2160  0 5176 1          TC      PRIOCHNG
0153   REF   8  LAST  418   36,2161  3 4764 0          CAF     TRACKBIT
0154   REF  23  LAST  443   36,2162  7 0075 1          MASK    FLAGWRD1   IS TRACK FLAG SET
0155                        36,2163  0 0006 1          EXTEND
0156   REF   3  LAST  420   36,2164  1 2416 1          BZF     FIXDB
0157   REF   3  LAST  208   36,2165  3 4754 0          CAF     REFSMBIT
0158   REF   5  LAST  428   36,2166  7 0077 0          MASK    FLAGWRD3   IS REFSMFLAG SET
0159                        36,2167  0 0006 1          EXTEND
0160   REF   4  LAST  555   36,2170  1 2416 1          BZF     FIXDB

0161   REF 117  LAST  548   36,2171  3 4772 1          CAF     ZERO
0162   REF  11  LAST  552   36,2172  55'774 0          TS      R61CNTR    INITIALIZE R61 COUNTER
0163   REF  19  LAST  554   36,2173  3 0134 1          CA      FLAGWRD8
0164   REF   9  LAST  554   36,2174  7 4760 0          MASK    UTBIT
0165   REF 147  LAST  554   36,2175  10 000 0          CCS     A
0166   REF   1               36,2176  0 2263 1          TC      CALLR6X

0167   REF  35  LAST  554   36,2177  0 5547 1          TC      UPFLAG
0168   REF   4  LAST  396   36,2200   00037 0          ADRES   R21MARK
0169   REF 109  LAST  553   36,2201  0 4636 0          TC      BANKCALL
0170   REF   1               36,2202   76333 0          CADR    R61CSM
0171   REF  13  LAST  279   36,2203  4 0106 1          CS      FLGWRD10   CHECK IF PC MANEUVER TO TRACK
0172   REF   1               36,2204  7 4752 1          MASK    PCMANBIT       ATTITUDE
0173                        36,2205  0 0006 1          EXTEND
0174   REF   1               36,2206  1 4116 1          BZF     AUTOCHK1
0175   REF  36  LAST  555   36,2207  0 5547 1  P20TRACK TC      UPFLAG     SET TARG FLAG TO LEM FOR R52
0176   REF   2  LAST  396   36,2210   00024 1          ADRES   TARG1FLG   BIT 10  FLAG 1
0177   REF  78  LAST  554   36,2211  0 6006 1  P20R52JB TC      INTPRET
0178                        36,2212   77624 1          CALL
0179   REF   1               36,2213   31005 0                  R52        SET UP AUTO OPTICS JOB
0180                        36,2214   77776 1          EXIT
0181   REF 110  LAST  555   36,2215  0 4636 0          TC      BANKCALL
0182   REF   3  LAST  242   36,2216   16073 1          CADR    MKRLEES
0183   REF   5  LAST  555   36,2217  1 2416 1          TCF     FIXDB

0184   REF   1               36,2220  55'351 0  UTKINPUT TS      OPTNTYPE
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0185   REF  37  LAST  555   36,2221  0 5547 1            TC      UPFLAG
0186   REF   6  LAST  554   36,2222   00176 1            ADRES   UTFLAG

0187   REF  29  LAST  554   36,2223  0 5561 0            TC      DOWNFLAG
0188   REF   5  LAST  554   36,2224   00010 0            ADRES   RNDVZFLG

0189   REF   2  LAST  555   36,2225  11'351 0            CCS     OPTNTYPE
0190   REF   1               36,2226  0 2255 1            TC      TYPE2IN

0191   REF   1               36,2227  3 2471 1  V1N70DSP  CAF     V01N70UT
0192   REF  13  LAST  553   36,2230  0 5535 1            TC      VNFLASH
0193   REF   5  LAST  450   36,2231  11'140 1            CCS     STARCODE
0194   REF   1               36,2232  6 2475 0            AD      NEG47UT
0195   REF 148  LAST  555   36,2233  10 000 0            CCS     A
0196   REF   1               36,2234  1 2253 0            TCF     NOGOOD

0197                         36,2235  1 2237 1            TCF     +2
0198                         36,2236  1 2237 1            TCF     +1
0199   REF   6  LAST  556   36,2237  3 1140 0            CA      STARCODE
0200   REF   1               36,2240  55'355 1            TS      UTSTARNO

0201   REF 149  LAST  556   36,2241  10 000 0            CCS     A
0202   REF   1               36,2242  1 2117 0            TCF     NDUTINPT

0203   REF   1               36,2243  3 5035 1            CAF     V06N88UT
0204   REF  14  LAST  556   36,2244  0 5535 1            TC      VNFLASH
0205   REF  79  LAST  555   36,2245  0 6006 1            TC      INTPRET
0206                         36,2246   77775 1            VLOAD
0207   REF   4  LAST  294   36,2247   03705 0                    STARSAV3
0208   REF   2  LAST  130   36,2250   03732 1            STORE   PLANVCUT
0209                         36,2251   77776 1            EXIT
0210   REF   2  LAST  556   36,2252  0 2117 1            TC      NDUTINPT

0211   REF   8  LAST  372   36,2253  0 4362 1  NOGOOD    TC      FALTON
0212   REF   1               36,2254  0 2227 1            TC      V1N70DSP

0213   REF   1               36,2255  3 5027 1  TYPE2IN   CAF     V06N34UT
0214   REF  15  LAST  556   36,2256  0 5535 1            TC      VNFLASH
0215                         36,2257  0 0006 1            EXTEND
0216   REF  24  LAST  461   36,2260  3 1251 0            DCA     DSPTEM1
0217   REF   3  LAST   87   36,2261  53'356 1            DXCH    R67TIME
0218   REF   3  LAST  556   36,2262  1 2117 0            TCF     NDUTINPT

0219   REF  30  LAST  556   36,2263  0 5561 0  CALLR6X   TC      DOWNFLAG
0220   REF   5  LAST  555   36,2264   00037 0            ADRES   R21MARK

0221   REF   3  LAST  556   36,2265  11'351 0            CCS     OPTNTYPE
0222   REF   1               36,2266  1 2271 0            TCF     TYPE2

0223   REF  39  LAST  540   36,2267  0 4655 0            TC      POSTJUMP
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0224  REF   1                 36,2270   74454 1            CADR    R66CSM

0225                          36,2271   0 0006 1  TYPE2    EXTEND
0226  REF  21  LAST  543      36,2272   4 0025 1           DCS     TIME2
0227  REF 241  LAST  548      36,2273   52 155 1           DXCH    MPAC
0228                          36,2274   0 0006 1           EXTEND
0229  REF   4  LAST  556      36,2275   3 1356 0           DCA     R67TIME
0230  REF 242  LAST  557      36,2276   20 155 1           DAS     MPAC
0231  REF   5  LAST  531      36,2277   0 7224 1           TC      DPAGREE
0232  REF 243  LAST  557      36,2300   10 154 0           CCS     MPAC
0233  REF   1                 36,2301   1 2314 1           TCF     DODELAY

0234                          36,2302   1 2305 1           TCF     +3
0235  REF 118  LAST  555      36,2303   3 4772 1           CAF     ZERO
0236  REF 244  LAST  557      36,2304   54 155 1           TS      MPAC +1
0237  REF 245  LAST  557      36,2305   10 155 1           CCS     MPAC +1
0238                          36,2306   1 2307 0           TCF     +1
0239  REF  58  LAST  540      36,2307   6 4770 0           AD      ONE
0240  REF  16  LAST  540      36,2310   0 5233 0           TC      WAITLIST
0241  REF  12  LAST  555      E6,1774                      EBANK=  R61CNTR
0242  REF   2  LAST  415      36,2311    02320 1           2CADR   R67
0242                          36,2312    74066 1
0243  REF  57  LAST  553      36,2313   0 5205 0           TC      ENDOFJOB

0244  REF  12  LAST  432      36,2314   3 4750 1  DODELAY  CAF     POSMAX
0245  REF 111  LAST  555      36,2315   0 4636 0           TC      BANKCALL
0246  REF   5  LAST  547      36,2316    01731 0           CADR    DELAYJOB
0247  REF   2  LAST  556      36,2317   1 2271 0           TCF     TYPE2

0248  REF   4  LAST  554      36,2320   3 7650 0  R67      CAF     PRIO26
0249  REF  27  LAST  555      36,2321   0 5135 0           TC      FINDVAC
0250  REF  13  LAST  557      E6,1774                      EBANK=  R61CNTR
0251  REF   1                 36,2322    02327 0           2CADR   R67START
0251  REF   1                 36,2323    74066 1
0252  REF  38  LAST  556      36,2324   0 5547 1           TC      UPFLAG
0253  REF   2  LAST  270      36,2325    00205 0           ADRES   R67FLAG

0254  REF  26  LAST  541      36,2326   0 5314 1           TC      TASKOVER

0255  REF  80  LAST  556      36,2327   0 6006 1  R67START TC      INTPRET
0256                          36,2330    47014 1           BON     RTB
0257  REF   3  LAST  261      36,2331    00701 1                   STIKFLAG
0258  REF   1                 36,2332    44717 0                   NOGOMB
0259  REF   3  LAST  403      36,2333    44370 0                   READCDUK
0260  REF  17  LAST  421      36,2334    37262 0           STCALL  BCDU
0261  REF   1                 36,2335    74437 1                   UTPREAX
0262  REF  47  LAST  416      36,2336    03343 0           STORE   COF
0263                          36,2337    77776 1           EXIT

02632                         36,2340   0 0004 0           INHINT
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02634  REF   1                    36,2341  3 5007 0        CAF     MINDB
02636  REF   3  LAST  552         36,2342  55'655 1        TS      ADB
0264   REF   4  LAST  552         36,2343  11'773 1        CCS     DBPTC
0265   REF  59  LAST  557         36,2344  6 4770 0        AD      ONE
0266                               36,2345  0 2347 0        TC      +2
0267   REF  60  LAST  558         36,2346  6 4770 0        AD      ONE
026702                             36,2347  0 0006 1        EXTEND
026704                             36,2350  1 2352 0        BZF     +2
0268   REF   4  LAST  558         36,2351  55'655 1        TS      ADB

0269   REF  81  LAST  557         36,2352  0 6006 1        TC      INTPRET
0270                               36,2353   41335 1        SLOAD   DMP
0271   REF   3  LAST  294         36,2354   03373 0                RATEPTC
0272   REF   1                    36,2355   34474 1                TUFITS          SCALING FACTOR(.4 DEC)
0273                               36,2356   45002 1        SR4     CALL            COMPUTE THE INCREMENTAL ROTATION MATRIX
0274   REF   4  LAST  416         36,2357   44522 1                DELCOMP         DEL CORRESPONDING TO A  1 SEC ROTATION
0275                               36,2360   41335 1        SLOAD   DMP             ABOUT COF
0276   REF   4  LAST  558         36,2361   03373 0                RATEPTC
0277   REF   2  LAST  558         36,2362   34474 1                TUFITS
0278                               36,2363   64361 1        VXSC    MXV
0279   REF  48  LAST  557         36,2364   03343 0                COF
0280   REF   3  LAST  419         36,2365   05014 1                QUADROT
0281   REF   6  LAST  420         36,2366   27311 1        STOVL   BRATE
0282   REF  14  LAST  553         36,2367   15336 0                ZEROVECS
0283   REF   5  LAST  420         36,2370   03275 1        STORE   BIASTEMP
0284                               36,2371   77776 1        EXIT

0285   REF  35  LAST  541         36,2372  0 5402 1        TC      PHASCHNG
0286                               36,2373   00131 1        OCT     00131

02865  REF   1                    01,2030                1P13SPT1 =      1.13SPOT
0287   REF  24  LAST  555         36,2374  3 0075 0       R67RSTRT CA     FLAGWRD1
0288   REF   9  LAST  555         36,2375  7 4764 1                MASK    TRACKBIT
0289                               36,2376  0 0006 1        EXTEND
0290   REF   6  LAST  555         36,2377  1 2416 1        BZF     FIXDB
0291   REF  23  LAST  508         36,2400  3 4755 1        CAF     BIT12
0292   REF  14  LAST  557         36,2401  55'774 0        TS      R61CNTR

0293   REF   5  LAST  557         36,2402  3 7650 0        CAF     PRIO26
0294   REF   7  LAST  555         36,2403  0 5176 1        TC      PRIOCHNG

0295   REF  82  LAST  558         36,2404  0 6006 1        TC      INTPRET
0296                               36,2405   72364 0        AXC,2   TLOAD
0297   REF  18  LAST  418         36,2406   03320 0                MIS
0298   REF  18  LAST  557         36,2407   03262 1                BCDU
0299                               36,2410   45014 0        SET     CALL
0300   REF   3  LAST  557         36,2411   04075 1                R67FLAG
0301   REF   4  LAST  403         36,2412   44377 1                CDUTODCM
0302                               36,2413   77614 1        SETGO
0303   REF   3  LAST  418         36,2414   01035 0                CALCMAN2        SET CALCMAN2 TO START MANEUVER
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0304   REF   3  LAST  418   36,2415   45053 0                        NEWANGL +1

0305   REF   7  LAST  507   36,2416   3 0105 0  FIXDB    CA     FLAGWRD9      RESTORE DAP DEADBAND
0306                       36,2417   0 0004 0            INHINT
0307   REF   2  LAST  222   36,2420   7 4755 0            MASK   MAXDBBIT
0308   REF 150  LAST  556   36,2421   10 000 0            CCS    A
0309                       36,2422   1 2426 1            TCF    +4

0310   REF 112  LAST  557   36,2423   0 4636 0            TC     BANKCALL
0311   REF   2  LAST  222   36,2424    51203 1            CADR    SETMINDB
0312                       36,2425   1 2430 0            TCF    +3

0313   REF 113  LAST  559   36,2426   0 4636 0            TC     BANKCALL
0314   REF   2  LAST  222   36,2427    51217 1            CADR   SETMAXDB

0315   REF  31  LAST  556   36,2430   0 5561 0            TC     DOWNFLAG
0316   REF   4  LAST  558   36,2431    00205 0            ADRES  R67FLAG
0317   REF  36  LAST  558   36,2432   0 5402 1            TC     PHASCHNG
0318                       36,2433    00111 0            OCT    00111
03185  REF   4  LAST  555   01,2025                1P11SPT5 =      1,11SPOT
0319                       36,2434   0 0004 0  STOPVEH  INHINT
0320   REF   5  LAST  422   36,2435   0 4463 1            TC     STOPRATE
0321   REF  58  LAST  557   36,2436   1 5205 1            TCF    ENDOFJOB

0322                       36,2437    73545 1  UTPREAX  DLOAD  SIN           COMPUTE PREFERRED UNIT VECTOR
0323   REF   5  LAST  553   36,2440    03740 1            UTPIT                        MPAC   =COS(P)COS(Y)
0324                       36,2441    65276 1            DCOMP  PDDL    PDX=-SIN(P)    MPAC +2=COS(P)SIN(Y)
0325   REF   6  LAST  559   36,2442    03740 1            UTPIT                        MPAC +4=-SIN(P)
0326                       36,2443    41546 0            COS    PUSH    PDX+2=COS(P) USED WITH SECOND DMP BELOW
0327                       36,2444    73525 1            PDDL   SIN     PDX+4=COS(P) USED WITH FIRST  DMP BELOW
0328   REF   5  LAST  553   36,2445    03742 0            UTYAW
0329                       36,2446    72405 0            DMP    SL1     MPAC=COS(P)SIN(Y)
0330                       36,2447    77725 1            PDDL           REPLACE PDX+2 WITH COS"P)SIN(Y)
0331                       36,2450    71525 0            PDDL   COS     REPLACE PDX+4 WITH COS(P) IN ORDER TO
0332   REF   6  LAST  559   36,2451    03742 0            UTYAW          POSITION PD COUNTER FOR DMP
0333                       36,2452    72405 0            DMP    SL1
0334                       36,2453    43466 1            VDEF   RVQ     PUSHUP FOR Y,Z COMPONENTS

0335   REF  25  LAST  558   36,2454   4 0075 1  R66CSM   CS     FLAGWRD1      R66 CONTROL
0336   REF  10  LAST  558   36,2455   7 4764 1            MASK   TRACKBIT
0337   REF 151  LAST  559   36,2456   10 000 0            CCS    A
0338   REF   7  LAST  558   36,2457   1 2416 1            TCF    FIXDB

0339   REF 114  LAST  559   36,2460   0 4636 0            TC     BANKCALL      TRACKFLG SET, CONTINUE R66
0340   REF   2  LAST  555   36,2461    76333 0            CADR   R61CSM        CALL R61

0341   REF   5  LAST  537   36,2462   3 5011 1            CAF    .5SEC
0342   REF 115  LAST  559   36,2463   0 4636 0            TC     BANKCALL      WAIT .5 SEC AND REPEAT
0343   REF   6  LAST  557   36,2464    01731 0            CADR   DELAYJOB
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0344   REF   2  LAST  557   36,2465  0 2454 0          TC      R66CSM

0345                        36,2466   74707 1  35DEGANG 2DEC    -.097222222222
0345                        36,2467   43433 1
0346                        36,2470   01516 1  V06N78UT VN      0678
0347                        36,2471   00306 1  V01N70UT VN      0170
0348   REF   1                5035             V06N88UT =       V06N88
0349                        36,2472   01517 0  V06N79UT VN      0679
0350   REF   2  LAST  458      5027             V06N34UT =       V06N34
0351                        36,2473   14631 0  TUFITS   2DEC    .4
0351                        36,2474   23146 0
0352                        36,2475   77730 0  NEG47UT  OCT     77730
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P0353   ORBITAL NAVIGATION PROGRAM 22
 0355   REF   1                  30,2000                    SETLOC  P20S1
 0356                            30,2153                    BANK

 0357   REF  10  LAST  293       E7,1751                    EBANK=  LANDMARK
 0358   REF   1                                             COUNT*  $$/P22

 0359   REF 116  LAST  559       30,2153   0 4636 0  PROG22  TC      BANKCALL
 0360   REF   2  LAST  552       30,2154    03731 1          CADR    R02BOTH
 0361   REF  83  LAST  558       30,2155   0 6006 1          TC      INTPRET
 0362                            30,2156    43014 0         BOFF    SET
 0363   REF   7  LAST  556       30,2157    04346 1                 UTFLAG
 0364                            30,2160    60162 1                 +2
 0365   REF   7  LAST  553       30,2161    00472 0                 TRACKFLG
 0366                            30,2162    47014 1         CLEAR   RTB
 0367   REF   6  LAST  556       30,2163    00270 1                 RNDVZFLG
 0368   REF  11  LAST  554       30,2164    51751 0                 LOADTIME
 0369   REF  17  LAST  519       30,2165    34041 0         STCALL  TDEC1
 0370   REF   3  LAST  505       30,2166    27170 1                 CSMCONIC        INTEGRATE TO PRESENT TIME
 0371                            30,2167    47375 0         VLOAD   VXV             CROSS PRODUCT BETWEEN V AND R
 0372   REF  12  LAST  518       30,2170    00007 0                 VATT
 0373   REF  14  LAST  518       30,2171    00001 0                 RATT
 0374                            30,2172    50256 0         UNIT    DOT
 0375   REF  14  LAST  539       30,2173    01742 1                 REFSMMAT +6
 0376                            30,2174    77646 0         ABS
 0377                            30,2175    65552 0         SL1     ARCCOS
 0378   REF   6  LAST  495       30,2176    03626 0         STORE   +MGA
 0379                            30,2177    77776 1         EXIT
 0380   REF   1                  30,2200   3 2257 0         CAF     V06N45B
 0381   REF   3  LAST  553       30,2201   0 5540 0         TC      VNFLASHR
 0382   REF   1                  30,2202   0 2206 1         TC      PROG22A
 0383   REF  22  LAST  554       30,2203   3 6214 0         CAF     THREE
 0384   REF   3  LAST  553       30,2204   0 5516 0         TC      BLANKET         BLANK OUT R1 + R2
 0385   REF  59  LAST  559       30,2205   0 5205 0         TC      ENDOFJOB
 0386   REF   7  LAST  521       30,2206   4 5051 1  PROG22A CS      PRIO7           RESULT=70777  SET OFFSET NO.=0
 0387   REF  11  LAST  561       30,2207   7 1751 1         MASK    LANDMARK
 0388   REF  12  LAST  561       30,2210   55'751 1         TS      LANDMARK
 0389   REF  12  LAST  555       30,2211   0 5362 0         TC      2PHSCHNG
 0390                            30,2212    00004 0         OCT     00004
 0391                            30,2213    05022 1         OCT     05022
 0392                            30,2214    13000 0         OCT     13000
 0393   REF  39  LAST  557       30,2215   0 5547 1         TC      UPFLAG
 0394   REF   1                  30,2216    00025 0         ADRES   TARG2FLG       SET =1 FOR SIGHTING LMK
 0395   REF  40  LAST  561       30,2217   0 5547 1         TC      UPFLAG
 0396   REF   3  LAST  553       30,2220    00026 0         ADRES   VEHUPFLG        VEH.=CSM
 0397   REF  84  LAST  561       30,2221   0 6006 1         TC      INTPRET
 0398                            30,2222    43014 0         CLEAR   CLEAR
 0399   REF   7  LAST  522       30,2223    01663 0                 LUNAFLAG
 0400   REF   2  LAST  245       30,2224    01664 1                 P22MKFLG
 0401                            30,2225    43014 0         SET     BOFF
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0402  REF   4  LAST  538   30,2226  00462 1                ERADFLAG
0403  REF   9  LAST  496   30,2227  04343 1                CMOONFLG
0404  REF   1              30,2230  60240 1                PROG22B       EARTH
0405                       30,2231  77614 1          SET                  MOON
0406  REF   8  LAST  561   30,2232  01463 1                LUNAFLAG
0407                       30,2233  45145 0          DLOAD CALL          MPAC=V05N70,MPAC+1=NONZERO FOR N70
0408  REF   1              30,2234  23513 1                V05N7022
0409  REF   1              30,2235  60332 0                S22N7071
0410                       30,2236  77650 1          GOTO
0411  REF   1              30,2237  60242 0                CALLR52
0412                       30,2240  77624 1  PROG22B CALL                GET LAT/LONG/ALT FROM ASTRO
0413  REF   1              30,2241  60304 0                P22SUBRB
0414                       30,2242  77624 1  CALLR52 CALL
0415  REF   2  LAST  555   30,2243  31005 0                R52
0416                       30,2244  45135 1  DOV5N71 SLOAD CALL          MPAC=V05N71,MPAC+1=0 FOR N71
0417  REF   1              30,2245  23514 0                V05N7122
0418  REF   2  LAST  562   30,2246  60332 0                S22N7071
0419                       30,2247  66214 0  PROG22C SET   SSP
0420  REF   3  LAST  561   30,2250  01464 0                P22MKFLG      FOR DOWNLINK
0421  REF   2  LAST  134   30,2251  03746 1                8KK
0422                       30,2252  00001 0          DEC   1
0423                       30,2253  77531 0          SSP   EXIT
0424  REF   2  LAST  134   30,2254  03751 1                S22LOC
0425  REF  26  LAST  248   30,2255  03537 0          ECADR SVMRKDAT
0426  REF   1              30,2256  0 2466 1         TC    S22.1

0427                       30,2257  01455 1  V06N45B VN    0645
0428  REF   1              31,3512           V05N7022 =    V05N70
0429  REF   1              31,3513           V05N7122 =    V05N71
0434                       30,2260  77634 0  S22LSITE RTB                CONVERT RLS FROM MOON-FIXED TO BASIC REF
0435  REF  12  LAST  561   30,2261  51751 0                LOADTIME
0436                       30,2262  24007 0          STOVL 6D            6-7D= TIME
0437  REF   6  LAST  547   30,2263  02026 1                RLS
0438                       30,2264  14001 0          STODL 0D            0-5D= LANDING SITE VECTOR
0439  REF   4  LAST  448   30,2265  15334 1                HIDPHALF      MPAC= ANY NON-ZERO FOR MOON
0440                       30,2266  77624 1          CALL
0441  REF   2  LAST  459   30,2267  55345 0                RP-TO-R       RLS IN BASIC REF B-27 IN MPAC
0442                       30,2270  77742 0          VSR2                LUNAFLAG AND ERADFLAG SET ABOVE
0443  REF   4  LAST  459   30,2271  02152 0          STORE ALPHAV        SCALE RLS B-29 FOR LAT-LONG
0444                       30,2272  77634 0          RTB
0445  REF  13  LAST  562   30,2273  51751 0                LOADTIME      SET PRESENT TIME IN MPAC FOR LAT-LONG
0446                       30,2274  77624 1          CALL
0447  REF   3  LAST  459   30,2275  26453 1                LAT-LONG
0448                       30,2276  77650 1          GOTO
0449  REF   2  LAST  129   30,2277  03667 0                S22TOFF       EXIT
0450                       30,2300  77624 1  OBTAINLL CALL                GET LAT/LONG/ALT FROM ASTRO
0451  REF   2  LAST  562   30,2301  60304 0                P22SUBRB
0452                       30,2302  77650 1          GOTO
0453  REF   3  LAST  562   30,2303  03667 0                S22TOFF       EXIT
0454                       30,2304  77420 1  P22SUBRB STQ   EXIT          GET LAT/LONG/ALT FROM ASTRO
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0455  REF   4  LAST  562  30,2305   03670 0                  S22TOFF +1
0456  REF   1            30,2306  3 5036 1      +2    CAF   V06N89B
0457  REF  16  LAST  556  30,2307   0 5535 1            TC    VNFLASH
0458  REF  85  LAST  561  30,2310   0 6006 1            TC    INTPRET
0459                      30,2311   51545 1            DLOAD ABS          TEST LAT/LONG GREATER THAN 90
0460  REF   2  LAST  294  30,2312   00747 0            LANDLAT
0461                      30,2313   50021 1            BDSU  BMN          1/4 REV - LAT
0462  REF   3  LAST  404  30,2314   15326 1            DP1/4TH
0463  REF   1            30,2315   60323 0            N89ERRX
0464                      30,2316   51545 1            DLOAD ABS
0465  REF   3  LAST  294  30,2317   02351 1            LANDLONG
0466                      30,2320   51021 0            BDSU  BPL
0467  REF   4  LAST  563  30,2321   15326 1            DP1/4TH
0468  REF   2  LAST  563  30,2322   60326 0            N89ERRX +3
0469                      30,2323   77776 1  N89ERRX   EXIT
0470  REF   9  LAST  556  30,2324   0 4362 1            TC    FALTON
0471  REF   3  LAST  562  30,2325   0 2306 0            TC    P22SUBRB +2  LONG GR. THAN 90  REDISPLAY
0472                      30,2326   77624 1      +3    CALL
0473  REF   1            30,2327   62371 0            LLASRDA
0474                      30,2330   77650 1            GOTO
0475  REF   5  LAST  563  30,2331   03670 0            S22TOFF +1   EXIT
0476  REF   3  LAST  562  30,2332   03746 1  S22N7071  STORE 8KK          8KK=V05N71,V05N70 8KK+1=0 N71,NOT 0 N70
0477                      30,2333   77420 1            STQ   EXIT
0478  REF   6  LAST  563  30,2334   03667 0                  S22TOFF
0479  REF   4  LAST  563  30,2335  3 1745 0  S22DSPPA  CA    8KK          V05N70 OR V05N71
0480  REF   4  LAST  561  30,2336   0 5540 0            TC    VNFLASHR
0481                      30,2337   0 2343 1            TC    +4
0482  REF  11  LAST  553  30,2340  3 4773 0            CAF   FIVE         IMMEDIATE RETURN BLANK OUT R1,R3
0483  REF   4  LAST  561  30,2341   0 5516 0            TC    BLANKET
0484  REF  60  LAST  561  30,2342   0 5205 0            TC    ENDOFJOB
0485  REF  13  LAST  561  30,2343   3 1751 0            CA    LANDMARK
0486  REF   8  LAST  561  30,2344   7 5051 1            MASK  PRIO7        07000
0487                      30,2345   0 0006 1            EXTEND
0488  REF  25  LAST  386  30,2346   7 4763 0            MP    BIT6
0489  REF   2  LAST  134  30,2347   55'744 0            TS    CXOFF        CB000 = OFFSET INDICATOR
0490  REF  12  LAST  563  30,2350   4 4773 1            CS    FIVE
0491  REF   3  LAST  563  30,2351   6 1744 1            AD    CXOFF
0492                      30,2352   0 0006 1            EXTEND
0493                      30,2353   6 2355 0            BZMF  +2           OFF=0 THRU 5 OK
0494  REF   1            30,2354   0 2367 1            TC    S22DSPP      OFF=6,7 ILLEGAL REDISPLAY
0495  REF  32  LAST  559  30,2355   0 5561 0            TC    DOWNFLAG
0496  REF   1            30,2356    00141 0            ADRES KNOWNFLG     CLEAR KNOWNFLG
0497  REF  14  LAST  563  30,2357   3 1751 0            CA    LANDMARK     MASK A FROM ABCDE
0498  REF   2  LAST  175  30,2360   7 7673 0            MASK  13,14,15
0499                      30,2361   0 0006 1            EXTEND
0500  REF   2  LAST  563  30,2362   6 2367 1            BZMF  S22DSPP      A=0,4,5,6,7  ILLEGAL REDISPLAY
0501  REF   2  LAST  134  30,2363   55'743 1            TS    22SUBSCL     TEMP
0502  REF  30  LAST  531  30,2364   4 4753 0            CS    BIT14
0503  REF   3  LAST  563  30,2365   6 1743 0            AD    22SUBSCL
0504  REF 152  LAST  559  30,2366   10 000 0            CCS   A
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0505  REF  10  LAST  563   30,2367  0 4362 1  S22DSPP  TC      FALTON      +  A=3 ILLEGAL REDISPLAY
0506  REF   1             30,2370  0 2335 0           TC      S22DSPPA    COMMON ERROR EXIT BACK TO DISPLAY
0507                      30,2371  0 2373 1           TC      +2          -   A=1 KNOWN LMK  CHECK DE
0508  REF   1             30,2372  0 2417 1           TC      S22ABDE     -0  A=2 UNKNOWN LMK,DE MEANINGLESS
0509  REF  41  LAST  561   30,2373  0 5547 1           TC      UPFLAG
0510  REF   2  LAST  563   30,2374    00141 0          ADRES   KNOWNFLG    SET KNOWNFLG
0511  REF   2  LAST  487   30,2375  4 7677 1           CS      HIGH9       RESULT= 00077
0512  REF  15  LAST  563   30,2376  7 1751 1           MASK    LANDMARK
0513  REF   4  LAST  563   30,2377  55'743 1           TS      22SUBSCL    00DE
0514  REF  31  LAST  547   30,2400  4 4770 1           CS      BIT1
0515  REF   5  LAST  564   30,2401  6 1743 0           AD      22SUBSCL
0516                      30,2402  0 0006 1           EXTEND
0517  REF   2  LAST  564   30,2403  6 2417 1           BZMF    S22ABDE     DE=0,1 OK FOR BOTH N70,N71
0518  REF   5  LAST  563   30,2404  3 1746 0           CA      8KK +1      =0 FOR N71, NOT =0 FOR N70
0519                      30,2405  0 0006 1           EXTEND
0520  REF   3  LAST  563   30,2406  1 2367 0           BZF     S22DSPP     N71 REDISPLAY  DE MUST= 0 OR 1
0521  REF  23  LAST  521   30,2407  3 4764 0           CA      BIT5        N70 TEST DE= 50-57 OCTAL FOR ADV. ORBIT
0522  REF   6  LAST  393   30,2410  6 5004 0           AD      OCT50       SUM=00070
0523  REF   6  LAST  564   30,2411  7 1743 1           MASK    22SUBSCL    00D0
0524  REF 153  LAST  563   30,2412  4 0000 0           CS      A
0525  REF   7  LAST  564   30,2413  6 5004 0           AD      OCT50
0526                      30,2414  0 0006 1           EXTEND
0527  REF   1             30,2415  1 2427 0           BZF     DE-GR-50    D=5 OR DE=50-57,OK FOR N70
0528  REF   4  LAST  564   30,2416  0 2367 1           TC      S22DSPP     DE NOT 50-57  ILLEGAL,REDISPLAY
0529  REF  86  LAST  563   30,2417  0 6006 1  S22ABDE  TC      INTPRET
0530                      30,2420    67214 1          BOFF    SLOAD
0531  REF   3  LAST  564   30,2421    03347 1                  KNOWNFLG    UNKNOWN LMK, DE MEANINGLESS
0532  REF   7  LAST  563   30,2422    03667 0                  S22TOFF
0533  REF   7  LAST  564   30,2423    03744 0                  22SUBSCL    =0 GET LLA FROM ASTRO,NOT=0 USE RLS
0534                      30,2424    52030 0          BHIZ    GOTO
0535  REF   1             30,2425    60300 1                  OBTAINLL    GET LAT/LONG/ALT FROM ASTRO  N89
0536  REF   1             30,2426    60260 0                  S22LSITE    GET LAT/LONG/ALT FROM RLS
0537  REF  87  LAST  564   30,2427  0 6006 1  DE-GR-50 TC      INTPRET     ADVANCED ORBIT OPTION IN R52
0538                      30,2430    45014 0          SET     CALL        ADVANCED ORBIT ENTRANCE TO R52
0539  REF   1             30,2431    04065 0                  ADVTRK
0540  REF   1             30,2432    31007 1                  R52VRB
0541                      30,2433    77650 1          GOTO
0542  REF   1             30,2434    60244 0                  DOV5N71
0543  REF   1             13,2000                     SETLOC  P24PROG
0544                      13,2254                     BANK
```

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P0545   PROGRAM 24
 05455  REF   1                                          COUNT*  $$/P24
 0546   REF   1                 13,2254  3 0737 1 PROG24 CA      NO.PASS
 0547   REF   1                 13,2255  55'131 1        TS      PASSCNT
 0548   REF  13  LAST  561      13,2256  0 5362 0        TC      2PHSCHNG
 0549                           13,2257   00004 0        OCT     00004
 0550                           13,2260   05022 1        OCT     05022
 0551                           13,2261   13000 0        OCT     13000
 0552   REF 117  LAST  561      13,2262  0 4636 0        TC      BANKCALL
 0553   REF   3  LAST  561      13,2263   03731 1        CADR    R02BOTH         IMU STATUS CHECK
 0554   REF  88  LAST  564      13,2264  0 6006 1        TC      INTPRET
 0555                           13,2265   43014 0        BOFF    SET
 0556   REF   8  LAST  561      13,2266   04346 1                UTFLAG
 0557                           13,2267   26271 1                +2
 0558   REF   8  LAST  561      13,2270   00472 0                TRACKFLG
 0559                           13,2271   43014 0        CLEAR   CLEAR
 0560   REF   3  LAST  247      13,2272   01274 1                P24MKFLG
 0561   REF   1                 13,2273   04261 0                NEWLMFLG
 0562                           13,2274   43014 0        CLEAR   CLEAR
 0563   REF   3  LAST  273      13,2275   01671 0                CRBWFLAG
 0564   REF   3  LAST  272      13,2276   02676 1                RENDWFLG
 0565                           13,2277   76131 0        SSP     AXT,1           ZERO P22 DOWNLIST MARK BUFFER
 0566   REF   6  LAST  439      13,2300   00051 0                S1
 0567                           13,2301   00006 1        DEC     6
 0568                           13,2302   00044 1        DEC     36
 0569                           13,2303   77214 0        SET     VLOAD
 0570   REF   2  LAST  209      13,2304   04461 0                P24FLAG
 0571   REF   3  LAST  491      13,2305   11762 1                ZEROVEC
 0572   REF  27  LAST  562      13,2306   07604 1 ZERODNLK STORE  SVMRKDAT +36D,1
 0573                           13,2307   43100 1        TIX,1   CLEAR
 0574   REF   1                 13,2310   26306 0                ZERODNLK
 0575   REF   4  LAST  562      13,2311   01664 1                P22MKFLG
 0576                           13,2312   47014 1        CLEAR   RTB
 0577   REF   7  LAST  561      13,2313   00270 1                RNDVZFLG
 0578   REF  14  LAST  562      13,2314   51751 0                LOADTIME
 0579   REF   4  LAST  554      13,2315   35062 0        STCALL  MARKTIME
 0580   REF   1                 13,2316   56462 1                SETINTG
 0581                           13,2317   77624 1        CALL
 0582   REF   4  LAST  456      13,2320   27236 0                INTEGRV         UPDATE STATE VEC TO CURRENT TIME
 0583                           13,2321   43014 0        SET     CLEAR
 0584   REF   5  LAST  562      13,2322   00462 1                ERADFLAG
 0585   REF   9  LAST  562      13,2323   01663 0                LUNAFLAG
 0586                           13,2324   43014 0        BOFF    SET
 0587   REF  10  LAST  562      13,2325   04343 1                CMOONFLG
 0588                           13,2326   26330 0                +2
 0589   REF  10  LAST  565      13,2327   01463 1                LUNAFLAG
 0590                           13,2330   77624 1        CALL
 0591   REF   4  LAST  563      13,2331   60304 0                P22SUBRB
 0592                           13,2332   77776 1        EXIT
 0593   REF  14  LAST  565      13,2333  0 5362 0        TC      2PHSCHNG
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0594                                13,2334   00004 0        OCT     00004
0595                                13,2335   05022 1        OCT     05022
0596                                13,2336   13000 0        OCT     13000
0597   REF  89  LAST  565           13,2337   0 6006 1       TC      INTPRET
0598                                13,2340   45014 0        SET     CALL
0599   REF   2  LAST  561           13,2341   00466 0                TARG2FLG
0600   REF   3  LAST  562           13,2342   31005 0                R52
0601                                13,2343   77776 1        EXIT
0602   REF  17  LAST  553           13,2344   0 4103 1       TC      GOTOPOOH
```

L P20-P25 USER'S PAGE NO. 16 E7 S3

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R0603   PROGRAM NAME- OPTICS CALIBRATION ROUTINE
R0604   MOD NO- 1
R0605   MOD BY- TOM KNATT
R0606
R0607   FUNCTIONAL DESCRIPTION- TO MEASURE THE EFFECT OF SOLAR RADIATION ON
R0608     THE SXT TRUNNION ANGLE AND TO STORE THE MEASURED TRUNNION BIAS FOR P23
R0609
R0610   CALLING SEQUENCE- CALL
R0611                         R57
R0612
R0613   SUBROUTINES CALLED- DISPLAY ROUTINES
R0614
R0615   NORMAL EXIT MODES-VIA EGRESS
R0616
R0617   ALARMS- NONE
R0618
R0619   ABORT MODES- P23ABORT IF MARKING SYSTEM OR EXTENDED VERB ACTIVE
R0620   INPUT- NONE REQUIRED, NORMALLY CALLED BY P23
R0621   OUTPUT- TRUNNION BIAS ANGLE- ANGLE DETERMINED WHEN SHAFT LINE OF SIGHT
R0622   (SLOS) AND LANDMARK LINE OF SIGHT (LLOS) ARE SUPERIMPOSED. THIS ANGLE
R0623   MAY NOT BE EXACTLY ZERO BECAUSE OF UNEVEN HEATING OF THE OPTICS,FOR
R0624   EXAMPLE.
R0625
R0626   ERASABLE INITIALIZATION REQUIRED- MRKBUF1, EXTVBACT
R0627
R0628   DEBRIS- RUPTREGS USED BY MARKRUPT AND ERASABLES USED BY DISPLAYS
 0630   REF   2  LAST  456   37,2000                    SETLOC  P20S
 0631                        37,2167                    BANK
 0632   REF   1                                         COUNT*  $$/R57
 0633   REF  27  LAST  554   E7,1722                    EBANK=  MRKBUF1
 0634                        37,2167   77420 1  R57     STQ     EXIT
 0635   REF   2  LAST   94   37,2170   02310 1          EGRESS
 0636   REF   6  LAST  555   37,2171   4 0077 0  R57A    CS      FLAGWRD3        IS THE IMU ALIGNED
 0637   REF   4  LAST  555   37,2172   7 4754 1          MASK    REFSMBIT
 0638   REF 154  LAST  564   37,2173   10 000 0          CCS     A
 0639   REF   1                37,2174   1 2213 1          TCF     R57C            NO
 0640   REF   1                37,2175   3 4776 0          CAF     ALRM15          YES SHOULD AUTO ACQUISITION OF STAR
 0641   REF 118  LAST  565   37,2176   0 4636 0          TC      BANKCALL            BE PERFORMED
 0642   REF   2  LAST  215   37,2177    21067 0          CADR    GOPERF1
 0643   REF  18  LAST  566   37,2200   0 4103 1          TC      GOTOPOOH        TERM
 0644                        37,2201   0 2203 1          TC      +2              PRO YES
 0645   REF   2  LAST  567   37,2202   0 2213 0          TC      R57C            ENTER NO
 0646   REF  90  LAST  566   37,2203   0 6006 1          TC      INTPRET
 0647                        37,2204    77624 1          CALL
 0648   REF   1                37,2205    30761 1          R51DSPA
 0649                        37,2206    77624 1          CALL
 0650   REF   1                37,2207    62756 1          DOR60
 0651                        37,2210    77776 1          EXIT
 0652   REF  37  LAST  559   37,2211   0 5402 1          TC      PHASCHNG
 0653                        37,2212    04022 0          OCT     04022
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 0654   REF 119  LAST  567   37,2213  0 4636 0  R57C    TC      BANKCALL
 0655   REF   2  LAST  241   37,2214   16062 1          CADR    TESTMARK
 0656   REF  42  LAST  564   37,2215  0 5547 1          TC      UPFLAG      SET V59FLAG(BIT 12 FLAG 5) TO INDICATE
 0657   REF   1               37,2216   00116 1          ADRES   V59FLAG     CALIBRATION MARK
 0658   REF   1               37,2217  3 2260 1          CAF     V59NB
 0659   REF 120  LAST  568   37,2220  0 4636 0          TC      BANKCALL
 0660   REF   1               37,2221   20607 1          CADR    GOMARKFR
 0661   REF  19  LAST  567   37,2222  0 4103 1          TC      GOTOPOOH    TERMINATE
 0662   REF   1               37,2223  0 2247 1          TC      ENDR57
 0663   REF   2  LAST  568   37,2224  0 2247 1          TC      ENDR57
 0664   REF  11  LAST  447   37,2225  3 4774 1          CAF     SEVEN
 0665   REF   5  LAST  563   37,2226  0 5516 0          TC      BLANKET     BLANK OUT R1,R2,R3
 0666   REF  61  LAST  563   37,2227  0 5205 0          TC      ENDOFJOB
R0667   STORE TRUNNION ANGLE (OCDU)
 0668   REF   1               37,2230  3 2257 0  MARKDISP CAF     V06N87NB
 0669   REF 121  LAST  568   37,2231  0 4636 0          TC      BANKCALL
 0670   REF   2  LAST  568   37,2232   20607 1          CADR    GOMARKFR
 0671   REF  20  LAST  568   37,2233  0 4103 1          TC      GOTOPOOH    TERMINATE
 0672   REF   1               37,2234  0 2241 1          TC      R57B        PROCEED
 0673   REF   1               37,2235  0 2255 1          TC      R57D        RECYCLE
 0674   REF  13  LAST  563   37,2236  3 4773 0          CAF     FIVE
 0675   REF   6  LAST  568   37,2237  0 5516 0          TC      BLANKET     BLANK OUT R1,R3
 0676   REF  62  LAST  568   37,2240  0 5205 0          TC      ENDOFJOB
 0677   REF   1               37,2241  3 2262 0  R57B    CA      19.77DEG    PUT FIXED INTO ERASABLE FOR MSU
 0678   REF  65  LAST  543   37,2242  54 001 1          TS      L           INSTRUCTION COMING UP
 0679   REF  28  LAST  567   37,2243  3 1727 1          CA      MRKBUF1 +5  CONTAINS TRUNNION
 0680                         37,2244  0 0006 1          EXTEND
 0681   REF  66  LAST  568   37,2245  20 001 1          MSU     L           CORRECTS TRUNBIAS FROM 2'S TO 1'S
 0682   REF   1               37,2246  55'024 1          TS      TRUNBIAS
 0683   REF  33  LAST  563   37,2247  0 5561 0  ENDR57   TC      DOWNFLAG    RESET V59FLAG
 0684   REF   2  LAST  568   37,2250   00116 1          ADRES   V59FLAG     BIT 12  FLAG 5
 0685   REF   5  LAST  509   37,2251  0 5527 1          TC      CLEARMRK    ALLOW R53 IN

 0686   REF  91  LAST  567   37,2252  0 6006 1          TC      INTPRET
 0687                         37,2253   77650 1          GOTO
 0688   REF   3  LAST  567   37,2254   02310 1                   EGRESS
 0689   REF   6  LAST  568   37,2255  0 5527 1  R57D    TC      CLEARMRK
 0690   REF   1               37,2256  1 2171 0          TCF     R57A
 0691                         37,2257   01527 0  V06N87NB VN      0687
 0692                         37,2260   16600 0  V59NB    VN      5900
 0693                         37,2261   14655 1  V51N45   VN      5145
 0694                         37,2262   61740 0  19.77DEG OCT     61740
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R0695   RENDEZVOUS TRACKING SIGHTING MARK ROUTINE (R21)
R0696   AND BACKUP SIGHTING MARK ROUTINE (R23)

R0697   PROGRAM DESCRIPTION
R0698   MOD NO - 1
R0699   MOD BY - N.BRODEUR
R0700   FUNCTIONAL DESCRIPTION
R0701
R0702     TO PERFORM SIGHTING MARKS IN CONJUNCTION WITH THE RENDEZVOUS NAVIG-
R0703   ATION PROGRAM. CALLED BY ASTRONAUT VIA EXTENDED VERB
R0704   CALLING SEQUENCE -
R0705           R21 VIA V 57
R0706           R23 VIA V 54
R0707   SUBROUTINES CALLED -
R0708     FLAGUP        FLAGDOWN      BANKCALL
R0709     ENDOFJOB      GOMARK2       GOMARKF
R0710     INTPRET       GENTRAN       KLEENEX
R0711     ENDMARK
R0712   NORMAL EXIT MODES-
R0713     MARKRUPT USED BY SXTMARK HAS BEEN MODIFIED TO STORE MARK IN MRKBUF2
R0714   FOR USE BY R22. WHEN ASTRONAUT IS FINISHED TAKING MARKS, HE HITS AN
R0715   PROCEED ,  R21 IS TERMINATED THUS CAUSING THE FINAL MARK TO BE TRANSFRD
R0716   TO MRKBUF2 FOR PROCESSING BY R22
R0717   ALARM OR ABORT EXIT MODES -
R0718     NONE
R0719   OUTPUT -
R0720     7 REGISTER MRKBUF2 CONTAINING TIME2,TIME1,CDUY,OPTICS X,CDUZ,OPTICS Y,
R0721   CDUX.
R0722   ERASABLE INITIALIZATION REQUIRED
R0723   FLAGS SET AND RESET
R0724     R21MARK   (COMMUNICATION TO MARKRUPT TO STORE MARKS IN MRKBUF1 + 2)
R0725     R23FLG  INDICATES CDAS MARKING
R0726   DEBRIS
 0727   REF  29  LAST  568   E7,1722                          EBANK= MRKBUF1
 0728   REF   1             37,2000                          SETLOC RENDEZ
 0729                       37,2263                          BANK

 0730   REF   1                                              COUNT* $$/R23
 07301  REF  34  LAST  568   37,2263  0 5561 0  R23CSM       TC     DOWNFLAG
 07302  REF   6  LAST  556   37,2264    00037 0              ADRES  R21MARK
 0731   REF  12  LAST  515   37,2265  3 7702 0               CAF    NEGONE
 0732   REF  30  LAST  569   37,2266  55'722 0               TS     MRKBUF1
 0733   REF   1             37,2267  3 7651 1               CAF    PRIO27
 0734   REF   8  LAST  558   37,2270  0 5176 1               TC     PRIOCHNG       HIGHER THAN R22

 0735   REF   1             37,2271  3 2332 1               CAF    V0694          R23 BACKUP MARKING
 0736   REF 122  LAST  568   37,2272  0 4636 0               TC     BANKCALL       DISPLAY SHAFT + TRUNNION
 0737   REF   4  LAST  507   37,2273    20576 1              CADR   GOMARKF
 0738   REF   1             37,2274  0 2320 1               TC     R21END         TERM
 0739                       37,2275  0 2277 1               TC     +2             PROC
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0740                                37,2276  0 2271 1                TC      -5              ENTER
0741  REF   1                      37,2277  3 2331 1  R23CSM1       CAF     V53N45          PERFORM ALT LOS SIGHT MARK
0742  REF 123  LAST  569           37,2300  0 4636 0                TC      BANKCALL
0743  REF   1                      37,2301    20612 0               CADR    MARKMONR
0744  REF   2  LAST  569           37,2302  0 2320 1                TC      R21END          V34-TERMINATE R23
0745  REF   3  LAST  570           37,2303  1 2320 0                TCF     R21END          PRO END BACK-UP MARKING (R23)
0746                                37,2304  0 0004 0                INHINT
0747                                37,2305  0 0006 1                EXTEND
0748  REF  22  LAST  557           37,2306  3 0025 0                DCA     TIME2
0749  REF  31  LAST  569           37,2307  53'723 1                DXCH    MRKBUF1         READ TIME
0750  REF   5  LAST  538           37,2310  3 0033 1                CA      CDUY            READ CDU ANGLES
0751  REF  32  LAST  570           37,2311  55'724 0                TS      MRKBUF1 +2
0752  REF   9  LAST  538           37,2312  3 0034 0                CA      CDUZ
0753  REF  33  LAST  570           37,2313  55'726 1                TS      MRKBUF1 +4
0754  REF  11  LAST  538           37,2314  3 0032 0                CA      CDUX
0755  REF  34  LAST  570           37,2315  55'730 0                TS      MRKBUF1 +6
0756                                37,2316  0 0003 1                RELINT
0757  REF   1                      37,2317  0 2277 1                TC      R23CSM1
0758  REF 124  LAST  570           37,2320  0 4636 0  R21END        TC      BANKCALL
0759  REF   2  LAST  241           37,2321    20575 1               CADR    KLEENEX
0760  REF  13  LAST  569           37,2322  3 7702 0                CA      NEGONE
0761  REF  35  LAST  570           37,2323  55'722 0                TS      MRKBUF1         CLEAR BUFFERS FOR REGULAR MARKING
0762  REF   7  LAST  392           37,2324  3 5055 1                CAF     PRIO16
0763  REF   9  LAST  569           37,2325  0 5176 1                TC      PRIOCHNG        LOWER THAN R22
0764  REF  43  LAST  568           37,2326  0 5547 1                TC      UPFLAG          SET R21MARK TO ALLOW REG OPTICS MARKING
0765  REF   7  LAST  569           37,2327    00037 0               ADRES   R21MARK         BIT 14  FLAG 2
0766  REF   1                      37,2330  0 5524 1                TC      ENDMARK         END MARKING AND ENDJOB
0767                                37,2331    15255 1  V53N45       VN      5345
0768                                37,2332    01536 0  V0694        VN      0694
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R0769   PREFERRED TRACKING ATTITUDE ROUTINE R61CSM
R0770   PROGRAM DESCRIPTION
R0771   MOD NO - 2
R0772   MOD BY - N.BRODEUR
R0773   FUNCTIONAL DESCRIPTION-
R0774     TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM TO ENABLE OPTICS
R0775   TRACKING OF THE LM AND TO PERFORM THE MANEUVER TO THE PREFERRED
R0776   OR X-AXIS TRACKING ATTITUDE.
R0777   CALLING SEQUENCE-
R0778             TC     BANKCALL
R0779             CADR   R61CSM
R0780   SUBROUTINES CALLED
R0781     MAKECADR          BANKCALL
R0782     INTPRET           FLAGUP            FLAGDOWN
R0783     BANKJUMP          CRS61.1           R60CSM
R0784     PHASCHNG
R0785   NORMAL EXIT MODES-
R0786     NORMAL RETURN IS TO CALLER + 1
R0787   OUTPUT -
R0788     SEE OUTPUT FOR CRS61.1 & ATTITUDE MANEUVER ROUTINE (R60CSM)
R0789   ERASABLE INITIALIZATION REQUIRED
R0790     GENRET USED TO SAVE Q FOR RETURN
R0791     R61CNTR MUST BE PRESET TO ZERO
R0792   FLAGS SET + RESET
R0793     3-AXIS FLAG
R0794   DEBRIS
R0795     SEE SUBROUTINES
 0796   REF   3  LAST  119   E6,1770                          EBANK=  GENRET
 0797   REF   1                                               COUNT*  $$/R61          ROUTINES - NAVIGATION - PREF. TR  9TT=

 0798   REF   7  LAST  539   37,2333   0 4611 0   R61CSM     TC      E6SETTER        SWITCH TO E6 - RETURNS WITH OLD SETTING
 0799   REF   2  LAST  119   37,2334   55'771 0               TS      SAVBNK          SAVE EBANK
 0800   REF   3  LAST  394   37,2335   0 4665 0               TC      MAKECADR
 0801   REF   4  LAST  571   37,2336   55'770 1               TS      GENRET
 0802   REF  15  LAST  558   37,2337   11'774 0               CCS     R61CNTR         TEST R61CNTR
 0803   REF   1               37,2340   0 2416 0               TC      DECRM61         NOT READY TO DO R61.
 0804                         37,2341   0 2343 1               TC      +2              DO R61
 0805   REF   2  LAST  571   37,2342   0 2417 1               TC      DECRM61 +1
 08052                        37,2343   0 0004 0               INHINT
 08054  REF   2  LAST  558   37,2344   3 5007 0               CAF     MINDB
 08056  REF   5  LAST  558   37,2345   55'655 1               TS      ADB
 0806   REF   5  LAST  558   37,2346   11'773 1               CCS     DBPTC
 0807   REF  61  LAST  558   37,2347   6 4770 0               AD      ONE
 0808                         37,2350   1 2352 0               TCF     +2
 0809   REF  62  LAST  571   37,2351   6 4770 0               AD      ONE
 0810                         37,2352   0 0006 1               EXTEND
 0811                         37,2353   1 2355 1               BZF     +2              IGNOR ZERO DEADBAND
 0812   REF   6  LAST  571   37,2354   55'655 1               TS      ADB

 0813   REF  92  LAST  568   37,2355   0 6006 1               TC      INTPRET
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C814                          37,2356   77624 1          CALL
C815   REF   1                37,2357   71432 1                  CRS61.1     LOS DETERMINATION + VEH ATTITUDE
C816                          37,2360   77776 1  R61DMPTG EXIT                DEFINE TAG FOR P20 EDIT DUMP
C817   REF  35 LAST  569      37,2361  0 5561 0          TC      DOWNFLAG    RESET FLAG TO INHIBIT FURTHER R6
C818   REF   4 LAST  553      37,2362    00055 1         ADRES   V50N18FL       ATTITUDE MANEUVERS
C819   REF 246 LAST  557      37,2363   50 154 1         INDEX   MPAC
C820                          37,2364  0 2365 0          TC      +1
C821   REF   1                37,2365  0 2415 0          TC      R61END      SUBROUTINE DRIVING DAP (EXIT R61)
AC822                                                                       OR AUTO MODE NOT SET (EXIT R61)
AC823                                                                       OR STIKFLAG SET      (EXIT R61)
C824   REF  36 LAST  572      37,2366  0 5561 0  R61C1  TC      DOWNFLAG    RESET 3-AXIS FLAG
C825   REF   4 LAST  402      37,2367    00124 0         ADRES   3AXISFLG    BIT 6  FLAG 5
C826   REF   3 LAST  215      37,2370  4 0107 0          CS      FLGWRD11
C827   REF   2 LAST  215      37,2371  7 4761 1          MASK    AZIMBIT
C828   REF 155 LAST  567      37,2372  10 000 0          CCS     A
C829                          37,2373  0 2376 1          TC      +3          AZIMFLAG NOT SET,CLEAR 3AXISFLAG

C830   REF  44 LAST  570      37,2374  0 5547 1          TC      UPFLAG      AZIMFLAG SET    ,SET   3AXISFLAG
C831   REF   5 LAST  572      37,2375    00124 0         ADRES   3AXISFLG

C832   REF  63 LAST  571      37,2376  4 4770 1          CS      ONE         SET R61CNTR NEG. TO INDICATE KALCMANU
C833   REF  16 LAST  571      37,2377  55'774 0          TS      R61CNTR

C834   REF  45 LAST  572      37,2400  0 5547 1          TC      UPFLAG      SET FLAG FOR PROIRITY DISPLAYS FOR R60
C835   REF   2 LAST  395      37,2401    00077 1         ADRES   PDSPFLAG    BIT 12  FLAG 4
C836   REF 125 LAST  570      37,2402  0 4636 0          TC      BANKCALL
C837   REF   2 LAST  402      37,2403    56074 1         CADR    R60CSM
C838   REF  37 LAST  572      37,2404  0 5561 0          TC      DOWNFLAG    RESET FLAG FOR PRIORITY DISPLAYS IN R60
C839   REF   3 LAST  572      37,2405    00077 1         ADRES   PDSPFLAG    BIT 12  FLAG 4
C840   REF 119 LAST  557      37,2406  3 4772 1          CAF     ZERO
C841   REF 126 LAST  572      37,2407  0 4636 0          TC      BANKCALL
C842   REF   1                37,2410    20753 1         CADR    PRIODSP     RELEASE DISPLAY
C843   REF  38 LAST  567      37,2411  0 5402 1          TC      PHASCHNG
C844                          37,2412    00111 0         OCT     00111
08445  REF   5 LAST  559      01,2025                  1P11SPT6 =       1.11SPOT
C845   REF 120 LAST  572      37,2413  3 4772 1          CAF     ZERO
C846   REF   3 LAST  571      37,2414  0 2416 0          TC      DECRM61
C847   REF  23 LAST  561      37,2415  3 6214 0  R61END  CAF     THREE

C848   REF  17 LAST  572      37,2416  55'774 0  DECRM61 TS      R61CNTR

C849   REF   5 LAST  571      37,2417  31'770 0    +1    CAE     GENRET
C850   REF 156 LAST  572      37,2420  22 000 1          LXCH    A           RETURN IS IN L
C851   REF   3 LAST  571      37,2421  3 1771 1          CA      SAVBNK      RESTORE EBANK
C852   REF  17 LAST  538      37,2422  56 003 1          XCH     EBANK
C853   REF 157 LAST  572      37,2423  22 000 1          LXCH    A           RETURN IS NOW BACK IN A
C854   REF   6 LAST  395      37,2424  0 4660 0          TC      BANKJUMP    EXIT R61
C856   REF   1                23,2000                   SETLOC  P20S2
C857                          23,2756                   BANK
```

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0858 REF 36 LAST 570 E7,1722 EBANK= MRKBUF1

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P0859    BVECTOR PERFORMS COMPUTATIONS FOR
R0860   DELTAQ,THE MEASURED DEVIATION BASED ON THE DIFFERENCE BETWEEN THE CSM-LE
R0861   M STATE VECTOR ESTIMATES AND THE ACTUAL TRACKING MEASUREMENT.
R0862   US,THE MODIFIED FICTITIOUS STAR DIRECTION VECTOR
R0863   GEOMETRY VECTOR B ASSOCIATED WITH EACH TRACKING MEASUREMENT.
R0864   INPUT
R0865      UM,1/2 UNIT VECTOR ALONG THE CSM-LM LINE OF SIGHT (BASIC REF.SYSTEM)
R0866      USTAR,FICTITIOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0867      RCLP,RELATIVE CSM TO LM POSITION VECTOR
R0868   OUTPUT
R0869      USTAR,MODIFIED FICTITOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0870      BVECTOR = 9 DIMENSIONAL BVECTOR (1/2 UNIT VEC.)
R0871      DELTAQ = MEASURED DEVIATION
R0872   CALLING SEQUENCE
R0873      L  CALL BVECTORS
R0874   NORMAL EXIT
R0875      L+1 OF CALLING SEQUENCE

 0876   REF   1                    23,2756   77620 0  BVECTORS STQ      COUNT* $$/INCOR
 0877                              23,2757   02310 1                    EGRESS
 0878   REF   4  LAST  568        23,2760   53575 0           VLOAD    UNIT
 0879                              23,2761   03531 0                    RCLP          RELATIVE POSITION VECTOR
 0880   REF   2  LAST  125        23,2762   14033 1           STODL    26D           RCLP UNIT VEC
 0881                              23,2763   00045 0                    36D           RCLP ABS VALUE
 0882                              23,2764   25136 1           STOVL    TEMPOR1       MOVE TO SAFE LOCATION
 0883   REF   1                    23,2765   01102 0                    USTAR
 0884   REF   2  LAST   79         23,2766   53435 0           VXV      UNIT
 0885                              23,2767   00033 1                    26D           USTAR = UNIT(US X UCL)
 0886                              23,2770   37502 1           STCALL   BVECTOR
 0887   REF   4  LAST  125        23,2771   22327 1                    GRP2PC        PHASE CHANGE
 0888   REF   1                    23,2772   77775 1           VLOAD
 0889                              23,2773   03502 0                    BVECTOR
 0890   REF   5  LAST  574        23,2774   01102 0           STORE    USTAR
 0891   REF   3  LAST  574        23,2775   72441 0           DOT      SL1
 0892                              23,2776   01072 0                    UM            USTAR DOT UM
 0893   REF   2  LAST   79         23,2777   45326 1           ACOS     DSU
 0894                              23,3000   15326 1                    DP1/4TH
 0895   REF   5  LAST  563        23,3001   41301 0           NORM     DMP
 0896                              23,3002   00047 1                    X1
 0897   REF   7  LAST  512        23,3003   07016 1                    PI/4.0
 0898   REF   1                    23,3004   53605 1           DMP      SRR*
 0899                              23,3005   01136 1                    TEMPOR1       RCLP ABS VALUE
 0900   REF   2  LAST  574        23,3006   21576 0                    -3,1          ADJUST SCALING
 0901                              23,3007   27524 1           STOVL    DELTAQ
 0902   REF   2  LAST  125        23,3010   15336 0                    ZEROVECS
 0903   REF  15  LAST  558        23,3011   03510 0           STORE    BVECTOR +6
 0904   REF   6  LAST  574        23,3012   03516 0           STORE    BVECTOR +120
 0905   REF   7  LAST  574        23,3013   77650 1           GOTO
 0906                              23,3014   02310 1                    EGRESS
 0907   REF   5  LAST  574
```

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```
0908                    23,3015   31103 1  PI/4.0   2DEC   .785398164
0908                    23,3016   36652 0
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```
P0909    GETUM-DETERMINES THE LINE OF SIGHT UNIT VECTOR UM IN THE BASIC REFERENC
R0910   E COORDINATE SYSTEM FROM THE OPTICS SHAFT AND TRUNNION ANGLES AND THE IM
R0911   U GIMBAL ANGLES.
R0912   INPUT
R0913      MARKDATA,BASE ADDRESS OF MARK DATA
R0914      REFSMMAT,ROTATION MATRIX FROM STABLE MEMBER TO BASIC REF.COORD.SYSTEM

R0915   SUBROUTINES CALLED-
R0916      SXTNB - SEXT. ANGULAR READINGS TO NAV. BASE COOR.
R0917      NBSM  - TRANSFORM FROM NAV. BASE TO STABLE MEMBER
R0918   OUTPUT
R0919      MPAC = LINE OF SIGHT 1/2 UNIT VECTOR IN BASIC REFERENCE SYSTEM
R0920   CALLING SEQUENCE
R0921      L  CALL GETUM

R0922   NORMAL EXIT
R0923      L+1 OF CALLING SEQUENCE

 0924                          23,3017  40220 0  GETUM   STQ     SETPD
 0925   REF   6  LAST  574     23,3020  02310 1          EGRESS
 0926                          23,3021  00001 0          0
 0927                          23,3022  77624 1          CALL
 0928   REF   1                23,3023  36057 0          SXTSM1
 0929                          23,3024  76505 0          VXM     VSL1
 0930   REF  15  LAST  561     23,3025  01734 0          REFSMMAT
 0931                          23,3026  77650 1          GOTO                    MPAC =(UM)LINE OF SIGHT VECTOR
 0932   REF   7  LAST  576     23,3027  02310 1          EGRESS                  EXIT
```

```
R0933   RENDEZVOUS TRACKING DATA PROCESSING ROUTINE (R22)

R0934   FUNCTIONAL DESCRIPTION

R0935   TO PROCESS RENDEZVOUS SIGHTING MARK AND VHF RANGING DATA TO UPDATE
R0936   THE STATE VECTOR OF EITHER THE CSM OR LM AS DEFINED BY VEHUPFLG.
R0937   (VEHUPFLG IS SET TO LM BY P20, CSM BY V81E, AND LM BY V80E.)

R0938   CALLING SEQUENCE
R0939     AUTOMATICALLY SELECTED BY P20

R0940   SUBROUTINES CALLED
R0941     PRIOCHNG          INTPRET           GRP2PC
R0942     GETUM             BVECTORS          INCORP1
R0943     INCORP2           INTEGRV           PHASCHNG
R0944     NOVAC             BANKCALL          GOTOV56
R0945     ENDOFJOB          INSTALL           DOWNFLAG
R0946     TRFAILOF          TRFAILON          TASKOVER
R0947     POSTJUMP

R0948   NORMAL EXIT MODES
R0949     RENDEZVOUS NAVIGATION MAY BE TERMINATED BY THE SELECTION OF
R0950     P00, P06, P22, P23, V34E FROM R60, AND V56E

R0951   ALARMS OR ABORT EXIT MODES
R0952     NONE

R0953   INPUT
R0954     MARK DATA, SEE R21 AND R23
R0955     VHF RANGING DATA

R0956   OUTPUT
R0957     TRKMKCNT, NO OF RENDEZVOUS TRACKING MARKS INCORPORATED (COUNTER)
R0958     VHFCNT, NO OF VHF RANGING MARKS INCORPORATED (COUNTER)
R0959     V06N49, EXCESSIVE UPDATE PARAMETERS-DELTA R AND DELTA V

R0960   FLAGS SET + RESET
R0961     SOURCFLG, VINTFLAG, DIMOFLAG, INCORFLG, ORBWFLAG, RENDWFLG
R0962     STATEFLG, D60R9FLG, SKIPVHF, DMENFLG                    AT THE INTERRUPTED DISPLAY.

 0965   REF   1                34,2000                    SETLOC  P20S3
 0966                          34,2625                    BANK

 0967   REF   1                                           COUNT*  $$/R22
 0968   REF   6  LAST  558    34,2625  3 7650 0  R22      CAF     PRIO26
 0969   REF   2  LAST  211    34,2626  55'262 1          TS      PHSPRDT2
 0970   REF  10  LAST  570    34,2627  0 5176 1          TC      PRIOCHNG
 0971   REF   2  LAST  333    34,2630  3 7700 1          CA      NEG3
 0972   REF  37  LAST  573    34,2631  55'722 0          TS      MRKBUF1
 0973   REF  93  LAST  571    34,2632  0 6006 1          TC      INTPRET
```

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0974                                  34,2633   77634 0           RTB
0975  REF  15  LAST  565             34,2634   51751 0                     LOADTIME
0976  REF   2  LAST  185             34,2635   01010 1           STORE     VHFTIME        PRESENT TIME
0977                                  34,2636   77624 1  REND1    CALL
0978  REF   2  LAST  574             34,2637   22327 1                     GRP2PC
0979                                  34,2640   77624 1           CALL
0980  REF   1                         34,2641   56523 0                     WAITONE
0981                                  34,2642   77776 1  REND1A   EXIT
0982  REF  38  LAST  577             34,2643  3 1722 1           CA        MRKBUF1
0983                                  34,2644  0 0006 1           EXTEND
0984  REF   1                         34,2645  1 2650 1           BZF       REND2
0985                                  34,2646  0 0006 1           EXTEND
0986  REF   1                         34,2647  6 2666 0           BZMF      REND3A
0987  REF  17  LAST  512             34,2650  3 6211 0  REND2    CAF       SIX
0988  REF   6  LAST  275             34,2651  0 5607 0           TC        GENTRAN
0989  REF  39  LAST  578             34,2652   01722 1           ADRES     MRKBUF1
0990  REF   5  LAST  565             34,2653   01061 1           ADRES     MARKTIME       MARKTIME MUST BE CONTIGUOUS WITH VTEMP
0991  REF   3  LAST  577             34,2654  3 7700 1           CAF       NEG3           NEG VALUE TO INDICATE VALUES USED
0992  REF  40  LAST  578             34,2655  55'722 0           TS        MRKBUF1
0993  REF  46  LAST  572             34,2656  0 5547 1           TC        UPFLAG         SET FLAG TO INDICATE THAT OPTICS MARK IS
0994  REF   1                         34,2657   00217 0           ADRES     R22CAFLG         BEING PROCESSED (TESTED IN MARK REJCT)
0995  REF  94  LAST  577             34,2660  0 6006 1           TC        INTPRET
0996                                  34,2661   45014 0           CLEAR     CALL
0997  REF   1                         34,2662   04667 1                     SOURCFLG       0 = OPTICS DATA
0998  REF   3  LAST  578             34,2663   22327 1                     GRP2PC         PHASE CHANGE
0999                                  34,2664   77650 1           GOTO
1000  REF   1                         34,2665   70761 0                     REND4
1001  REF  95  LAST  578             34,2666  0 6006 1  REND3A   TC        INTPRET
1002                                  34,2667   77624 1  REND3    CALL
1003  REF   4  LAST  578             34,2670   22327 1                     GRP2PC
1004                                  34,2671   77624 1           CALL
1005  REF   2  LAST  578             34,2672   56523 0                     WAITONE
1006                                  34,2673   43014 0           BOFF      BOFF
1007  REF   4  LAST  273             34,2674   04746 0                     VHFRFLAG
1008  REF   1                         34,2675   70642 0                     REND1A
1009  REF   1                         34,2676   05346 0                     RANGFLAG       RANGE > 200 N.M. DONT READ
1010  REF   2  LAST  578             34,2677   70642 0                     REND1A
1011                                  34,2700   77634 0           RTB
1012  REF  16  LAST  578             34,2701   51751 0                     LOADTIME       PRESENT TIME
1013                                  34,2702   45225 0           DSU       DSU
1014  REF   1                         34,2703   14651 0                     60SECDP        1 MIN
1015  REF   3  LAST  578             34,2704   01010 1                     VHFTIME        LAST READING OF RADAR
1016                                  34,2705   77440 1           BMN       EXIT
1017  REF   3  LAST  578             34,2706   70642 0                     REND1A
1018                                  34,2707  0 0004 0  RANGERD  INHINT                  READ RADAR RANGE
1019  REF   1                         34,2710  4 4777 0           CS        OCT17
1020                                  34,2711  0 0006 1           EXTEND
1021  REF   6  LAST  392             34,2712  03 013 0           WAND      CHAN13         ZERO OUT BITS 1-4 OF CHANNEL 13
1022                                  34,2713  0 0006 1  RADSTART EXTEND
1023  REF   4  LAST  432             34,2714  00 004 0           READ      LOSCALAR       READ PRESENT TIME
```

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1024   REF  67  LAST  568   34,2715  54 001 1          TS      L
1025   REF   6  LAST  386   34,2716  7 4342 1          MASK    LOW5        ONLY THE 5 BITS MATTER
1026                        34,2717  4 0000 0          COM
1027   REF  26  LAST  563   34,2720  6 4763 1          AD      BIT6        COMPUTE DELTA TIME TO NEXT T5 TICK
1028   REF   7  LAST  579   34,2721  7 4342 1          MASK    LOW5

1029   REF   1              34,2722  55'064 0          TS      RADDEL
1030   REF   6  LAST  278   34,2723  6 7701 0          AD      NEG2        IF A TICK OF T5 IS NEAR, WAIT TILL IT
1031                        34,2724  0 0006 1          EXTEND              HAS TICKED.  MAX DELAY HERE IS
1032   REF   1              34,2725  6 2713 0          BZMF    RADSTART    937.5 MICROSEC.

1033   REF   1              34,2726  3 4322 0          CA      OCT11       SET RADAD BITS NOW
1034                        34,2727  0 0006 1          EXTEND
1035   REF   7  LAST  578   34,2730  05 013 0          WOR     CHAN13
1036   REF  68  LAST  579   34,2731  4 0001 1          CS      L
1037   REF   2  LAST   80   34,2732  55'063 1          TS      RADTIME     SAVE NEG TIME OF READ

1038                        34,2733  0 0003 1          RELINT
1039                        34,2734  0 0006 1          EXTEND
1040   REF  23  LAST  570   34,2735  3 0025 0          DCA     TIME2
1041   REF   6  LAST  578   34,2736  53'062 0          DXCH    MARKTIME    READ PRESENT TIME
1042   REF  38  LAST  572   34,2737  0 5561 0          TC      DOWNFLAG
1043   REF   1              34,2740  00043 0           ADRES   SKIPVHF     CLEAR VHF RESTART FLAG
1044   REF  63  LAST  568   34,2741  0 5205 0          TC      ENDOFJOB    WAIT FOR RADAR READ
1045   REF   2  LAST  273   34,2742  0 5632 0  RANGERD1 TC      TRFAILOF    TURN TRACKER LIGHT OFF
1046   REF   4  LAST  186   34,2743  11'703 0          CCS     RM          15 BIT UNSIGNED RANGE
1047   REF   1              34,2744  0 2750 1          TC      RANGERD4    GR + 0
1048   REF   1              34,2745  0 3424 0          TC      LIGHTON +4  =  + 0
1049   REF   1              34,2746  0 3406 0          TC      RANGERD3    L  - 0
1050   REF   2  LAST  579   34,2747  0 3406 0          TC      RANGERD3    =  - 0
1051   REF  96  LAST  578   34,2750  0 6006 1  RANGERD4 TC      INTPRET
1052                        34,2751  41335 1           SLOAD   DMP
1053   REF   5  LAST  579   34,2752  03704 1                   RM
1054   REF   1              34,2753  16535 0                   CONVRNGE    CONVERT RANGE TO METERS B-27
1055   REF   1              34,2754  01114 1  RANGERD2 STORE   VHFRANGE
1056                        34,2755  71214 0           SET     DLOAD
1057   REF   2  LAST  578   34,2756  04467 0                   SOURCFLG    SOURCE OF DATA TO VHF RADAR
1058   REF   7  LAST  579   34,2757  01062 1                   MARKTIME
1059   REF   4  LAST  578   34,2760  01010 1           STORE   VHFTIME     FOR DOWNLINK
1060                        34,2761  77624 1  REND4    CALL
1061   REF   2  LAST  554   34,2762  60435 0                   UPSTATE     INTEGRATE CSM,LM,W MATRIX
1062                        34,2763  77624 1           CALL
1063   REF   1              34,2764  56603 1                   SHIFTNDX    SET EARTH MOON SCALING INDEX
1064                        34,2765  45014 0           CLEAR   CALL
1065   REF   4  LAST  565   34,2766  01671 0                   ORBWFLAG    CLEAR FOR P22 AND P23
1066   REF   1              34,2767  71327 1                   CMPOS       SET CSM POSITION
1067                        34,2770  45014 0           SET     CALL
1068   REF   1              34,2771  02464 0                   INCORFLG    SET FOR FIRST PASS
1069   REF   1              34,2772  71336 1                   LMPOS       SET LM POSITION
```

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1070                                34,2773  77614 1          BON
1071  REF  12 LAST  553             34,2774  05310 0                   AUTOSEQ
1072  REF   1                       34,2775  47030 1                   AUTOW          AUTOMATIC W MATRIX REINITIALIZATION
1073                                34,2776  77614 1  REND5B   BON
1074  REF   4 LAST  565             34,3000  01713 1                   REND5FLG
1076                                34,3001  77745 1  REND5C   DLOAD
1077  REF  16 LAST  574             34,3002  15336 0                   ZEROVECS
1078  REF   6 LAST  292             34,3003  14772 0          STODL    VHFCNT         ZERO OUT VHFCNT AND TRKMKCNT
1079  REF   2 LAST  486             34,3004  02001 1                   WRENDPOS
1080                                34,3005  34001 1          STCALL   0              0=WRENDPOS  1=WRENDVEL
1081  REF   1                       34,3006  56612 1                   INITIALW       INITIALIZE W MATRIX
1082                                34,3007  71214 0          CLEAR    DLOAD
1083  REF   2 LAST  472             34,3010  05267 1                   P35FLAG
1084  REF   8 LAST  579             34,3011  01062 1                   MARKTIME
1085  REF   2 LAST  284             34,3012  03736 0          STORE    AGEOFW
1086                                34,3013  66214 0          CLEAR    SSP
1087  REF   2 LAST  216             34,3014  05273 1                   PTV93FLG
1088  REF   2 LAST  105             34,3015  02551 1                   COUNT3MK
1089                                34,3016  00001 0                   1
1090                                34,3017  77614 1  REND6    SET
1091  REF   5 LAST  580             34,3020  02476 0                   RENDWFLG
1092                                34,3021  52375 1  REND7    VLOAD    VSU
1093  REF   4 LAST   79             34,3022  01054 1                   LEMPOS
1094  REF   2 LAST   79             34,3023  01046 1                   CSMPOS
1095  REF   3 LAST  574             34,3024  03531 0          STORE    RCLP           LM - CSM
1096                                34,3025  43056 0          UNIT     BON
1097  REF   3 LAST  579             34,3026  04707 0                   SOURCFLG
1098  REF   1                       34,3027  71251 1                   REND14         BRANCH IF DATA IS RADAR
1099  REF   2 LAST   80             34,3030  01130 1          STORE    UCL
1100                                34,3031  74014 1          BOFF     AXC,1
1101  REF   2 LAST  579             34,3032  02744 1                   INCORFLG
1102  REF   1                       34,3033  71047 1                   REND9
1103  REF   9 LAST  580             34,3034  01061 1                   MARKTIME
1104                                34,3035  77624 1          CALL
1105  REF   1                       34,3036  47017 1                   GETUM          CALCULATE UM LINE OF SIGHT
1106  REF   3 LAST  574             34,3037  25072 0          STOVL    UM
1107  REF   3 LAST  580             34,3040  01130 1                   UCL
1108                                34,3041  40035 0          VXV      BOV
1109  REF   4 LAST  580             34,3042  01072 0                   UM             UCL X UM
1110  REF   1                       34,3043  71044 1                   REND8
1111                                34,3044  40056 0  REND8    UNIT     BOV
1112  REF   1                       34,3045  71375 0                   RENDISP3       IGNORE MARK RESET FLAGS FOR REJECT
1113  REF   4 LAST  574             34,3046  01102 0          STORE    USTAR
1114                                34,3047  77624 1  REND9    CALL
1115  REF   1                       34,3050  46756 1                   BVECTORS
1116                                34,3051  77214 0          BON      VLOAD
1117  REF   4 LAST  561             34,3052  00707 1                   VEHUPFLG
1118  REF   1                       34,3053  71057 0                   REND9A
1119  REF   8 LAST  574             34,3054  03502 0                   BVECTOR
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1120                          34,3055  77676 0          VCOMP
1121  REF   9  LAST  580     34,3056  03502 0          STORE   BVECTOR
1122                          34,3057  77624 1  REND9A  CALL
1123  REF   5  LAST  578     34,3060  22327 1          GRP2PC
1124                          34,3061  77614 1          BOFF
1125  REF   8  LAST  570     34,3062  01341 0          R21MARK
1126  REF   1                 34,3063  71302 0          REND15          BRANCH IF BACKUP OPTICS (R23 WORKING)
1127                          34,3064  43345 1          DLOAD   DAD
1128  REF   1                 34,3065  16457 0          SXTVAR
1129  REF   1                 34,3066  16461 0          IMUVAR
1130  REF   2  LAST  125     34,3067  27526 0  REND10  STOVL   VARIANCE        TEMP STORAGE FOR VARIANCE CALC.
1131  REF   4  LAST  580     34,3070  03531 0          RCLP
1132                          34,3071  60246 1          ABVAL   NORM
1133  REF   8  LAST  574     34,3072  00047 1          X1
1134                          34,3073  41316 0          DSQ     DMP
1135  REF   3  LAST  581     34,3074  03526 0          VARIANCE
1136                          34,3075  45070 1          XAD,1   CALL
1137  REF   9  LAST  581     34,3076  00046 0          X1
1138  REF   2  LAST  579     34,3077  56603 1          SHIFTNDX        GET EARTH MOON SCALING INDEX
1139                          34,3100  56070 0          XAD,1   XAD,1
1140  REF   7  LAST  518     34,3101  00047 1          X2
1141  REF   8  LAST  581     34,3102  00047 1          X2
1142                          34,3103  72257 1          SR*     TLOAD
1143                          34,3104  20577 0                  0 -2,1          ADJUST SCALING TO B-40
1144  REF 247  LAST  572     34,3105  00155 0          MPAC
1145  REF   4  LAST  581     34,3106  03526 0          STORE   VARIANCE
1146                          34,3107  54335 0          SLOAD   SR
1147  REF   1                 34,3110  02400 1          INTVAR          INTEGRATION VARIANCE SCALED B-15
1148                          34,3111  20632 1          25D             SCALE IT B-40
1149                          34,3112  47171 0          TAD     RTB
1150  REF   5  LAST  581     34,3113  03526 0          VARIANCE
1151  REF   1                 34,3114  45657 1          TPMODE
1152  REF   6  LAST  581     34,3115  03526 0          STORE   VARIANCE
1153                          34,3116  76214 1          BOFF    TAD
1154  REF   4  LAST  580     34,3117  04747 1          SOURCFLG        BRANCH IF NOT VHF RADAR
1155  REF   1                 34,3120  71127 0          REND10A
1156  REF   1                 34,3121  03005 1          RVARMIN         VHF RADAR MIN. VARIANCE
1157                          34,3122  72244 0          BPL     TLOAD
1158  REF   2  LAST  581     34,3123  71127 0          REND10A
1159  REF   2  LAST  581     34,3124  03005 1          RVARMIN
1160                          34,3125  77646 0          ABS             MIN. VALUE WAS STORED AS NEG.
1161  REF   7  LAST  581     34,3126  03526 0          STORE   VARIANCE        STORE MIN. VALUE
1162                          34,3127  45014 0  REND10A CLEAR   CALL
1163  REF   1                 34,3130  02666 0          DMENFLG         CLEAR FOR 6 X 6 W MATRIX
1164  REF   1                 34,3131  75260 1          INCORP1         CALCULATE UPDATE
1165                          34,3132  77624 1          CALL
1166  REF   6  LAST  581     34,3133  22327 1          GRP2PC
1167                          34,3134  45014 0          BOFF    CALL
1168  REF   3  LAST  580     34,3135  02744 1          INCORFLG
1169  REF   1                 34,3136  71176 1          REND12
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1170  REF  3 LAST 581  34,3137  56603 1                SHIFTNDX        GET EARTH MOON SCALING INDEX
1171                   34,3140  51575 1          VLOAD ABVAL
1172  REF  7 LAST  80  34,3141  01122 1                DELTAX +6
1173                   34,3142  77657 0          SR*
1174                   34,3143  57176 0                0,2
1175  REF  4 LAST 292  34,3144  27504 0          STOVL N49DISP +2
1176  REF  8 LAST 582  34,3145  01114 1                DELTAX
1177                   34,3146  53646 0          ABVAL SR*
1178                   34,3147  57176 0                0,2
1179  REF  5 LAST 582  34,3150  03502 0          STORE N49DISP
1180                   34,3151  43131 0          SSP   BON
1181  REF  6 LAST 582  34,3152  03506 1                N49DISP +4
1182                   34,3153  00002 0          OCT   2
1183  REF  5 LAST 581  34,3154  04707 0                SOURCFLG
1184  REF  1           34,3155  71163 0                REND10B         VHF MARK CODE
1185                   34,3156  66214 0          BON   SSP
1186  REF  3 LAST 269  34,3157  05303 1                REJCTFLG
1187  REF  2 LAST 580  34,3160  71375 0                RENDISP3
1188  REF  7 LAST 582  34,3161  03506 1                N49DISP +4      OPTICS MARK CODE
1189                   34,3162  00001 0          OCT   1
1190                   34,3163  77735 0  REND10B SLOAD
1191  REF  1           34,3164  02003 0                RMAX
1192                   34,3165  45261 0          SR    DSU
1193                   34,3166  20613 1                100
1194  REF  8 LAST 582  34,3167  03502 0                N49DISP
1195                   34,3170  67240 0          BMN   SLOAD
1196  REF  1           34,3171  71345 0                RENDISP         BRANCH IF POS UP.GREATER THAN MAX.
1197  REF  1           34,3172  02004 1                VMAX
1198                   34,3173  50025 0          DSU   BMN
1199  REF  9 LAST 582  34,3174  03504 0                N49DISP +2
1200  REF  2 LAST 582  34,3175  71345 0                RENDISP         BRANCH IF VEL.UPDATE GREATER THAN MAX.
1201                   34,3176  77624 1  REND12  CALL
1202  REF  1           34,3177  75472 1                INCORP2         INCORPORATE UPDATE VALUES INTO STATE VEC
1203                   34,3200  71214 0          BOFF  DLOAD
1204  REF  4 LAST 581  34,3201  02744 1                INCORFLG
1205  REF  1           34,3202  71217 0                REND12A         BRANCH IF IST PASS OPTICS
1206  REF 10 LAST 580  34,3203  01062 1                MARKTIME
1207  REF  2 LAST 130  34,3204  03734 1          STORE OLDMKTME        SAVE OLD MARK TIME
1208                   34,3205  67214 1          CLEAR SLOAD
1209  REF  3 LAST 486  34,3206  05272 0                MANEUFLG        CLEAR MANEUVER FLAG
1210  REF  3 LAST 580  34,3207  02551 1                COUNT3MK
1211                   34,3210  45254 0          BZE   DSU
1212  REF  2 LAST 582  34,3211  71217 0                REND12A
1213  REF  1           34,3212  07142 1                HIGH3           CHECK IF 3 MARKS TAKEN
1214                   34,3213  66240 1          BMN   SSP
1215  REF  1           34,3214  71237 1                REND13A         BRANCH IF NOT 3 YET
1216  REF  4 LAST 582  34,3215  02551 1                COUNT3MK        SET COUNT EQUAL TO 0
1217                   34,3216  00000 1          DEC   0
1218                   34,3217  43014 0  REND12A BON   BOFF
1219  REF  6 LAST 582  34,3220  04707 0                SOURCFLG
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1220  REF  1                  34,3221  71307 0                 REND16    BRANCH IF DATA IS RADAR
1221  REF  5  LAST  582       34,3222  02744 1                 INCORFLG
1222  REF  1                  34,3223  71315 0                 REND17
1223                          34,3224  77624 1           CALL
1224  REF  4  LAST  582       34,3225  56603 1                 SHIFTNDX  GET EARTH MOON SCALING INDEX
1225                          34,3226  45014 0           BON   CALL
1226  REF  5  LAST  580       34,3227  00707 1                 VEHUPFLG
1227  REF  1                  34,3230  71323 0                 REND18    BRANCH IF CSM UPDATE
1228  REF  2  LAST  579       34,3231  71336 1                 LMPOS     GET LM POSITION
1229                          34,3232  77624 1  REND13   CALL
1230  REF  7  LAST  581       34,3233  22327 1                 GRP2PC    PHASE CHANGE
1231                          34,3234  77614 1           CLRGO
1232  REF  6  LAST  583       34,3235  02624 0                 INCORFLG
1233  REF  1                  34,3236  71021 1                 REND7     BRANCH FOR 2ND PASS THIS OPTICS MARK
1236                          34,3237  77735 0  REND13A  SLOAD
1237  REF  5  LAST  582       34,3240  02551 1                 COUNT3MK
1238  REF  3  LAST  130       34,3241  37732 0           STCALL CNT3TEMP
1239  REF  8  LAST  583       34,3242  22327 1                 GRP2PC
1240                          34,3243  62150 1           LXA,1  INCR,1
1241  REF  4  LAST  583       34,3244  03731 1                 CNT3TEMP
1242                          34,3245  00001 0           DEC    1         ADD ONE TO MARK COUNT
1243                          34,3246  52130 1           SXA,1  GOTO
1244  REF  6  LAST  583       34,3247  02550 0                 COUNT3MK
1245  REF  3  LAST  582       34,3250  71217 0                 REND12A
1246  REF  2  LAST  561       30,2000                  SETLOC P20S1
1247                          30,2435                  BANK

12475 REF  1                                           COUNT* $$/R22
1248                          30,2435  45020 1  UPSTATE STQ   CALL      INTEGRATE NON-UPDATED VEHICLE STATE
1249  REF  2  LAST   77       30,2436  01006 0                 POINTEX     VECTOR
1250  REF  2  LAST  565       30,2437  56462 1                 SETINTG   SET INTEGRV FLAGS   VINTFLAG=1 FOR CSM
1251                          30,2440  43014 0           BOFF   CLEAR
1252  REF  6  LAST  583       30,2441  00747 0                 VEHUPFLG  0=LM 1=CSM FOR UPDATE VEHICLE
1253  REF  1                  30,2442  60444 0                 REND4A    INTEGRATE CSM
1254  REF  6  LAST  456       30,2443  01674 0                 VINTFLAG  INTEGRATE LM
1255                          30,2444  77624 1  REND4A   CALL
1256  REF  5  LAST  565       30,2445  27236 0                 INTEGRV
1257                          30,2446  77624 1           CALL
1258  REF  9  LAST  583       30,2447  22327 1                 GRP2PC    PHASE CHANGE
1259                          30,2450  77624 1           CALL            INTEGRATE UPDATED VEHICLE
1260  REF  3  LAST  583       30,2451  56462 1                 SETINTG   SET INTEGRV FLAGS   VINTFLAG=1 FOR CSM
1261                          30,2452  43014 0           BOFF   SET
1262  REF  6  LAST  580       30,2453  02756 1                 RENDWFLG
1263  REF  1                  30,2454  60456 0                 REND5     IF FLAG=0 DO NOT INTEGRATE W MATRIX
1264  REF  5  LAST  457       30,2455  01476 0                 DIMOFLAG  INTEGRATE VALID W MATRIX
1265                          30,2456  43014 0  REND5    BON    CLEAR
1266  REF  7  LAST  583       30,2457  00707 1                 VEHUPFLG
1267  REF  1                  30,2460  60462 1                 REND5A    INTEGRATE CSM
1268  REF  7  LAST  583       30,2461  01674 0                 VINTFLAG  INTEGRATE LM
1269                          30,2462  77624 1  REND5A   CALL
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1270   REF   6  LAST  583   30,2463   27236 0              INTEGRV
1271                       30,2464   77650 1        GOTO
1272   REF   3  LAST  583   30,2465   01006 0              PCINTEX
1273   REF   2  LAST  577   34,2000                SETLOC P20S3
1274                       34,3251                BANK

12745  REF   2 LAST  577 TO  583:   276   276*     COUNT* $$/R22
1275   REF  10  LAST  581   34,3251   27502 0 REND14 STOVL  BVECTOR          VHF RADAR BVECTOR
1276   REF  17  LAST  580   34,3252   15336 0        ZEROVECS
1277   REF  11  LAST  584   34,3253   03510 0        STORE  BVECTOR +6
1278   REF  12  LAST  584   34,3254   27516 0        STOVL  BVECTOR +12D
1279   REF   5  LAST  581   34,3255   03531 0              RCLP
1280                       34,3256   71256 0        UNIT   DLOAD
1281   REF   2  LAST  579   34,3257   01114 1              VHFRANGE          VHFRANGE SCALED B-27
1282                       34,3260   60414 0        BON    SR2
1283   REF   6  LAST  511   34,3261   04303 0              MOONTHIS
1284                       34,3262   71263 0              +1
1285                       34,3263   43025 1        DSU    SET
1286                       34,3264   00045 0              36D               ABVAL (RCLP)
1287   REF   7  LAST  583   34,3265   02464 0              INCORFLG
1288   REF   3  LAST  574   34,3266   03524 1        STORE  DELTAQ
1289                       34,3267   77214 0        BOFF   VLOAD
1290   REF   8  LAST  583   34,3270   00747 0              VEHUPFLG
1291   REF   1              34,3271   71275 1              REND14A
1292   REF  13  LAST  584   34,3272   03502 0              BVECTOR
1293                       34,3273   77676 0        VCOMP
1294   REF  14  LAST  584   34,3274   03502 0        STORE  BVECTOR
1295                       34,3275   77624 1 REND14A CALL
1296   REF  10  LAST  583   34,3276   22327 1              GRP2PC
1297                       34,3277   52145 0        DLOAD  GOTO
1298   REF   1              34,3300   03003 1              RVAR
1299   REF   1              34,3301   71067 0              REND10
1300                       34,3302   43335 0 REND15 SLOAD  CAD               GET ALT LOS VARIANCE
1301   REF   1              34,3303   01350 0              ALTVAR            BACKUP OPTICS
1302   REF   2  LAST  581   34,3304   16461 0              IMUVAR            IMU VARIANCE
1303                       34,3305   77650 1        GOTO
1304   REF   2  LAST  584   34,3306   71067 0              REND10
1305                       34,3307   62150 1 REND16 LXA,1  INCR,1
1306   REF   7  LAST  580   34,3310   00771 0              VHFCNT            VHF RADAR UPDATE COUNT
1307                       34,3311   00001 0        DEC    1
1308                       34,3312   52130 1        SXA,1  GOTO
1309   REF   8  LAST  584   34,3313   00771 0              VHFCNT            UPDATE COUNT
1310   REF   3  LAST  582   34,3314   71375 0              RENDISP3
1311                       34,3315   62150 1 REND17 LXA,1  INCR,1
1312   REF   3  LAST  195   34,3316   00772 0              TRKMKCNT          OPTICS MARK COUNT
1313                       34,3317   00001 0        DEC    1
1314                       34,3320   52130 1        SXA,1  GOTO
1315   REF   4  LAST  584   34,3321   00772 0              TRKMKCNT          UPDATE COUNT
1316   REF   4  LAST  584   34,3322   71375 0              RENDISP3
1317                       34,3323   77624 1 REND18 CALL
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1318  REF   2 LAST  579   34,3324   71327 1                CMPOS          GET CSM POSITION
1319                      34,3325   77650 1          GOTO
1320  REF   1             34,3326   71232 1                REND13
1321  REF   3 LAST  584   34,2000                    SETLOC P20S3
1322                      34,3327                    BANK

13225 REF   3 LAST  584 TO  585:    46   322*        COUNT* $$/R22
1323                      34,3327   53775 1 CMPOS    VLOAD  VSR*
1324  REF   1             34,3330   01573 1                DELTACSM
1325                      34,3331   57167 0                7,2
1326                      34,3332   77655 1          VAD
1327  REF   1             34,3333   01607 1                RCVCSM
1328  REF   3 LAST  580   34,3334   01046 1          STORE  CSMPOS         CSM POSITION SCALED B-27 OR B-29
1329                      34,3335   77616 0          RVQ
1330                      34,3336   53775 1 LMPOS    VLOAD  VSR*
1331  REF   1             34,3337   01645 1                DELTALEM
1332                      34,3340   57167 0                7,2
1333                      34,3341   77655 1          VAD
1334  REF   1             34,3342   01661 1                RCVLEM
1335  REF   5 LAST  580   34,3343   01054 1          STORE  LEMPOS         LM POSITION SCALED B-27 OR B-29
1336                      34,3344   77616 0          RVQ
1337  REF   4 LAST  585   34,2000                    SETLOC P20S3
1338                      34,3345                    BANK

13385 REF   4 LAST  585 TO  585:    14   336*        COUNT* $$/R22
1339                      34,3345    77776 1 RENDISP EXIT
1340  REF 121 LAST  572   34,3346  3 4772 1          CAF    ZERO           SET TEMPOR1 > ZERO TO INDICATE
1341  REF   3 LAST  574   34,3347  55'135 0          TS     TEMPOR1        V06 N49 DISPLAY HASNT BEEN ANSWERED
1342  REF  39 LAST  572   34,3350  0 5402 1          TC     PHASCHNG
1343                      34,3351   04022 0          OCT    04022
1344  REF   2 LAST  569   34,3352  3 7651 1          CAF    PRIO27         SET UP DISPLAY JOB WITH HIGHER PRIORITY
1345  REF  10 LAST  531   34,3353  0 5121 0          TC     NOVAC
1346  REF  41 LAST  578   E7,1722                    EBANK= MRKBUF1        THAN PRESENT JOB
1347  REF   1             34,3354   03366 1          2CADR  RENDISP2
1347  REF   1             34,3355   70067 1
1348  REF  97 LAST  579   34,3356  0 6006 1 RENDISP7 TC     INTPRET
1349  REF 248 LAST  581   34,3357   00155 0          STORE  MPAC
1350                      34,3360   53135 0          SLOAD  BZE
1351  REF   4 LAST  585   34,3361   01136 1                TEMPOR1
1352  REF   1             34,3362   71357 0                RENDISP7 +1    DISPLAY HAS NOT BEEN ANSWERED YET
1353                      34,3363   52040 1          BMN    GOTO
1354  REF   2 LAST  581   34,3364   71176 1                REND12         NEG INDICATES PROCEED
1355  REF   5 LAST  584   34,3365   71375 0                RENDISP3       POS INDICATES RECYCLE
1356  REF   1             34,3366  3 5030 1 RENDISP2 CAF    V06N49
1357  REF 127 LAST  572   34,3367  0 4636 0          TC     BANKCALL
1358  REF   2 LAST  572   34,3370   20753 1          CADR   PRIODSP
1359  REF   2 LAST  396   34,3371  0 4546 1          TC     GOTOV56        TERM EXIT P20 VIA V56
1360  REF  64 LAST  572   34,3372  4 4770 1          CS     ONE            NEG INDICATES PROCEED RENDISP7 JOB
1361  REF   5 LAST  585   34,3373  55'135 0          TS     TEMPOR1        POS INDICATES RECYCLE RENDISP7 JOB
1362  REF  64 LAST  579   34,3374  0 5205 0          TC     ENDOFJOB       GO COMPLETE ABOVE JOB
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1363                          34,3375  77624 1  RENDISP3 CALL
1364  REF  11 LAST  584       34,3376  22327 1           GRP2PC
1365                          34,3377  43014 0           CLEAR    CLEAR          RESET FLAGS
1366  REF   2 LAST  578       34,3400  04670 1                    R22CAFLG
1367  REF   4 LAST  582       34,3401  05263 0                    REJCTFLG
1368                          34,3402  52014 0           BON      GOTO
1369  REF   7 LAST  582       34,3403  04707 0                    SOURCFLG
1370  REF   1                 34,3404  70636 0                    REND1          DATA WAS RADAR GO LOOK FOR OPTICS NEXT
1371  REF   1                 34,3405  70667 1                    REND3
1372  REF   2 LAST  572       23,2000                   SETLOC   P20S2
1373                          23,3030                   BANK

13735 REF   1                                           COUNT*   $$/R22
1374                          23,3030  67214 1  AUTOW    BON      SLOAD
1375  REF   4 LAST  582       23,3031  05312 1                    MANEUFLG       MANEUVER DONE IF SET
1376  REF   1                 23,3032  50104 1                    AUTOW3
1377  REF   7 LAST  583       23,3033  02551 1                    COUNT3MK       COUNT OF MARKS SINCE W REINITIALIZED
1378                          23,3034  52054 1           BZE      GOTO
1379  REF   1                 23,3035  47037 0                    AUTOW1A
1380  REF   1                 23,3036  47133 0                    AUTOW2
1381                          23,3037  77614 1  AUTOW1A  BOFF
1382  REF   4 LAST  484       23,3040  05354 0                    TPIMNFLG       NOT AFTER TPI
1383  REF   1                 23,3041  47046 0                    AUTOW1         NOT AFTER TPI
1384                          23,3042  52014 0           BOFF     GOTO
1385  REF   3 LAST  580       23,3043  05347 1                    P35FLAG
1386  REF   2 LAST  586       23,3044  47133 0                    AUTOW2
1387  REF   1                 23,3045  71001 0                    REND5C
1388                          23,3046  71201 1  AUTOW1   SETPD    DLOAD          PUT TIG
1389                          23,3047  00001 0                    0                    OR
1390  REF  41 LAST  531       23,3050  03413 1                    TIG                     TCDH IF P. C.
1391                          23,3051  71214 0           BOFF     DLOAD
1392  REF   4 LAST  496       23,3052  05356 1                    PCFLAG                          PUSH LIST 0
1393  REF   1                 23,3053  47055 1                    AUTOW11
1394  REF   5 LAST  283       23,3054  02461 0                    TCDH
1395                          23,3055  67206 1  AUTOW11  PUSH     SLOAD          PD 0,1 = TIG OR TCDH IF P C
1396  REF   2 LAST   96       23,3056  02372 0                    WRDTIME
1397                          23,3057  67206 1           PUSH     SLOAD          PD 2,3 = WRDTIME
1398  REF   2 LAST   96       23,3060  02373 1                    MINBLKTM
1399                          23,3061  67206 1           PUSH     SLOAD          PD 4,5 = MINBLKTM
1400  REF   2 LAST   96       23,3062  02374 0                    TBEFCOMP
1401                          23,3063  67206 1           PUSH     SLOAD          PD 6,7 = TBEFCOMP
1402  REF   2 LAST   96       23,3064  02375 1                    BRNBLKTM
1403                          23,3065  67206 1           PUSH     SLOAD          PD 8,9 = BRNBLKTM
1404  REF   2 LAST   96       23,3066  02376 1                    MAXWTIME
1405                          23,3067  67206 1           PUSH     SLOAD          PD 10,11 == MAXWTIME
1406  REF   2 LAST   96       23,3070  02377 0                    FINCMPTM
1407                          23,3071  71206 0           PUSH     DLOAD          PD 12,13 = FINCMPTM
1408  REF  11 LAST  582       23,3072  01062 1                    MARKTIME
1409                          23,3073  45225 0           DSU      DSU
1410                          23,3074  00003 1                    2              WRDTIME
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1411  REF  3  LAST  580   23,3075  03736 0            AGEOFW
1412                      23,3076  71240 1      BMN   DLOAD
1413  REF  3  LAST  586   23,3077  47133 0            AUTOW2    AGEOFW GR WRDTIME
1414  REF  3  LAST  582   23,3100  03734 1            OLDMKTME
1415                      23,3101  43225 0      DSU   DAD
1416  REF 12  LAST  586   23,3102  01062 1            MARKTIME  MARK TIME
1417                      23,3103  00005 1            4         MINBLKTM
1418                      23,3104  71240 1      BMN   DLOAD
1419  REF  1              23,3105  50114 0            AUTOW4    (TIME - OLDMKTME) GR MIN
1420  REF 13  LAST  587   23,3106  01062 1            MARKTIME
1421                      23,3107  51025 1      DSU   BPL
1422                      23,3110  00001 0            DD        TIG
14222 REF  1              23,3111  50120 1            AUTOW5    REINITIALIZE - TIG IS IN THE PAST
14224                     23,3112  77615 0      DAD
1423                      23,3113  00015 0            12D       FINCMPTM
1424                      23,3114  50015 0      DAD   BMN
1425                      23,3115  00007 0            6D        TBEFCOMP
1426  REF  2  LAST  587   23,3116  50120 1            AUTOW5    (FINCMPTM - TIME) GR TBEFCOMP
1427                      23,3117  43345 1      DLOAD DAD
1428                      23,3120  00001 0            1
1429  REF  1              23,3121  07137 0            3MINCON   3 MIN CONSTANT (APPROX)
1430                      23,3122  43225 0      DSU   DAD
1431                      23,3123  00015 0            12D       FINCMPTM
1432                      23,3124  00011 1            8D        BRNBLKTM
1433                      23,3125  45225 0      DSU   DSU
1434  REF  4  LAST  587   23,3126  03736 0            AGEOFW
1435                      23,3127  00013 0            10D       MAXWTIME
1436                      23,3130  43040 1      BMN   SET
1437  REF  4  LAST  587   23,3131  47133 0            AUTOW2    FINCOM + BRNBLK+3MIN+AGE GR MAXWTIME
1438  REF  3  LAST  580   23,3132  05073 0            PTV93FLG  POST BURN V93 REQUEST FLAG
1439                      23,3133  52014 0  AUTOW2    CLEAR     GOTO
1440  REF  5  LAST  579   23,3134  01671 0            CRBWFLAG  P22 W MATRIX FLAG
1441  REF  1              23,3135  70776 0            RENDSB
1447                      23,3136  00001 0  3MINCON   DEC   1.0  B-14   2.74 MIN
1449                      23,3137  00002 0  HIGH2     2DEC  2.0  B-14
1449                      23,3140  00000 1
1450                      23,3141  00003 1  HIGH3     2DEC  3.0 B-14
1450                      23,3142  00000 1
1451  REF  1              24,2000                    SETLOC    P20S5
1452                      24,2104                    BANK

14525 REF  1                                         COUNT*    $$/R22
1453                      24,2104  43014 0  AUTOW3    BON       BOFF
1454  REF  4  LAST  587   24,2105  05313 0            PTV93FLG
1455  REF  2  LAST  586   24,2106  71001 0            RENDSC
1456  REF  5  LAST  586   24,2107  05354 0            TPIMNFLG
1457  REF  2  LAST  587   24,2110  50114 0            AUTOW4
1458                      24,2111  77614 1            BOFF
1459  REF  3  LAST  279   24,2112  05355 1            FULTKFLG
1460  REF  3  LAST  587   24,2113  71001 0            RENDSC    BRANCH IF VHF AND OPTICS MARKING
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1461                          24,2114  52131 0  AUTOW4   SSP     GOTO
1462  REF   8  LAST  586      24,2115  02551 1           COUNT3MK        SET 3 MARK COUNTER EQ 1
1463                          24,2116  00001 0           DEC     1
1464  REF   5  LAST  587      24,2117  47133 0           AUTOW2          BYPASS REINITIALIZING W MATRIX
1465                          24,2120  52014 0  AUTOW5   CLEAR   GOTO
1466  REF   5  LAST  587      24,2121  05273 1           PTV93FLG
1467  REF   4  LAST  587      24,2122  71001 0           RENDSC

1468  REF   1                24,2000                    SETLOC  R22S1
1469                          24,2456                    BANK

14695 REF   1                                            COUNT*  $$/R22
1470                          24,2456  00052 0  SXTVAR   2DEC    0.04 E-6 B+16   SXT ERROR VARIANCE = .04 (MR)SQ
1470                          24,2457  36307 0
1471                          24,2460  00052 0  IMUVAR   2DEC    0.04 E-6 B+16   IMU ERROR VARIANCE = .04 (MR)SQ
1471                          24,2461  36307 0
1472                          24,2462  45020 1  SETINTG  STQ     CALL
1473  REF   8  LAST  576      24,2463  02310 1           EGRESS
1474  REF  15  LAST  521      24,2464  27516 0           INTSTALL        RESERVE INTEGRATION
1475                          24,2465  43145 0           DLOAD   SET
1476  REF  14  LAST  587      24,2466  01062 1           MARKTIME
1477  REF   1                24,2467  01472 1           STATEFLG
1478  REF  18  LAST  561      24,2470  00041 1           STORE   TDEC1           MARKTIME
1479                          24,2471  43014 0           CLEAR   CLEAR
1480  REF  10  LAST  514      24,2472  01673 1           INTYPFLG        PRECISION INTEGRATION
1481  REF   6  LAST  583      24,2473  01676 1           DIMOFLAG
1482                          24,2474  43014 0           SET     CLRGO
1483  REF   8  LAST  583      24,2475  01474 1           VINTFLAG        SET VEHICLE EQ. CSM
1484  REF   1                24,2476  01635 0           D60R9FLG        SET W MATRIX DIM. EQ 6
1485  REF   9  LAST  588      24,2477  02310 1           EGRESS          EXIT
1486                          24,2500  43014 0  CONTCHK   BOFF    BOFF
1487  REF   8  LAST  565      24,2501  00350 1           RNDVZFLG
1488  REF   1                24,2502  31263 1           ENDPLAC

1489  REF   3  LAST  539      24,2503  01742 1           REFSMFLG        BRANCH TO END OF JOB IF REFSMMAT NO GOOD
1490  REF   2  LAST  588      24,2504  31263 1           ENDPLAC
1491                          24,2505  50135 0           SLOAD   BMN
1492  REF  18  LAST  572      24,2506  03375 0           R61CNTR
1493  REF   1                24,2507  56525 0           WAITONE1
1494                          24,2510  43014 0           BON     BOFF            IS TRACK FLAG SET
1495  REF   5  LAST  554      24,2511  00710 1           UPDATFLG
1496  REF   4  LAST  584      24,2512  01006 0           POINTEX
1497  REF   9  LAST  565      24,2513  00752 1           TRACKFLG
1498  REF   3  LAST  588      24,2514  31263 1           ENDPLAC
1499                          24,2515  77776 1           EXIT
1500  REF  40  LAST  585      24,2516  0 5402 1 REDOR22   TC      PHASCHNG
1501                          24,2517  00132 1           OCT     00132
15015 REF   1                01,2047                    2P13SPT1 =      2.13SPOT
1502  REF   7  LAST  577      24,2520  3 7650 0          CAF     PRIO26
1503  REF  11  LAST  577      24,2521  0 5176 1          TC      PRIOCHNG
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1504   REF   2  LAST  588   27,2522  1 2526 0            TCF     WAITONE1 +1

1505                       27,2523   77620 0  WAITONE    STQ
1506   REF   5  LAST  588   27,2524   01006 0             EXIT    POINTEX
1507                       27,2525   77776 1  WAITONE1   EXIT
1508   REF   2  LAST  151   27,2526  3 5020 0    +1       CAF     4SECS          WAIT 4 SECS.
1509   REF 128  LAST  585   27,2527  0 4636 0             TC      BANKCALL
1510   REF   7  LAST  559   27,2530   01731 0             CADR    DELAYJOB
1511   REF  98  LAST  585   27,2531  0 6006 1             TC      INTPRET
1512                       27,2532   77650 1             GOTO
1513   REF   1              27,2533   56500 1             CONTCHK        CHECK AGAIN NOW
1514   REF   5  LAST  585   34,2000                       SETLOC  P20S3
1515                       34,3406                       BANK

15155  REF   5 LAST  585 TO  586:     33   369*          COUNT*  $$/R22
1516   REF   6  LAST  579   34,3406  3 1703 1  RANGERD3   CA      RM
1517   REF  13  LAST  557   34,3407  7 4750 0             MASK    POSMAX
1518   REF 249  LAST  585   34,3410  54 154 0             TS      MPAC           MASK OUT NEG. SIGN BIT
1519   REF  99  LAST  589   34,3411  0 6006 1             TC      INTPRET
1520                       34,3412   41335 1             SLOAD   DMP
1521   REF 250  LAST  589   34,3413   00155 0                     MPAC           CLEAR MPAC +1
1522   REF   2  LAST  579   34,3414   16535 0                     CONVRNGE       CONVERT FROM NM TO METERS AND SCALE B-27
1523                       34,3415   52015 1             DAD     GOTO
1524   REF   3  LAST  589   34,3416   16535 0                     CONVRNGE       VALUE IN METERS OF SIGN BIT SCALED B-27
1525   REF   1              34,3417   70754 0                     RANGERD2
1526   REF   3  LAST  584   34,3420  3 1113 0  LIGHTON    CA      VHFRANGE
1527                       34,3421  0 0006 1             EXTEND
1528                       34,3422  1 3424 1             BZF     +2
1529   REF   1              34,3423  0 5644 1             TC      TRFAILON
1530   REF 100  LAST  589   34,3424  0 6006 1    +4       TC      INTPRET
1531                       34,3425   77745 1             DLOAD
1532   REF  15  LAST  588   34,3426   01062 1                     MARKTIME
1533   REF   5  LAST  579   34,3427   01010 1             STORE   VHFTIME
1534                       34,3430   77650 1             GOTO
1535   REF   2  LAST  586   34,3431   70636 0                     REND1
1536   REF   2  LAST  215      4777                OCT17    EQUALS  LOW4
1537   REF   2  LAST  588   27,2000                       SETLOC  R22S1
1538                       27,2534                       BANK

15385  REF   2 LAST  588 TO  589:     46    46*          COUNT*  $$/R22
1539                       27,2534    00045 0  CONVRNGE   2DEC    18.52 B-13     VHF INPUT RANGE CONV. FROM .01 NM TO M
1539                       27,2535    01217 1
R1540                                 AND 16384 X 18.52 = METERS FOR SIGN BIT
1541                       27,2536  0 0006 1  VHFREAD    EXTEND
1542   REF   8  LAST  382   27,2537  04 007 1             ROR     SUPERBNK       MUST SAVE SBANK BECAUSE OF RUPT
1543   REF   5  LAST  550   27,2540  54 016 1             TS      BANKRUPT       EXITS VIA RESUME, LIGHTON, RANGERD1
1544                       27,2541  0 0006 1             EXTEND
1545   REF   5  LAST  550   27,2542  22 012 1             QXCH    QRUPT
1546   REF  11  LAST  485   27,2543  4 0076 1             CS      FLAGWRD2
1547   REF   3  LAST  202   27,2544  7 4757 1             MASK    SKIPVBIT       SKIPVHF FLAG
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1548                          27,2545  0 0006 1          EXTEND
1549  REF  22  LAST  551      27,2546  1 5323 1          BZF     RESUME          BRANCH IF VHF RESTART BIT SET
1550  REF   3  LAST  214      27,2547  3 4762 0          CAF     UPDATBIT
1551  REF  26  LAST  559      27,2550  7 0075 1          MASK    FLAGWRD1        UPDATFLG
1552                          27,2551  0 0006 1          EXTEND
1553  REF   1                 27,2552  1 2574 1          BZF     BYPASS1
1554  REF   5  LAST  396      27,2553  4 0100 1          CS      FLAGWRD4
1555  REF   3  LAST  396      27,2554  7 4755 0          MASK    PDSPFBIT        PDSPFLAG
1556                          27,2555  0 0006 1          EXTEND
1557  REF   2  LAST  590      27,2556  1 2574 1          BZF     BYPASS1
1558  REF   1                 27,2557  3 0046 0          CA      RNRAD
1559  REF   7  LAST  589      27,2560  55'703 0          TS      RM              SAVE RANGE
1560  REF  23  LAST  553      27,2561  3 4767 0          CAF     BIT2
1561                          27,2562  0 0006 1          EXTEND
1562  REF   5  LAST  198      27,2563  02 033 0          RAND    CHAN33          READ DATA GOOD BIT
1563                          27,2564  0 0006 1          EXTEND
1564  REF   1                 27,2565  1 2576 0          BZF     VHFGOOD         BRANCH IF DATA GOOD BIT EQUALS GOOD
1565  REF   4  LAST  589      27,2566  55'113 1 BYPASS   TS      VHFRANGE        STORE NON ZERO VALUE
1566  REF   8  LAST  588      27,2567  3 7650 0          CAF     PRIO26
1567  REF  28  LAST  557      27,2570  0 5135 0          TC      FINDVAC
1568  REF  42  LAST  585      E7,1722                    EBANK=  MRKBUF1
1569  REF   2  LAST  579      27,2571    03420 1         2CADR   LIGHTON
1569                          27,2572    70067 1
1570  REF  23  LAST  590      27,2573  0 5323 0          TC      RESUME

1571  REF 122  LAST  585      27,2574  3 4772 1 BYPASS1  CAF     ZERO
1572  REF   1                 27,2575  0 2566 0          TC      BYPASS
1573  REF   9  LAST  590      27,2576  3 7650 0 VHFGOOD  CAF     PRIO26
1574  REF  29  LAST  590      27,2577  0 5135 0          TC      FINDVAC
1575  REF  43  LAST  590      E7,1722                    EBANK=  MRKBUF1
1576  REF   1                 27,2600    02742 1         2CADR   RANGERD1
1576  REF   1                 27,2601    70067 1
1577  REF  24  LAST  590      27,2602  0 5323 0          TC      RESUME

1578                          27,2603    77774 0 SHIFTNDX AXT,2
1579                          27,2604    00000 1                 0
1580                          27,2605    43414 1          BON     RVQ
1581  REF  11  LAST  565      27,2606    04303 0                  CMOONFLG
1582                          27,2607    56610 0                  +1              MOON ORB.
1583                          27,2610    43514 0          INCR,2  RVQ
1584                          27,2611    77775 1          DEC     -2
1585                          27,2612    66370 0 INITIALW AXT,1   SSP
1586                          27,2613    00044 1                  36D
1587  REF   7  LAST  565      27,2614    00051 0                  S1
1588                          27,2615    00006 1                  6
1589                          27,2616    77775 1          VLOAD
1590  REF  18  LAST  584      27,2617    15336 0                  ZEROVECS
1591  REF   6  LAST  277      27,2620    06445 1 INITA    STORE   W +36D,1       CLEAR 0 - 35
1592  REF   7  LAST  590      27,2621    06533 1          STORE   W +90D,1       CLEAR 54-89
1593                          27,2622    67300 0          TIX,1   SLOAD
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 1594   REF   1                    27,2623   56620 0                INITA
 1595                              27,2624   00001 0                0                POSITION VALUE
 1596   REF   8   LAST  590        27,2625   02401 0         STORE  W                INITIALIZE DIAGONAL W  POSITION
 1597   REF   9   LAST  591        27,2626   02411 1         STORE  W +8D
 1598   REF  10   LAST  591        27,2627   02421 1         STORE  W +16D
 1599                              27,2630   77735 0         SLOAD
 1600                              27,2631   00002 0                1                VELOCITY VALUE
 1601   REF  11   LAST  591        27,2632   02511 0         STORE  W +72D            INITIALIZE DIAGONAL W VELOCITY
 1602   REF  12   LAST  591        27,2633   02521 0         STORE  W +80D
 1603   REF  13   LAST  591        27,2634   02531 1         STORE  W +88D
 1604                              27,2635   77616 0         RVQ
R1605
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P1606 STALL ROUTINE FOR USERS OF CHANNEL 13.

```
1607   REF   2  LAST  141      4000                        SETLOC  FFTAG12
1608                           4542                        BANK

16085  REF   1                                            COUNT*  $$/CHN13
1609   REF   6  LAST  274      4542   3 4754 0  C13STALL   CAF     PRIO10          = BANK 04
1610   REF   2  LAST  206      4543   56 004 0             XCH     FBANK
1611   REF   6  LAST  157      4544   54 071 0             TS      RUPTREG2
1612   REF   1                 4545   1 3251 0             TCF     C13STAL1
1613   REF   1                04,2000                     SETLOC  C13BANK
1614                          04,3251                     BANK

16145  REF   1                                            COUNT*  $$/CHN13
1615   REF  24  LAST  517     04,3251  3 4765 1  C13STAL1  CAF     BIT4
1616                          04,3252  0 0006 1            EXTEND
1617   REF   8  LAST  579     04,3253  02 013 1            RAND    CHAN13
1618                          04,3254  0 0006 1            EXTEND
1619   REF   1                04,3255  1 3276 0            BZF     TCQSTAL         NO RADAR ACTIVITY. OK TO WRITE.

1620                          04,3256  13 257 0  C13SLOOP   NOOP                    TO PREVENT TC TRAP
1621                          04,3257  0 0006 1            EXTEND
1622   REF   5  LAST  578     04,3260  00 004 0            READ    LOSCALAR
1623   REF   3  LAST  579     04,3261  6 1063 0            AD      RADTIME         COMPUTE DELTA T SINCE LAST RADAR READ
1624   REF   3  LAST  444     04,3262  6 4753 1            AD      HALF
1625   REF   4  LAST  592     04,3263  6 4753 1            AD      HALF            FOR OVERFLOW
1626   REF  69  LAST  579     04,3264  56 001 0            XCH     L

1627   REF   1                04,3265  3 3301 0            CA      90MSCALR
1628   REF   2  LAST  579     04,3266  6 1064 1            AD      RADDEL
1629                          04,3267  0 0006 1            EXTEND
1630   REF  70  LAST  592     04,3270  60 001 0            SU      L

1631                          04,3271  0 0006 1            EXTEND
1632   REF   2  LAST  592     04,3272  6 3276 1            BZMF    TCQSTAL         GR THAN 90 MS.  OK

1633   REF   1                04,3273  6 3302 0            AD      -DTSCALR
1634                          04,3274  0 0006 1            EXTEND
1635   REF   1                04,3275  6 3256 0            BZMF    C13SLOOP        IN FORBIDDEN PERIOD.  LOOP UNTIL OK

1636   REF   7  LAST  592     04,3276  3 0071 1  TCQSTAL   CA      RUPTREG2
1637   REF 129  LAST  548     04,3277  22 002 0            LXCH    Q
1638                          04,3300  52 005 0            DTCF

1639                          04,3301   00440 1  90MSCALR  OCT     440             90 MILLISEC IN SCALAR
1640                          04,3302   77754 1  -DTSCALR  OCT     77754           -5.9375 MS IN SCALAR

R1641  CRS61.1  4/10/68
R1642    TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM WHICH ENABLES
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R1643   OPTICS  TRACKING OF THE LM AND LM TRACKING OF THE CSM RADAR TRANSPONDER
R1644   AND TO COMPUTE THE &X-AXIS TRACKING ATTITUDE OF THE CSM WHICH ENABLES
R1645   COAS TRACKING OF THE LM.
R1646     TO PERFORM THE MANEUVER TO THE SELECTED TRACKING ATTITUDE IF THE
R1647   MANEUVER IS LESS THAN 10 DEGREES BUT TO CALL R60 IF THE MANEUVER IS
R1648   GREATER THAN 10 DEGREES OR IF THE R60FLAG IS SET.
R1649           (1) EXTRAPOLATE LM AND CSM STATE VECTORS TO PRESENT TIME USING
R1650               CONIC EQUATIONS.

R1651           (2) CALCULATE LOS FROM CSM TO LM = RL - RC.

R1652           (3) THE PREFERRED TRACKING ATTITUDE IS DEFINED AS FOLLOWS:
R1653               THE TRACK AXIS (I) IS ALIGNED ALONG THE LOS TO THE LM. THE
R1654               TRACK AXIS (I) IS DEFINED AS:
R1655
R1656               UNIT(I)=UNIT(Z  )COS55 &UNIT(X  )SIN55
R1657                    -       -SC             -SC
R1658           (4) COMPUTE DESIRED CDU ANGLES, USING VECPOINT.
R1659           (7) FORM DIFFERENCE BETWEEN DESIRED AND ACTUAL CDUS.
R1660               IF ANY OF THE THREE ANGLE DIFFERENCES EXCEEDS 10 DEGREES,
R1661               GROSS MANEUVER IS REQUIRED. SIGNAL R61 (SET MPAC=1) TO
R1662               OPERATE KALCMANU AND EXIT CRS61.1.
R1663               IF ALL DIFFERENCES ARE LESS THAN 10 DEGREES, CONTINUE.

R1664           (8) CALCULATE ORTHOGONAL LOS RATE IN REF COORDS AS

R1665               OMEGATH = (UNITLOS(B1) X UNITDV(B1))(ABSDV(B7)/ABSLOS(B29))
R1666               CONVERSION FACTOR OF 100/2PI (B4) REV CSEC PER RAD SEC IS
R1667               APPLIED TO YIELD UNITS OF REVS/SEC. SCALE IS CARRIED AS
R1668               B+1+1+7-29+4+1 PLUS RESULTS OF NORMALIZING ABSDV, ABSLOS.
R1669               THE EXTRA B+1 RESULTS FROM RESCALING ABSDV B8 AFTER NORM
R1670               TO AVOID OVFLOW ON DIVIDE.

R1671               UNITLOS = UNIT( RL - RC) B1.
R1672               UNITDV  = UNIT( VL - VC) B1.
R1673               ABSLOS  = LENGTH OF LOS, METERS B29.
R1674               ABSDV   = LENGTH OF DV , METERS/CSEC B7.

R1675           (9) OBTAIN RATE IN SM COORDS.

R1676               OMEGATHSM = (REFSMMAT)(OMEGATH).

R1677           (10)OBTAIN GIMBAL ANGLE INCREMENTS FOR 0.1 SECOND.

R1678               DTHETASM = (0.1)(OMEGATHSM)

R1679           (11)OBTAIN DELCDUX,Y,Z USING SUBR SMCDURES.
R1680               INPUT CONSISTS OF

R1681               (A) VECTOR OF ANGULAR INCREMENTS, DTHETASM, STORED
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R1682                    IN V(DTHETASM).

R1683               (B) SIN,COS CDUX,Y,Z FROM  SUBR CDUTRIG.

R1684               TRANSFER OUTPUT OF SMCDURES FROM V(DCDU) TO VAC14D.

R1685            (12)CALCULATE ANG LOS RATE IN BODY(NB) COORDS USING SUBR SMNB.

R1686               OMEGANB = (SMNB)(OMEGATHSM)

R1687               SUBR SMNB REQUIRES  OMEGATHSM IN V(VAC32D) AND ACTUAL CDUS
R1688               (Y,X,Z ORDER) IN V(VAC20D) WITH S1 OF VAC = BASE ADDRESS
R1689               OF CDUS (FIXLOC + 20D).

R1690            (13)CALCULATE ANG LOS RATE IN CONTROL COORDS AS FOLLOWS

R1691               WBODY = (MBDYTCTL)(OMEGANB)   UNITS=REVS/SEC(B0).

R1692                                ( 0.5        0            0       ) BODY TO
R1693               MBDYTCTL(B1) = ( 0    COS(7.25)B1  -SIN(7.25)B1 )=CONTROL
R1694                                ( 0    SIN(7.25)B1   COS(7.25)B1 ) AXES
R1695                                                                   CONVERSION
R1696                                                                    MATRIX

R1697            (14)RESCALE WBODY TO UNITS OF 450 DEG/SEC BY APPLYING FACTOR
R1698                   OF 0.8 TO REVS/SEC.

R1699            (15)ADDRESS LIVE AUTOPILOT REGISTERS IN BASIC (UNDER INHINT).

R1700                   TRANSFER DESIRED CDUS, SCALED 180 DEGREES,FROM T(SAVEDCDU)
R1701                   TO V(CDUXD).
R1702                   TRANSFER DELCDUS, SCALED 180 DEG, FROM V(VAC14D)
R1703                   TO V(DELCDUX).
R1704                   TRANSFER OMEGA CONTROL, SCALED 450 DEG/SEC,FROM V(MPAC)
R1705                   TO V(WBODY).
R1706                   RELINT, SET MPAC=0, EXIT CRS61.1

R1707   CALL     L  CALL CRS61.1

R1708   RETURNS  ALL TO L+1.

R1709            (1) S(MPAC)=0. NORMAL EXIT. 3 SETS OF INPUTS FED TO DAP.
R1710            (2) S(MPAC)=1. CALCULATED DESIRED CDUS,SP, SET IN T(CPHI)
R1711                FOR KALCMANU. ABS(ACDU - DCDU) EXCEEDS 10 DEGREES.
R1712            (3) S(MPAC)=2. GNCS AUTO MODE NOT SELECTED (BIT10=1).
R1713            (4) S(MPAC)=3. DAP HOLD FLAG (HOLDFLAG) NOT EQUAL -1.

R1714   INPUT    (1) TIME2,TIME1. COMPUTER CLOCK TIME,DP, CENTISEC B28.
R1715            (2) CDUX,Y,Z. PRESENT CDU ANGLES,SP,2S COMPL HALF-REVS B0.
R1716            (3) M(REFSMMAT),STABLE MEMBER COORDS B1.
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R1717   OUTPUT   NORMAL. EXIT WITH S(MPAC) = 0.

R1718            (1) CDUXD,CDUYD,CDUZD, DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1719                DP, 1S COMPL, SCALED 180 DEGREES (HALF-REVS BO).
R1720            (2) DELCDUX,DELCDUY,DELCDUZ. 0.1 SEC DCU ANGULAR INCREMENTS,
R1721                DP, 1S COMPL, SCALED 180 DEG.
R1722            (3) WBODY,WBODY1,WBODY2. LOS ANGULAR RATE IN CONTROL COORDS,
R1723                DP, 1S COMPL, SCALED 450 DEG/SEC.

R1724            SPECIAL. EXIT WITH S(MPAC) = 1.

R1725            (1) CPHI,CTHETA,CPSI. DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1726                SP, 2S COMPL, SCALED 180 DEGREES.

R1727   EXTERNAL SUBROUTINES USED   (B)=BASIC

R1728            (1) CALCGA     (5) LOADTIME(B)   (9) SMNB
R1729            (2) CDUTRIG    (6) MATMOVE
R1730            (3) CSMCONIC   (7) RDCDUS(B)
R1731            (4) LEMCONIC   (8) SMCDURES

R1732   ERASABLE (1) S(Q611),EBANK7  CRS61.1 EXIT .
R1733            (2) S(Q6111)EBANK7  CALCDCDU EXIT.
R1734            (3) T(SAVEDCDU) E6  SP VECTOR OF CDUDS.
R1735            (4) V(SAVEPOS)  E7  CSM POS VEC AND  D(SAVEPOS)= LENGTH OF LOS.
R1736            (5) V(SAVEVEL) E7  CSM VEL VEC.

R1737   FLAGWDS  HOLDFLAG. USED, NOT SET.

R1738   MISC     (1) ERASABLE ITEMP1 USED TO TEMP STORE EBANK UNDER INHINT.
R1739            (2) ERASABLE P21TIME USED AS TEMP STORE DURING CRS61.1
R1740            (3) ERAS DTHETASM USED AS TEMP STORE DURING EARLY CRS61.1

R1741   DEBRIS - CURRENT VAC AREA, CRS61.1 ERASABLES, ITEMP1, P21TIME

 1743   REF   1                 34,2000                       SETLOC  P20S4
 1744                           34,3432                       BANK

 1745   REF   6  LAST  423      E6,1646                       EBANK=  CDUXD
 1746   REF   1                                               COUNT*  $$/CRS61
A1747
 1748                           34,3432   40220 0  CRS61.1    STQ     SETPD
 1749   REF   2  LAST  129      34,3433   03704 1                    Q611
 1750                           34,3434   00001 0                    0
 1751                           34,3435   77634 0            RTB
 1752   REF  17  LAST  578      34,3436   51751 0                    LOADTIME        LOAD CLOCK TIME2,1 INTO MPAC.
A1753
 1754   REF   2  LAST   94      34,3437   36307 0  STORT     STCALL  R63TIME         STORE CLOCK TIME FOR SUBR R63
 1755   REF   1                 34,3440   73171 1                    R63             SUBR TO CALC DCDU(T=PRESENT,PASS1)
 1756                           34,3441   71214 0            CLEAR   DLOAD
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1757  REF   2  LAST  578   34,3442   05266 0                  RANGFLAG
1758  REF   3  LAST  595   34,3443   02307 1                  R63TIME
1759                       34,3444   51025 1          DSU     BPL
1760  REF   1              34,3445   33161 1                  328NM
1761                       34,3446   71451 1                  +3
1762                       34,3447   77614 1          SET
1763  REF   3  LAST  596   34,3450   05066 1                  RANGFLAG
1764                       34,3451   77776 1   +3     EXIT
1765  REF  16  LAST  521   34,3452   0 5354 0  STEP2CK TC      CHECKMM      CHECK MAJOR MODE = 27 (UPDATE PROG)
1766                       34,3453   00033 1          MM      27
1767  REF   2  LAST  211   34,3454   0 4415 0          TC      UPACTOFF     NO TURN OFF UPLINK LITE
A1768                                                                       YES  LEAVE UPLINK AS IS
1769  REF   7  LAST  420   34,3455   11'340 0          CCS     HOLDFLAG
1770  REF   1              34,3456   0 3560 1          TC      ASET         EXIT IF HOLDFLAG IS + NONZERO
1771                       34,3457   0 3461 1          TC      +2
1772                       34,3460   0 3461 1          TC      +1
1773  REF   4  LAST  572   34,3461   4 0107 0          CS      FLGWRD11
1774  REF   3  LAST  572   34,3462   7 4761 1          MASK    AZIMBIT
1775  REF 158  LAST  572   34,3463   10 000 0          CCS     A
1776  REF   1              34,3464   0 3505 1          TC      NOAZFLG1     AZIMFLAG NOT SET

1777  REF  27  LAST  506   34,3465   3 4767 0          CAF     TWO          AZIMFLAG SET
1778  REF   2  LAST  113   34,3466   55'611 1  CDULOOP TS      DTHETASM
1779  REF   3  LAST  596   34,3467   51'611 0          INDEX   DTHETASM
1780  REF  12  LAST  570   34,3470   3 0032 0          CA      CDUX
1781                       34,3471   0 0006 1          EXTEND
1782  REF   4  LAST  596   34,3472   5 1611 0          INDEX   DTHETASM
1783  REF  15  LAST  283   34,3473   21'307 0          MSU     THETAD
1784  REF 251  LAST  589   34,3474   54 154 0          TS      MPAC

1785  REF 101  LAST  589   34,3475   0 6006 1          TC      INTPRET
1786                       34,3476    45246 0          ABS     DSU
1787  REF   1              34,3477    16645 1                  DEGREE10
1788                       34,3500    77444 0          BPL     EXIT
1789  REF   1              34,3501    71566 1                  STKTEST

1790  REF   5  LAST  596   34,3502   11'611 1          CCS     DTHETASM
1791  REF   1              34,3503   0 3466 0          TC      CDULOOP

1792  REF   1              34,3504   0 3545 0          TC      AUTOCK

1793  REF   8  LAST  188   34,3505   3 1572 0  NOAZFLG1 CA     THETADX
1794  REF   5  LAST  545   34,3506   55'175 1          TS      CDUSPOT +4
1795  REF   7  LAST  188   34,3507   3 1573 1          CA      THETADY
1796  REF   6  LAST  596   34,3510   55'171 0          TS      CDUSPOT
1797  REF   7  LAST  188   34,3511   3 1574 0          CA      THETADZ
1798  REF   7  LAST  596   34,3512   55'173 1          TS      CDUSPOT +2   STORE IN CDUSPOT FOR TRG*NBSM
1799  REF 102  LAST  596   34,3513   0 6006 1          TC      INTPRET
1800                       34,3514    45175 0          VLOAD   CALL
1801  REF  12  LAST  400   34,3515    03351 0                  SCAXIS
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1802  REF   1                 34,3516   47642 1                 TRG*NBSM
1803                          34,3517   50206 0          PUSH   DOT          PD 0-5
1804  REF   4  LAST  398     34,3520   03357 0                 POINTVSM
1805                          34,3521   50025 0          DSU    BMN          BRANCH IF GR. 10 DEG.
1806  REF   1                 34,3522   16641 0                 COSTEN
1807  REF   2  LAST  596     34,3523   71566 1                 STKTEST
1808                          34,3524   47375 0          VLOAD  VXV
1809                          34,3525   00001 0                 0            SCAXIS IN S.M.
1810  REF   5  LAST  597     34,3526   03357 0                 POINTVSM
1811                          34,3527   41561 0          VXSC   PUSH         PD 6-11 B2
1812  REF   1                 34,3530   16644 0                 DELTYME      1/(DELTA TIME) B-2
1813                          34,3531   45246 0          ABVAL  DSU
1814  REF   1                 34,3532   16642 0                 MAXRATE      .1 DEG. / SEC. B0
1815                          34,3533   77240 1          BMN    VLOAD        PUSH UP 6-11
1816  REF   1                 34,3534   71540 0                 STEP2CKB     BRANCH IF LESS .1 DEG./SEC.
1817                          34,3535   74256 0          UNIT   VXSC
1818  REF   2  LAST  597     34,3536   16642 0                 MAXRATE
1819                          34,3537   41572 1          VSL1   PUSH         PD 6-11 .1 DEG./SEC DISTRIBUTED
1820                          34,3540   74375 0  STEP2CKB VLOAD  VXSC
1821                          34,3541   00007 0                 6
1822  REF   1                 34,3542   16637 1                 RADTOREV     RAD. TO REV. B0
1823  REF   6  LAST  596     34,3543   03212 0          STORE  DTHETASM     B0
1824                          34,3544   77776 1          EXIT
1825  REF   2  LAST  394     34,3545 3 7673 1  AUTOCK CAF    FURST3       BITS 15,14,13 OF CHAN31 = 011
1826  REF   2  LAST  394     34,3546 0 5654 0         TC     C31BTCHK     FOR AUTO AND G&N CONTROL
1827                          34,3547 1 3550 0         TCF    +1
1828  REF   2  LAST  394     34,3550 6 7671 0         AD     NEG30000
1829                          34,3551 0 0006 1         EXTEND              AUTO MODE SELECTED (BITS 15-13=011)
1830  REF   1                 34,3552 1 3554 1         BZF    DAPCK           YES-CONTINUE.
1831  REF   2  LAST  596     34,3553 0 3560 1         TC     ASET
1832  REF  27  LAST  590     34,3554 4 0075 1  DAPCK  CS     FLAGWRD1     IS STIKFLAG SET (I.E. IS SOMEONE ON RHC)
1833  REF   1                 34,3555 7 4753 0         MASK   STIKBIT
1834  REF 159  LAST  596     34,3556 10 000 0         CCS    A
1835  REF   1                 34,3557 0 3600 1         TC     STEP3CK
1836  REF 103  LAST  596     34,3560 0 6006 1  ASET   TC     INTPRET
18362                         34,3561   77614 1          CLEAR
18364 REF   2  LAST  416      34,3562   00273 1                 CYC61FLG
1837                          34,3563   52135 1          SLOAD  GOTO
1838  REF  19  LAST  590      34,3564   15336 0                 ZEROVECS
1839  REF   3  LAST  595      34,3565   03704 1                 Q611
18391                         34,3566   77614 1  STKTEST BOFINV
18392 REF   3  LAST  597      34,3567   00153 0                 CYC61FLG
18393 REF   2  LAST  395      34,3570   44001 0                 KALCMAN3 +1
1840                          34,3571   77414 0          BON    EXIT
1841  REF   5  LAST  572      34,3572   01700 1                 V50N18FL
1842  REF   1                 34,3573   73166 1                 MANUEXIT
1843  REF  28  LAST  553      34,3574   3 4766 1         CAF    BIT3
1844                          34,3575   0 0006 1         EXTEND              STIKFLG IS SET
1845  REF  19  LAST  529      34,3576   05 011 1         WOR    DSALMOUT     TURN ON UPACTY LIGHT
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 1846   REF   3  LAST  597   34,3577  0 3560 1            TC      ASET        EXIT AND SET R61CNTR
 1847   REF 104  LAST  597   34,3600  0 6006 1  STEP3CK   TC      INTPRET
 1848                        34,3601   43001 1            SETPD   BOFF
 1849                        34,3602   00001 0            0D
 1850   REF   9  LAST  565   34,3603   04346 1            UTFLAG
 1851   REF   1              34,3604   71610 0            CRS61.2     NORMAL P-20 (OPTION 0) IF UTFLAG NOT SET

 1852                        34,3605   53145 1            DLOAD   BZE         OPTION 1,TEST FOR STAR OR PLANET
 1853   REF   4  LAST  596   34,3606   02307 1                    R63TIME     =0 IF STAR
 1854   REF   1              34,3607   73162 0                    UTSTAR1
A1855                                                              USE NORMAL P20 PATH FOR PLANET
A1856                                                              WITH VL AND RL = 0
A1857                                                              NOW HAVE DCDUS STORED IN T(SAVEDCDU).
A1858                                                              GO CALC OTHER DAP INPUTS (DELCDU,WBODY)
 1859                        34,3610   52375 1  CRS61.2   VLOAD   VSU
 1860   REF   3  LAST  116   34,3611   03204 1                    DCDU
 1861   REF   2  LAST  129   34,3612   03715 1                    SAVEVEL     DV = VL - VC
 1862                        34,3613   57456 1            UNIT    VCOMP       V(MPAC)=-UNITDV.VAC36D=ABSDV.
 1863                        34,3614   74235 0            VXV     VXSC        (-UNITDV)CROSS(UNITLOS).
 1864   REF   2  LAST  129   34,3615   03707 1                    SAVEPOS
 1865   REF   1              34,3616   16646 1                    RVCS/RDS    (UNITLOS B1)(UNITDV B1)(CONST B4)=CROSS.
 1866                        34,3617   60325 0            PDDL    NORM
 1867   REF   5  LAST  598   34,3620   02307 1                    R63TIME     R63TIME IS TEMP STORE FOR ABS(LOS)
 1868   REF  10  LAST  581   34,3621   00047 1                    X1
 1869                        34,3622   60325 0            PDDL    NORM
 1870                        34,3623   00045 0                    36D         NORM ABS VALUE OF DV(NUM).
 1871   REF   8  LAST  590   34,3624   00051 0                    S1
A1872
 1873                        34,3625   70460 1            XSU,1   SR1         X1 = X1(N DENOM)-S1(N NUM).
 1874   REF   9  LAST  598   34,3626   00050 1                    S1          SR1 TO AVOID OFLOW ON DDV.
 1875                        34,3627   74271 0            DDV     VXSC        ABSDV(MPAC)/ABSLOS(PUSH1) = QUOT.
 1876                        34,3630   53721 0            MXV     VSL*
 1877   REF  16  LAST  576   34,3631   01734 0                    REFSMMAT
 1878                        34,3632   20163 1                    0 -14D,1    UNNORMALIZE,ADJUST FOR REF. AND SCALE B0
 1879                        34,3633   53214 0            BON     VAD
 1880   REF   4  LAST  554   34,3634   05707 1                    AZIMFLAG
 1881                        34,3635   71637 0                    +2
 1882   REF   7  LAST  597   34,3636   03212 0                    DTHETASM    SCALED B0
 1883                        34,3637   00025 0            STORE   20D
 1884                        34,3640   77761 1            VXSC
 1885   REF   1              34,3641   16650 0                    1ENTH
 1886   REF   8  LAST  598   34,3642   37212 1            STCALL  DTHETASM    STORE SM INCREM. ANGLES FOR SMCDURES
 1887   REF   3  LAST  545   34,3643   47530 1                    CDUTRIG     OBTAIN SIN,COSCDUS FOR SMCDURES.
 1888                        34,3644   45001 1            SETPD   CALL        SMCDURES USES PUSH
 1889                        34,3645   00001 0                    0
 1890   REF   1              34,3646   47743 1                    SMCDURES    OBTAIN DELCDU IN V(DCDU).
 1891                        34,3647   70575 1            VLOAD   VSR2
 1892   REF   4  LAST  598   34,3650   03204 1                    DCDU
 1893                        34,3651   34017 0            STCALL  14D
 1894   REF   4  LAST  598   34,3652   47530 1                    CDUTRIG
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1895                                34,3653  45175 0                VLOAD  CALL          LOAD VECTOR AND CALL TRANSFORMATION
1896                                34,3654  00025 0                       2D            VECTOR FOR TRG*SMNB INTO MPAC
1897  REF   2 LAST  298            34,3655  47633 1                       *SMNB*        OBTAIN ANG. RATE REFERRED TO NB (BODY)
1898                                34,3656  77721 0                MXV
1899  REF   1                      34,3657  16652 1                       MBODYTCTL     CONVERT RATE(OMEGA) TO CONTROL COORDS.
1900                                34,3660  76561 1                VXSC   VSL1          MULT. BY 0.8 TO RESCALE REVS TO 450 DEG.
1901  REF   1                      34,3661  15272 1                       POINT8
A1902
1903                                34,3662  77776 1  CRS61.2A      EXIT
1904                                34,3663  0 0004 0               INHINT
1905  REF   5 LAST  596            34,3664  4 0107 0               CS     FLGWRD11
1906  REF   4 LAST  596            34,3665  7 4761 1               MASK   AZIMBIT
1907  REF 160 LAST  597            34,3666  10 000 0               CCS    A
1908  REF   1                      34,3667  0 3710 1               TC     THTDXYZ       AZIMFLAG NOT SET,USE THETADX,Y,Z

19085 REF  28 LAST  596            34,3670  3 4767 0               CAF    TWO           AZIMFLAG SET, MODIFY DELCDUS
1909  REF   9 LAST  598            34,3671  55'611 1  DCDULOOP     TS     DTHETASM
19095                               34,3672  6 0000 1               DOUBLE
1910  REF   8 LAST  548            34,3673  6 0120 1               AD     FIXLOC
19105 REF  10 LAST  599            34,3674  55'612 1               TS     DTHETASM +1
1911  REF  11 LAST  599            34,3675  51'611 0               INDEX  DTHETASM
19115 REF  16 LAST  596            34,3676  3 1307 1               CA     THETAD
1912                                34,3677  0 0006 1               EXTEND
19125 REF  12 LAST  599            34,3700  5 1611 0               INDEX  DTHETASM
1913  REF   9 LAST  596            34,3701  21'572 1               MSU    THETADX
19135                               34,3702  0 0006 1               EXTEND
1914  REF   1                      34,3703  7 3755 1               MP     1/200
19145 REF  13 LAST  599            34,3704  51'612 0               INDEX  DTHETASM +1
1915                                34,3705  20 017 0               DAS    14D
19155 REF  14 LAST  599            34,3706  11'611 1               CCS    DTHETASM
19158 REF   1                      34,3707  1 3671 0               TCF    DCDULOOP
1916  REF  10 LAST  599            34,3710  3 1572 0  THTDXYZ      CA     THETADX
1917  REF   7 LAST  595            34,3711  55'646 0               TS     CDUXD
1918  REF   8 LAST  596            34,3712  3 1573 1               CA     THETADY
1919  REF   4 LAST  423            34,3713  55'650 1               TS     CDUYD
1920  REF   8 LAST  596            34,3714  3 1574 0               CA     THETADZ
1921  REF   4 LAST  423            34,3715  55'652 0               TS     CDUZD
A1922
1923                                34,3716  0 0006 1  THTD123      EXTEND               TRANSFER OMEGA CONTROL (ANG LOS RATE)
1924  REF 252 LAST  596            34,3717  3 0155 0               DCA    MPAC          FROM V(MPAC) TO V(WBODY ).
1925  REF  11 LAST  422            34,3720  53'526 0               DXCH   WBODY
1926                                34,3721  0 0006 1               EXTEND
1927  REF 253 LAST  599            34,3722  3 0160 0               DCA    MPAC +3
1928  REF   5 LAST  422            34,3723  53'530 1               DXCH   WBODY1
1929                                34,3724  0 0006 1               EXTEND
1930  REF 254 LAST  599            34,3725  3 0162 1               DCA    MPAC +5
1931  REF   5 LAST  422            34,3726  53'532 0               DXCH   WBODY2
A1932
1933                                34,3727  0 0006 1               EXTEND               TRANSFER CDU INCREMENTS
1934  REF   9 LAST  599            34,3730  5 0120 1               INDEX  FIXLOC        FROM V(VAC14D) TO V(DELCDUX).
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1935                                  34,3731  3 0017 1                 DCA     14D
1936  REF   5  LAST  422               34,3732  53'576 0                 DXCH    DELCDUX
1937                                  34,3733  0 0006 1                 EXTEND
1938  REF  10  LAST  599               34,3734  5 0120 1                 INDEX   FIXLOC
1939                                  34,3735  3 0021 1                 DCA     16D
1940  REF   4  LAST  422               34,3736  53'600 1                 DXCH    DELCDUY
1941                                  34,3737  0 0006 1                 EXTEND
1942  REF  11  LAST  600               34,3740  5 0120 1                 INDEX   FIXLOC
1943                                  34,3741  3 0023 0                 DCA     18D
1944  REF   4  LAST  422               34,3742  53'602 0                 DXCH    DELCDUZ
1945  REF  65  LAST  585               34,3743  4 4770 1                 CS      ONE             NOW DAP VARIABLES LOADED. SET HOLDFLAG.
1946  REF   8  LAST  596               34,3744  55'340 0                 TS      HOLDFLAG        TO -1.
1947                                  34,3745  0 0003 1                 RELINT
1948  REF   4  LAST  598               34,3746  0 3560 1                 TC      ASET
A1949
19491                                 34,3747  43234 0  RCYCLR61 RTB     DAD
19492 REF  18  LAST  595              34,3750  51751 0                  LOADTIME
19493 REF   1                         34,3751  33574 1                  20.48SEC
19494                                 34,3752  52015 1          DAD     GOTO
19495 REF   6  LAST  420              34,3753  03317 1                  TM
19496 REF   1                         34,3754  71437 1                  STORT
19497 REF   1                         35,3573           20.48SEC EQUALS 1RTEB17
19498                                 34,3755  00122 0  1/200    DEC     .005
1950  REF   1                         35,2000                   SETLOC  P20S8
1951                                  35,3160                   BANK

19515 REF   1                                                   COUNT*  $$/CRS61
1952                                  35,3160  00022 1  328NM   2DEC    606844.84 B-29  327.67 N.M.
1952                                  35,3161  20476 0
1953                                  35,3162  77775 1  UTSTAR1 VLOAD                  STAR, N88 PATH SET WCA, DELTA GA =  0
1954  REF  20  LAST  597              35,3163  15336 0                  ZEROVECS
1955                                  35,3164  34017 0          STCALL  14D             DELTA GA AT PDIJ  (INCR GIMB CHANGES)
1956  REF   1                         35,3165  71662 0                  CRS61.2A        WCA IS IN MPAC (LOS RATE). SET RCS DAP

1957                                  35,3166  52135 1  MANUEXIT SLOAD  GOTO
1958  REF   1                         35,3167  16674 0                  LCONE           OCTAL 00001
1959  REF   4  LAST  597              35,3170  03704 1                  Q611
A1960
1961                                  35,3171  71220 1  R63      STQ     DLOAD           SUBR TO CALL DESIRED CDUS(T)
1962  REF   2  LAST  129              35,3172  03705 0                  Q6111
1963  REF   6  LAST  598              35,3173  02307 1                  R63TIME
1964  REF  19  LAST  588              35,3174  34041 0          STCALL  TDEC1
1965  REF   4  LAST  561              35,3175  27170 1                  CSMCONIC
1966                                  35,3176  77775 1          VLOAD                   SAVE CSM POSITION AND VEL
1967  REF  15  LAST  561              35,3177  00001 0                  RATT            RC B-29
1968  REF   3  LAST  598              35,3200  27707 1          STOVL   SAVEPOS
1969  REF  13  LAST  561              35,3201  00007 0                  VATT            VC B-7
1970  REF   3  LAST  598              35,3202  03715 1          STORE   SAVEVEL
1971                                  35,3203  77635 1          VXV
1972  REF   4  LAST  600              35,3204  03707 1                  SAVEPOS
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1973  REF   6  LAST  597   35,3205  03357 0            STORE   POINTVSM        SAVE VXR
1974                       35,3206  71214 0            BON     DLOAD
1975  REF  10  LAST  598   35,3207  04306 0                    UTFLAG
1976  REF   1              35,3210  76425 0                    UTAREA1         UT OPTION 1 PROCESSING
1977  REF   7  LAST  600   35,3211  02307 1                    R63TIME         NORMAL P-20 PATH
1978  REF  20  LAST  600   35,3212  34041 0            STCALL  TDEC1
1979  REF   3  LAST  505   35,3213  27202 1                    LEMCONIC
1980                       35,3214  77775 1            VLOAD                   SAVE LM VEL
1981  REF  14  LAST  600   35,3215  00007 0                    VATT            VL B-7
1982  REF   5  LAST  598   35,3216  27204 1            STOVL   DCDU
1983  REF  16  LAST  600   35,3217  00001 0                    RATT            RL B-29
1984                       35,3220  53451 1            VSU     UNIT
1985  REF   5  LAST  600   35,3221  03707 1                    SAVEPOS
1986  REF   6  LAST  601   35,3222  17707 1            STODL   SAVEPOS         SAVE UNITLOS FOR CRS61.2 RATE CALC.
1987                       35,3223  00045 0                    36D
1988  REF   8  LAST  601   35,3224  26307 1            STOVL   R63TIME         SAVE ABS VAL OF LOS FOR CRS61.2
1989  REF   7  LAST  601   35,3225  03707 1                    SAVEPOS
1990                       35,3226  77614 1  R63COM1   BON
1991  REF   5  LAST  598   35,3227  05707 1                    AZIMFLAG
1992  REF   1              35,3230  76462 0                    UTOPT45         OPTIONS 4,5
1993                       35,3231  76521 0            MXV     VSL1            COMMON PATH NORMAL P20,OPTION 1
1994  REF  17  LAST  598   35,3232  01734 0                    REFSMMAT
1995  REF   7  LAST  601   35,3233  37357 1            STCALL  POINTVSM        ULOS IN STABLE MEM
1996  REF   2  LAST  557   35,3234  74437 1                    UTPREAX         COMPUTE UNIT PREFERRED VECTOR
1997  REF  13  LAST  596   35,3235  37351 1            STCALL  SCAXIS
1998  REF   3  LAST  394   35,3236  56225 1                    VECPOINT
1999  REF  17  LAST  599   35,3237  01310 1            STORE   THETAD          DESIRED GIMBALS
2000                       35,3240  77650 1            GOTO
2001  REF   3  LAST  600   35,3241  03705 0                    Q6111

2002  REF   3  LAST  567   37,2000                     SETLOC  P20S
2003                       37,2425                     BANK

20035 REF   1                                          COUNT*  $$/CRS61
2004                       37,2425  45145 0  UTAREA1   DLOAD   CALL            UT OPTION 1 PATH
2005  REF   9  LAST  601   37,2426  02307 1                    R63TIME
2006  REF   1              37,2427  54136 1                    LSPOS
2007                       37,2430  00017 1            STORE   14D             RM B-29
2008                       37,2431  52214 1            BON     VSU
2009  REF  12  LAST  590   37,2432  04303 0                    CMOONFLG
2010  REF   1              37,2433  76445 0                    UTMNCNTR
2011  REF   8  LAST  601   37,2434  03707 1                    SAVEPOS         RC B-29
2012                       37,2435  77656 1            UNIT
2013  REF  14  LAST  601   37,2436  27351 0            STOVL   SCAXIS          VMOON = UNIT(RM-RC)
2014  REF   9  LAST  601   37,2437  03707 1                    SAVEPOS
2015                       37,2440  57456 1            UNIT    VCOMP
2016                       37,2441  24011 1            STOVL   8D              VEARTH=-UNIT(RC)
2017                       37,2442  00003 1                    2D              RS B-38
2018                       37,2443  52056 0            UNIT    GOTO
2019  REF   1              37,2444  76460 1                    SAVEVSUN        VSUN = UNIT(RS)
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2020                                37,2445  53455 0  LTMNCNTR VAD     UNIT                MOON PATH
2021  REF  10  LAST  601           37,2446  03707 1           SAVEPOS
2022                                37,2447  77676 0           VCOMP
2023                                37,2450  24011 1           STOVL    8D                  VEARTH = -UNIT(RM+RC)
2024  REF  11  LAST  602           37,2451  03707 1           SAVEPOS
2025                                37,2452  57456 1           UNIT     VCOMP
2026  REF  15  LAST  601           37,2453  27351 0           STOVL    SCAXIS              VMOON = -UNIT(RC)
2027                                37,2454  00017 1           14D                          RM B-29
2028                                37,2455  74402 1           VSR8     VSR1                SCALE RM B-38
2029                                37,2456  53445 1           BVSU     UNIT                VSUN = UNIT(RS-RM)
2030                                37,2457  00003 1           2D
2031                                37,2460  34003 0  SAVEVSUN STCALL   2D
2032  REF  1                        37,2461  32000 0           SAVESTAR

2033  REF  1                        15,2000                    SETLOC   STARTAB
2034                                15,2000                    BANK

20345 REF  1                                                   COUNT*   $$/CRS61
2035                                15,2000  47201 1  SAVESTAR SETPD    VXV
2036                                15,2001  00001 0           0D
2037  REF  1                        15,2002  34644 0           ECLIPOL
2038  REF  2  LAST  121             15,2003  27452 1           STOVL    VEL/C
2039  REF  4  LAST  600             15,2004  03715 1           SAVEVEL
2040                                15,2005  53361 0           VXSC     VAD
2041  REF  1                        15,2006  34642 0           1/C
2042  REF  3  LAST  602             15,2007  03452 1           VEL/C
2043  REF  4  LAST  602             15,2010  27452 1           STOVL    VEL/C
2044  REF  4  LAST  565             15,2011  11762 1           ZEROVEC
2045  REF  6  LAST  601             15,2012  27204 1           STOVL    DCDU                VL=0  FOR STAR AND PLANET
2046  REF  12  LAST  602            15,2013  03707 1           SAVEPOS
2047                                15,2014  53476 1           VCOMP    UNIT
2048  REF  13  LAST  602            15,2015  17707 1           STODL    SAVEPOS             UNIT(0-RC)  FOR PLANET
2049                                15,2016  00045 0           36D
2050  REF  10  LAST  601            15,2017  02307 1           STORE    R63TIME             ABS(0-RC) FOR PLANET
2051                                15,2020  41535 1           SLOAD    PUSH                PDC = STARCODE
2052  REF  2  LAST  556             15,2021  01356 0           UTSTARNO                     STARCODE
2053                                15,2022  67254 0           BZE      SLOAD
2054  REF  1                        15,2023  73257 0           UTVIAN88                     UNITLOS WAS VIA N88
2055  REF  1                        15,2024  32050 0           UTSP46
2056                                15,2025  77621 1           BDSU                         STARCODE-46(OCTAL)
2057                                15,2026  77244 0           BPL      VLOAD               BRANCH IF STARCODE=46,47,50 OCTAL
2058  REF  1                        15,2027  73242 1           UTST4650
2059  REF  5  LAST  602             15,2030  11762 1           ZEROVEC
2060  REF  5  LAST  602             15,2031  17715 1           STODL    SAVEVEL             VC=0 FOR STAR
2061  REF  6  LAST  602             15,2032  11762 1           ZEROVEC
2062  REF  11  LAST  602            15,2033  02307 1           STORE    R63TIME             STAR INDICATOR USED LATER IN CRS61.2
2063                                15,2034  41335 1           SLOAD    DMP
2064  REF  1                        15,2035  32047 0           UTSP6
2065                                15,2036  00001 0           0D                           0D STILL = STARCODE
2066                                15,2037  76750 1  LXA,1    VLOAD*
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2067   REF 255  LAST  599   15,2040   00155 0                  MPAC +1          STARCODE*6
2068   REF   1               15,2041   33776 1                  CATLOG,1         MPAC= UNIT STAR VECTOR
2069                         15,2042   53455 0  UTABERR  VAD    UNIT             CORRECT FOR ABERRATION
2070   REF   5  LAST  602    15,2043   03452 1                  VEL/C
2071                         15,2044   77650 1          GOTO                     GOTO COMMON AREA
2072   REF   1               15,2045   73226 0                  R63COM1

2073                         15,2046   00006 1  UTSP6   OCT     6                SINGLE PRE 6 FOR MULT STARCODE
2074                         15,2047   00046 0  UTSP46  OCT     46               SINGLE PRE 46 FOR DETERMINING PLANET

2075   REF   2  LAST  600    35,2000                   SETLOC  P20S8
2076                         35,3242                   BANK

20765  REF   2 LAST  600 TO  601:    50    50*         COUNT*  $$/CRS61
2077                         35,3242   70454 0  UTST4650 BZE     SR1              SUN,EARTH,MOON  OR PLANET PATH
2078   REF   1               35,3243   73251 0                  UTSUN            STARCODE=46 OCTAL (SUN)
2079                         35,3244   77230 0          BHIZ    VLOAD
2080   REF   1               35,3245   73254 0                  UTEARTH          STARCODE=47 OCTAL (EARTH)
2081   REF  16  LAST  602    35,3246   03351 0                  SCAXIS           VMOON     STARCODE= 50 OCTAL
2082                         35,3247   77650 1          GOTO
2083   REF   1               35,3250   32042 0                  UTABERR

2084                         35,3251   52175 0  UTSUN    VLOAD   GOTO
2085                         35,3252   00003 1                  2D               VSUN
2086   REF   2  LAST  603    35,3253   32042 0                  UTABERR

2087                         35,3254   52175 0  UTEARTH  VLOAD   GOTO
2088                         35,3255   00011 1                  8D               VEARTH
2089   REF   3  LAST  603    35,3256   32042 0                  UTABERR

2090                         35,3257   77775 1  UTVIAN88 VLOAD                   UNITLOS IN STARSAV3 VIA N88
2091   REF  21  LAST  600    35,3260   15336 0                  ZEROVECS
2092   REF   6  LAST  602    35,3261   17715 1          STODL   SAVEVEL          VC = 0 FOR N88 VECTOR
2093   REF  22  LAST  603    35,3262   15336 0                  ZEROVECS
2094   REF  12  LAST  602    35,3263   26307 1          STOVL   R63TIME          STAR INDICATOR USED LATER IN CRS61.2
2095   REF   3  LAST  556    35,3264   03732 1                  PLANVCOT         N88 UNIT VECTOR BAS REF
2096                         35,3265   53561 0          VXSC    UNIT
2097   REF   1               35,3266   33272 0                  1/SQRT3
2098                         35,3267   77650 1          GOTO
2099   REF   4  LAST  603    35,3270   32042 0                  UTABERR

2100                         35,3271   22363 1  1/SQRT3  2DEC    .57735021        1/SQUARE ROOT 3  B-0
2100                         35,3272   11623 0

2101   REF   4  LAST  601    37,2000                   SETLOC  P20S
2102                         37,2462                   BANK

21025  REF   2 LAST  601 TO  602:    29    29*         COUNT*  $$/CRS61
2103   REF   1               23,3526             UT166 EQUALS  .166...
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```
2104                        0000            UTSAP   =       CD          SA PRIME
2105                        0006            UTSBP   =       6D          SB PRIME
2106                        0022            UTSA    =       18D         SA
2107                        0030            UTSB    =       24D         SB
2108                        0000            UTUXP   =       CD          UX PRIME
2109                        0006            UTUYP   =       6D          UY PRIME
2110                        0014            UTUZP   =       12D         UZ PRIME
2111                        0022            UTUX    =       18D         UX
2112                        0030            UTUY    =       24D         UY
2113                        0036            UTUZ    =       30D         UZ
A2114                                       UTX     =       SCAXIS      X
A2115                                       UTY     =       POINTVSM    Y
2116                        0000            UTZ     =       CD          Z AFTER UNIT
2117                        0044            UTZINIT =       36D         Z BEFORE UNIT
2118                        0006            UTAMG   =       6D          AMG
2119                        0030            UTOGA   =       24D         OGA REVS B-0
2120  REF   1               0032            UTIGA   =       UTOGA +2    IGA REVS B-0
2121  REF   2 LAST  604     0034            UTMGA   =       UTOGA +4    MGA REVS B-0

2122  REF   1               37,2462 34031 1 UTOPT45 STCALL  UTSB        SB=  ULOS BASIC REF. IN MPAC B-1
2123  REF   3 LAST  601     37,2463 74437 1                 UTPRFAX
2124  REF   1               37,2464 00007 0         STORE   UTSBP       SB PRIME NAV BASE B-1

2125                        37,2465 53435 0         VXV     UNIT
2126  REF   2 LAST   34     37,2466 15332 1                 UNITY
2127  REF   1               37,2467 24001 0         STOVL   UTSAP       SA PRIME=(SB PRIME)X(0,1,0) B-1 NAV B
2128  REF   2 LAST  604     37,2470 00031 0                 UTSB
2129                        37,2471 53435 0         VXV     UNIT
2130  REF   8 LAST  601     37,2472 03357 0                 POINTVSM    VXR   SAVED ABOVE
2131  REF   9 LAST  604     37,2473 17357 0         STODL   POINTVSM    ULOS X (VXR) B-1
2132  REF   4 LAST  553     37,2474 01353 0                 AZIMANGL
2133                        37,2475 74346 0         COS     VXSC
2134  REF  10 LAST  604     37,2476 03357 0                 POINTVSM
2135  REF  17 LAST  603     37,2477 27351 0         STOVL   SCAXIS      B-2
2136  REF   3 LAST  604     37,2500 00031 0                 UTSB
2137                        37,2501 53435 0         VXV     UNIT
2138  REF  11 LAST  604     37,2502 03357 0                 POINTVSM
2139  REF  12 LAST  604     37,2503 17357 0         STODL   POINTVSM    ULOS X (ULOS X (VXR)) B-1
2140  REF   5 LAST  604     37,2504 01353 0                 AZIMANGL
2141                        37,2505 74356 1         SIN     VXSC        B-2
2142  REF  13 LAST  604     37,2506 03357 0                 POINTVSM
2143                        37,2507 76455 1         VAD     VSL1
2144  REF  18 LAST  604     37,2510 03351 0                 SCAXIS
2145  REF   1               37,2511 24023 0         STOVL   UTSA        SA B-1
2146  REF   2 LAST  604     37,2512 00001 0                 UTSAP                       START AXISGEN
2147                        37,2513 53435 0         VXV     UNIT        UX PRIME ALREADY IN UTUXP B-1
2148  REF   2 LAST  604     37,2514 00007 0                 UTSBP       UX       ALREADY IN UTUX  B-1
2149  REF   1               37,2515 24007 0         STOVL   UTUYP       UY PRIME B-1
2150  REF   1               37,2516 00001 0                 UTUXP
2151                        37,2517 76435 1         VXV     VSL1
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2152   REF  2 LAST  604   37,2520  00007 0                UTUYP
2153   REF  1             37,2521  24015 0          STOVL UTUZP          UZ PRIME B-1
2154   REF  2 LAST  604   37,2522  00023 0                UTSA
2155                      37,2523  53435 0          VXV   UNIT
2156   REF  4 LAST  604   37,2524  00031 0                UTSB
2157   REF  1             37,2525  24031 0          STOVL UTUY           UY B-1
2158   REF  1             37,2526  00023 0                UTUX
2159                      37,2527  76435 1          VXV   VSL1
2160   REF  2 LAST  605   37,2530  00031 0                UTUY
2161   REF  1             37,2531  24037 0          STOVL UTUZ           UZ B-1
2162   REF  2 LAST  605   37,2532  00023 0                UTUX
2163                      37,2533  77761 1          VXSC
2164   REF  2 LAST  604   37,2534  00001 0                UTUXP
2165   REF  1             37,2535  37351 1          STCALL UTX
2166   REF  1             37,2536  73273 0                UTOPT45A

2167   REF  3 LAST  603   35,2000                   SETLOC P20S8
2168                      35,3273                   BANK

21685  REF  3 LAST  603 TO  603:     25     75*     COUNT* $$/CRS61
2169                      35,3273  77775 1 UTOPT45A VLOAD
2170   REF  3 LAST  605   35,3274  00031 0                UTUY
2171                      35,3275  53361 0          VXSC  VAD
2172   REF  3 LAST  605   35,3276  00007 0                UTUYP
2173   REF  2 LAST  605   35,3277  03351 0                UTX
2174   REF  3 LAST  605   35,3300  27351 0          STOVL UTX
2175   REF  2 LAST  605   35,3301  00037 0                UTUZ
2176                      35,3302  53361 0          VXSC  VAD
2177   REF  2 LAST  605   35,3303  00015 0                UTUZP
2178   REF  4 LAST  605   35,3304  03351 0                UTX
2179   REF  5 LAST  605   35,3305  27351 0          STOVL UTX            UX NOT UNIT YET
2180   REF  3 LAST  605   35,3306  00023 0                UTUX
2181                      35,3307  77761 1          VXSC
2182   REF  3 LAST  605   35,3310  00003 1                UTUXP +2
2183   REF  1             35,3311  27357 0          STOVL UTY
2184   REF  4 LAST  605   35,3312  00031 0                UTUY
2185                      35,3313  53361 0          VXSC  VAD
2186   REF  4 LAST  605   35,3314  00011 1                UTUYP +2
2187   REF  2 LAST  605   35,3315  03357 0                UTY
2188   REF  3 LAST  605   35,3316  27357 0          STOVL UTY
2189   REF  3 LAST  605   35,3317  00037 0                UTUZ
2190                      35,3320  53361 0          VXSC  VAD
2191   REF  3 LAST  605   35,3321  00017 1                UTUZP +2
2192   REF  4 LAST  605   35,3322  03357 0                UTY
2193   REF  5 LAST  605   35,3323  27357 0          STOVL UTY            UY NOT UNIT YET
2194   REF  4 LAST  605   35,3324  00023 0                UTUX
2195                      35,3325  77761 1          VXSC
2196   REF  4 LAST  605   35,3326  00005 1                UTUXP +4
2197   REF  1             35,3327  24045 0          STOVL UTZINIT
2198   REF  5 LAST  605   35,3330  00031 0                UTUY
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2199                          35,3331  53361 0   VXSC    VAD
2200  REF   5  LAST  605      35,3332  00013 0             UTUYP +4
2201  REF   2  LAST  605      35,3333  00045 0             UTZINIT
2202  REF   3  LAST  606      35,3334  24045 0   STOVL     UTZINIT
2203  REF   4  LAST  605      35,3335  00037 0             UTUZ
2204                          35,3336  53361 0   VXSC      VAD
2205  REF   4  LAST  605      35,3337  00021 1             UTUZP +4
2206  REF   4  LAST  606      35,3340  00045 0             UTZINIT
2207                          35,3341  77656 1   UNIT                  UTUZ AND UTZINIT ARE CLOBBERED BY UNIT
2208  REF   1                 35,3342  24001 0   STOVL     UTZ         UZ B-1
2209  REF   6  LAST  605      35,3343  03357 0             UTY
2210                          35,3344  77656 1   UNIT
2211  REF   7  LAST  606      35,3345  27357 0   STOVL     UTY         UY B-1
2212  REF   6  LAST  605      35,3346  03351 0             UTX
2213                          35,3347  77656 1   UNIT
2214  REF   7  LAST  606      35,3350  03351 0   STORE     UTX         UX B-1    END AXISGEN
2215                          35,3351  53435 0   VXV       UNIT                  STATR CALCGA
2216  REF  18  LAST  601      35,3352  01742 1             REFSMMAT +6 YSM
2217  REF   1                 35,3353  00007 0   STORE     UTAMG       AMG B-1
2218                          35,3354  77641 1   DOT
2219  REF   2  LAST  606      35,3355  00001 0             UTZ
2220  REF   2  LAST  299      35,3356  24021 1   STOVL     COSTH       COS(OGA)= AMG.ZNB B-2
2221  REF   2  LAST  606      35,3357  00007 0             UTAMG
2222                          35,3360  77641 1   DOT
2223  REF   8  LAST  606      35,3361  03357 0             UTY
2224  REF   2  LAST  299      35,3362  34023 1   STCALL    SINTH       SIN(OGA)= AMG.YNB B-2
2225  REF   2  LAST  299      35,3363  47311 1             ARCTRIG
2226  REF   3  LAST  604      35,3364  24031 0   STOVL     UTOGA       OGA REVS B-0
2227  REF   3  LAST  606      35,3365  00007 0             UTAMG
2228                          35,3366  50235 0   VXV       DOT
2229  REF   8  LAST  606      35,3367  03351 0             UTX
2230  REF  19  LAST  606      35,3370  01742 1             REFSMMAT +6
2231                          35,3371  77752 1   SL1
2232  REF   3  LAST  606      35,3372  24021 1   STOVL     COSTH       COS(MGA)= YSM.(AMG X XNB) B-2
2233  REF  20  LAST  606      35,3373  01742 1             REFSMMAT +6
2234                          35,3374  77641 1   DOT
2235  REF   9  LAST  606      35,3375  03351 0             UTX
2236  REF   3  LAST  606      35,3376  34023 1   STCALL    SINTH       SIN(MGA)= YSM.XNB B-2
2237  REF   3  LAST  606      35,3377  47311 1             ARCTRIG
2238  REF   1                 35,3400  00035 1   STORE     UTMGA       MGA REVS B-0
2239                          35,3401  45246 0   ABS       DSU
2240  REF   1                 35,3402  07527 0             UT166
2241                          35,3403  77644 1   BPL
2242  REF   1                 35,3404  73425 0             UTGMLOCK
2243                          35,3405  50375 0 UTCGA1 VLOAD  DOT
2244  REF  21  LAST  606      35,3406  01750 1             REFSMMAT +12D
2245  REF   4  LAST  606      35,3407  00007 0             UTAMG
2246  REF   4  LAST  606      35,3410  24021 1   STOVL     COSTH       COS(IGA)= AMG.ZSM B-2
2247  REF  22  LAST  606      35,3411  01734 0             REFSMMAT
2248                          35,3412  77641 1   DOT
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2249   REF   5  LAST  606   35,3413   00007 0                    UTAMG
2250   REF   4  LAST  606   35,3414   34023 1            STCALL  SINTH     SIN(IGA)= AMG.XSM B-2
2251   REF   4  LAST  606   35,3415   47311 1                    ARCTRIG
2252   REF   1              35,3416   00033 1            STORE   UTIGA     IGA REVS B-0
2253                        35,3417   47175 1            VLOAD   RTB
2254   REF   4  LAST  606   35,3420   00031 0                    UTOGA     CONVERT TO 2S COMP
2255   REF   5  LAST  545   35,3421   45644 0                    V1STO2S   ORDER IS OGA,IGA,MGA
2256   REF  18  LAST  601   35,3422   01310 1            STORE   THETAD    TRIPLE PREC
2257                        35,3423   77650 1            GOTO
2258   REF   4  LAST  601   35,3424   03705 0                    Q6111     EXIT R63

2259                        35,3425   77776 1  UTGMLOCK  EXIT               GIMBAL LOCK HAS OCCURED
2260   REF  22  LAST  467   35,3426   0 5671 1           TC      ALARM
2261                        35,3427   00401 1            OCT     00401

2262   REF 105  LAST  598   35,3430   0 6006 1           TC      INTPRET
2263                        35,3431   77650 1            GOTO
2264   REF   1              35,3432   73405 1                    UTCGA1

2265   REF   3  LAST  589   27,2000                      SETLOC  R22S1
2266                        27,2636                      BANK

22665  REF   1                                          COUNT*  $$/CRS61
2267                        27,2636   05057 0  RADTOREV  2DEC    0.15915494      RADIANS TO REV
2267                        27,2637   23015 1
2268                        27,2640   07702 0  COSTEN    DEC     0.98481 B-2     COSINE OF 10 DEG.
2269                        27,2641   00034 0  MAXRATE   2DEC    0.00174         .1 DEG./SEC. RATE
2269                        27,2642   20206 1
2270                        27,2643   06315 0  DELTYME   DEC     0.05 B2         1/DELTA TIME  = 1/20 SEC
2271                        27,2644   01616 1  DEGREE10  DEC     .05556          10 DEG IN REV
2272                        27,2645   37651 1  RVCS/RDS  2DEC    15.915494 B-4   100/2PI REV-CSEC/RAD-SEC.
2272                        27,2646   16721 1
2273                        27,2647   31463 1  TENTH     2DEC    .1 B+3          .1 B-3 (TO SCALE ANG.RATE TO .1 INREMS)
2273                        27,2650   06315 0
2274                        27,2651   20000 0  MBDYTCTL  2DEC    .5                              7.25 DEG NEGATIVE
2274                        27,2652   00000 1
2275                        27,2653   00000 1            2DEC    0                               X-AXIS ROTATION MATRIX
2275                        27,2654   00000 1
2276                        27,2655   00000 1            2DEC    0                               CONVERTS BODY TO CTL
2276                        27,2656   00000 1
2277                        27,2657   00000 1            2DEC    0                               AXES. SAME AS QUADROT
2277                        27,2660   00000 1
2278                        27,2661   17676 0            2DEC    .99200495 B-1   COS7.25 B1      BUT SCALED B1
2278                        27,2662   20113 0
2279                        27,2663   75766 1            2DEC    -.12619897 B-1  -SIN7.25 B1
2279                        27,2664   45544 0
2280                        27,2665   00000 1            2DEC    0
2280                        27,2666   00000 1
2281                        27,2667   02011 0            2DEC    .12619897 B-1   SIN7.25 B1
2281                        27,2670   32233 1
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2282                    27,2671   17676 0                2DEC    .99200495 B-1   COS7.25 B1
2282                    27,2672   20113 0
2283                    27,2673   00001 0   LOONE        OCT     00001           TO SET MPAC = 00001 FOR SPECIAL EXIT.
2284  REF   3 LAST 563     7673             FORST3       EQUALS  13,14,15        CONSTANT FOR AUTOCK (OCT 70000).
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P2285   ..... S22.1 ORBITAL NAVIGATION ROUTINE
R2286   MCD 1

R2287   FUNCTIONAL DESCRIPTION
R2288    1. UPDATE CSM STATE VECTOR
R2289    2. UPDATE LANDMARK POSITION
R2290    3. CONVERT W MATRIX FROM 9 TO 6 DIMENSIONS

R2291   SUBROUTINES CALLED
R2292    INITSALL,INTEGRV,GETUM,SETRE,R-TO-TP,RP-TO-R,BVECTORS,INCORP1,INCORP2
R2293    LALOTORV,S22F2410,LAT-LONG,ROWDOT

R2294   ERASABLE INITIALIZATION
R2295    W=9X9 MATRIX
R2296    ORBWFLAG=0 FOR INVALID W MATRIX,=1 FOR VALID W MATRIX
R2297    ASTRONAUT ENTRY OF KNOWN,L,OFF
R2298    8NN= NUMBER OF MARKS  DECIMAL INTEGER B-14
R2299    REFSMMAT= TRANSFORMATION MATRIX
R2300    MARKSTAT= ADDRESS OF START OF MARK DATA (MARK DATA OF EACH MARK IS
R2301              STORED AS FOLLOWS,  TIME,AIG,SA,AMG,PA,AOG) TIME IS IN DOUBLE
R2302              PRECISION,ALL OTHERS ARE IN SINGLE PRECISION
R2303    CSM STATE VECTOR

R2304   OUTPUT
R2305    UPDATED CSM STATE VECTOR
R2306    UPDATED LANDMARK POSITION
R2307    NEW 6 DIMENSIONAL W MATRIX

R2308   DEBRIS
R2309    PUSH LIST,CSMPOS,ALPHAV,ERADM,UM,RCLP,USTAR,VARIANCE,X789,BVECTOR,8KK,
R2310    S22LOC, SVMRKDAT TABLE,22SUBSCL,LANDMARK,CXOFF,S22C,LAT,LONG,ALT,
R2311    TEMPOR1,S22TOFF,S221OFF,DSPTEM1,S22EORM,S22TPRIM

 2313   REF   1              30,2000                    SETLOC P20S6
 2314                       30,2466                    BANK

 2315   REF  16  LAST  564   E7,1751                    EBANK= LANDMARK
 2316   REF   2 LAST  561 TO  565:   178   178*         COUNT* $$/P22
 2317   REF  15  LAST  565   30,2466  0 5362 0  S22.1   TC     2PHSCHNG
 2318                       30,2467   00004 0           OCT    00004
 2319                       30,2470   05022 1           OCT    05022
 2320                       30,2471   13000 0           OCT    13000
 2321   REF 106  LAST  607   30,2472  0 6006 1          TC     INTPRET
 2322                       30,2473   45001 1           SETPD  CALL
 2323                       30,2474   00001 0                  0D
 2324   REF   5  LAST  583   30,2475   56603 1                  SHIFTNDX
 2325                       30,2476   45134 0  FIG2EXIT SXA,2  CALL
 2326   REF   2  LAST  129   30,2477   03673 0                  S22EORM        SET =0 EARTH,=2 MOON FOR SHIFTING
 2327   REF   4  LAST  583   30,2500   56462 1                  SETINTG
R2328                  FLOWCHART D=0   THEN DIMOFLAG=0  D6OR9FLG NOT TESTED
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R2329 FLOWCHART D=6 THEN DIMCFLAG=1 D6OR9FLG=0
R2330 FLOWCHART D=9 THEN DIMCFLAG=1 D6OR9FLG=1

2331					30,2501	43014 0		BOFF	SETGO	
2332	REF	6	LAST	587	30,2502	01751 0			ORBWFLAG	
2333	REF	1			30,2503	60506 1			SETWW5D	BRANCH TO SET W0-W5,ORBWFLAG,D
2334	REF	7	LAST	588	30,2504	01436 1			DIMCFLAG	FLOWCHART D=6 PATH
2335	REF	1			30,2505	60513 0			SETVANDI	
2336					30,2506	71214 0	SETWW5D	CLEAR	CLOAD	
2337	REF	7	LAST	583	30,2507	02676 1			RENDWFLG	FLOWCHART D=9 PATH
2338	REF	1			30,2510	02005 0			WORBPOS	
2339					30,2511	34001 1		STCALL	0	
2340	REF	2	LAST	580	30,2512	56612 1			INITIALW	
2341					30,2513	77370 0	SETVANDI	AXT,1	VLOAD	
2342					30,2514	00022 1		DEC	18	
2343	REF	23	LAST	603	30,2515	15336 0			ZEROVECS	
2344					30,2516	77731 1		SSP		
2345	REF	10	LAST	598	30,2517	00051 0			S1	
2346					30,2520	00006 1		DEC	6	
2347	REF	14	LAST	591	30,2521	06467 1	NEXTW2W8	STORE	W +54D,1	CLEAR W2
2348	REF	15	LAST	610	30,2522	06555 1		STORE	W +108D,1	W5
2349	REF	16	LAST	610	30,2523	06577 1		STORE	W +126D,1	W6
2350	REF	17	LAST	610	30,2524	06621 1		STORE	W +144D,1	W7
2351	REF	18	LAST	610	30,2525	06643 0		STORE	W +162D,1	W8
2352					30,2526	43100 1		TIX,1	CLEAR	
2353	REF	1			30,2527	60521 1			NEXTW2W8	
2354	REF	2	LAST	581	30,2530	02666 0			DMENFLG	0=6X6W, 1=9X9W
2355					30,2531	77624 1	S22NXTIN	CALL		
2356	REF	1			30,2532	62357 1			GETTF	
2357	REF	21	LAST	601	30,2533	34041 0		STCALL	TDEC1	
2358	REF	7	LAST	584	30,2534	27236 0			INTEGRV	
2359					30,2535	45154 0		LXA,2	CALL	
2360	REF	3	LAST	609	30,2536	03673 0			S22EORM	
2361	REF	3	LAST	585	30,2537	71327 1			CMPOS	
2362					30,2540	45140 0		LXC,1	CALL	
2363	REF	3	LAST	562	30,2541	03750 0			S22LOC	SETUP ADDR. OF MARK DATA FOR GETUM SUBR.
2364	REF	2	LAST	580	30,2542	47017 1	S2GETUM		GETUM	
2365	REF	5	LAST	580	30,2543	01072 0		STORE	UM	
2366					30,2544	41535 1	DMPINTEG	SLOAD	PUSH	TEST OFF=I
2367	REF	6	LAST	564	30,2545	03746 1			BKK	
2368					30,2546	45335 0		SLOAD	DSU	
2369	REF	4	LAST	563	30,2547	03745 1			CXOFF	BEFORE SUBT.
2370					30,2550	43030 0		BHIZ	BCN	
2371	REF	1			30,2551	61042 0			S22OFF=I	BRANCH HERE IF OFF=I
2372	REF	3	LAST	610	30,2552	02706 1			DMENFLG	0=6X6W, 1=9X9W
2373	REF	1			30,2553	61050 0			S22D=9	
2374					30,2554	77624 1		CALL		
2375	REF	12	LAST	586	30,2555	22327 1			GRP2PC	
2376					30,2556	77614 1		SET		
2377	REF	7	LAST	610	30,2557	01471 1			ORBWFLAG	

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2378                          30,2560  43014 0        SET     SET
2379  REF   4  LAST  610     30,2561  02466 1                DMENFLG         =0 ON FIRST PASS THRU HERE FOR D=0,OR6
2380  REF   1                 30,2562  01062 1                22DSPFLG        =1 TO DISPLAY DR,DV ON FIRST PASS
2381                          30,2563  77614 1        BON
2382  REF   4  LAST  564     30,2564  03307 0                KNOWNFLG
2383  REF   1                 30,2565  61204 0                S22BOX22
2384                          30,2566  53575 0        VLOAD   UNIT            UNIT ALSO PUTS ABVAL(RC) IN 36D
2385  REF   4  LAST  585     30,2567  01046 1                CSMPOS
2386  REF   5  LAST  562     30,2570  36152 1        STCALL  ALPHAV          ALPHAV +4=SINL FOR SETRE
2387  REF   1                 30,2571  26654 1                SETRE           ERADM= RO METERS B-29 BOTH EARTH/MOON
2388                          30,2572  77624 1        CALL                    COMPUTE RL FROM EQUATION 2.4.10
2389  REF   1                 30,2573  61331 1                S22FZ410        STORED IN X789,MPAC  B-27,B-29
2390                          30,2574  70414 1        BOFF    VSR2            SCALE RL B-29 FOR BOTH EARTH/MOON
2391  REF  13  LAST  601     30,2575  04343 1                CMOONFLG
2392                          30,2576  60577 1                +1
2393  REF   1                 30,2577  02555 0        STORE   S22RL
2394                          30,2600  72441 0        DOT     SL1
2395  REF   6  LAST  610     30,2601  01072 0                UM
2396  REF   1                 30,2602  24037 0        STOVL   S22D            D= UM.RL B-29
2397  REF  24  LAST  610     30,2603  15336 0                ZEROVECS
2398                          30,2604  41401 1        SETPD   PUSH
2399                          30,2605  00001 0                CD
2400                          30,2606  65206 0        PUSH    PDDL            SET 0-18D = I BACKWARDS
2401  REF   5  LAST  562     30,2607  15334 1                HIDPHALF        PD I8
2402                          30,2610  77702 1                SR2             B-3
2403                          30,2611  00005 1                STORE   4D
2404                          30,2612  00011 1                STORE   8D
2405                          30,2613  24015 0                STOVL   12D
2406  REF   7  LAST  611     30,2614  01072 0                UM              B-1
2407  REF   1                 30,2615  24023 0                STOVL   S223X1
2408  REF   2  LAST  611     30,2616  02555 0                S22RL           B-29
2409                          30,2617  77624 1                CALL            (UM)(RL T) B-30 STORED IN S22UMRL THRU
2410  REF   1                 30,2620  62340 1                S2231X13        S22UMRL +17D
2411                          30,2621  66370 0                AXT,1   SSP
2412                          30,2622  00022 1                DEC     18
2413  REF  11  LAST  610     30,2623  00051 0                S1
2414                          30,2624  00006 1                DEC     6
2415                          30,2625  70573 1  S22NXTU       VLOAD*  VSR2            (UM)(RL T) B-32
2416  REF   1                 30,2626  03524 1                S22UMRL +18D,1
2417                          30,2627  77741 0                V/SC
2418  REF   2  LAST  611     30,2630  00037 0                S22D            D B-29
2419                          30,2631  45445 0                BVSU    STADR           SUBTRACT FROM I B-3
2420  REF   2  LAST  611     30,2632  70253 1                STORE   S22UMRL +18D,1  U MATRIX B-3
2421                          30,2633  76100 1                TIX,1   AXT,1           PD 0 AFTER TIX
2422  REF   1                 30,2634  60625 0                S22NXTU
2423                          30,2635  00044 1                DEC     36              S1 STILL 6 FROM ABOVE
2424                          30,2636  64373 1  S22NXTWI       VLOAD*  MXV
2425  REF  19  LAST  610     30,2637  02445 0                W +36D,1        B-19
2426  REF   3  LAST  611     30,2640  03502 0                S22UMRL         B-3
2427                          30,2641  77732 1                VSL3
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2428  REF  20  LAST  611   30,2642  06621 1            STORE   W +1440,1        W(I+18)= UW(I) B-19
2429                       30,2643  71300 1            TIX,1   DLOAD
2430  REF   1              30,2644  60636 1                    S22NXTWI
2431  REF   1              30,2645  00041 1                    S22RHO           B-28,B-30
2432                       30,2646  60414 0            BOFF    SR2              MAKE RHO B-30
2433  REF  14  LAST  611   30,2647  04343 1                    CMOONFLG
2434                       30,2650  60651 0                    +1
2435                       30,2651  57101 0            NORM    XAD,2
2436  REF   9  LAST  581   30,2652  00050 1                    X2
2437  REF  10  LAST  612   30,2653  00047 1                    X2
2438                       30,2654  41316 0            DSQ     DMP
2439  REF   1              30,2655  24024 1                    SCTVAR           B+18
2440                       30,2656  76142 1            SR1     AXT,1            ACCOUNTS FOR 1/2 IN NEXT FORMULA
2441                       30,2657  00022 1            DEC     18
2442  REF   2  LAST  612   30,2660  00041 1            STORE   S22RHO           1/2(RHO SQ)(VARSCT)
2443                       30,2661  64373 1  S22NXXA   VLOAD*  MXV
2444  REF   4  LAST  611   30,2662  03524 1                    S22UMRL +18D,1   B-3
2445  REF   5  LAST  612   30,2663  03502 0                    S22UMRL          B-3
2446                       30,2664  53761 1            VXSC    VSR*
2447  REF   3  LAST  612   30,2665  00041 1                    S22RHO
2448                       30,2666  57212 1                    0 -12D,2         WITH VARRP SCALED B-28
2449  REF   1              30,2667  05136 0            STORE   S22UUT +18D,1    1/2(RHO SQ)(VARSCT)(U)(U T)
2450                       30,2670  77300 1            TIX,1   VLOAD
2451  REF   1              30,2671  60661 0                    S22NXXA
2452  REF   8  LAST  611   30,2672  01072 0                    UM
2453  REF   2  LAST  611   30,2673  34023 1            STCALL  S223X1           UM ALSO IN MPAC FOR S2231X13 SUBR.
2454  REF   2  LAST  611   30,2674  62340 1                    S2231X13         (UM)(UM T) B-2 IN S22UMRL,P17D
2455                       30,2675  50545 0            DLOAD   SR3
2456  REF   2  LAST   93   30,2676  02240 0                    ERADM            RO B-29
2457                       30,2677  63471 0            DDV     DSQ
2458  REF   3  LAST  611   30,2700  00037 0                    S22D             B-29
2459                       30,2701  76005 0            DMP     AXT,1
2460  REF   1              30,2702  02010 1                    RPVAR            ***** METERS SQ
2461                       30,2703  00022 1            DEC     18
2462  REF   4  LAST  612   30,2704  00041 1            STORE   S22RHO           TEMP (VARRP)(RO/D)
2463                       30,2705  74373 0  S22NXXB   VLOAD*  VXSC
2464  REF   6  LAST  612   30,2706  03524 1                    S22UMRL +18D,1   (UM)(UM T) B-2
2465  REF   5  LAST  612   30,2707  00041 1                    S22RHO
2466                       30,2710  77653 1            VAD*
2467  REF   2  LAST  612   30,2711  01136 1                    S22UUT +18D,1
2468  REF   3  LAST  612   30,2712  05136 0            STORE   S22UUT +18D,1    SMALL E MATRIX
2469                       30,2713  40100 1            TIX,1   BDV
2470  REF   1              30,2714  60705 0                    S22NXXB
2471                       30,2715  60716 1                    +1
2472                       30,2716  50145 1            DLOAD   BMN
2473  REF   4  LAST  612   30,2717  01134 0                    S22UUT +16D      E5
2474  REF   1              30,2720  60741 0                    S22W76X
2475                       30,2721  53166 0            SQRT    BZE
2476  REF   2  LAST  612   30,2722  60741 0                    S22W76X
2477                       30,2723  77742 0            SR1                      B-19
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2478  REF  21  LAST  612  30,2724  16625 1          STODL  W +148D          W74= SQ ROOT E5
2479  REF   5  LAST  612  30,2725  01132 0                 S22UUT +14D      E4
2480                      30,2726  40071 0          DDV    BOV
2481  REF  22  LAST  613  30,2727  02625 1                 W +148D
2482  REF   1              30,2730  60733 0                 S22W72X
2483                      30,2731  77702 1          SR2                     B-19
2484  REF  23  LAST  613  30,2732  02623 1          STORE  W +146D          W73= E4/W74
2485                      30,2733  56345 0  S22W72X DLOAD  DDV
2486  REF   6  LAST  613  30,2734  01130 1                 S22UUT +12D      E3
2487  REF  24  LAST  613  30,2735  02625 1                 W +148D
2488                      30,2736  40102 0          SR2    BOV              B-19
2489  REF   3  LAST  612  30,2737  60741 0                 S22W76X
2490  REF  25  LAST  613  30,2740  02621 0          STORE  W +144D          W72= E3/W74
2491                      30,2741  63545 0  S22W76X DLOAD  DSQ
2492  REF  26  LAST  613  30,2742  02623 1                 W +146D
2493                      30,2743  44312 1          SL2    BDSU
2494  REF   7  LAST  613  30,2744  01124 1                 S22UUT +8D       E2
2495                      30,2745  75440 0          BMN    SQRT
2496  REF   1              30,2746  60763 0                 S22W78X
2497                      30,2747  70454 0          BZE    SR1              B-19
2498  REF   2  LAST  613  30,2750  60763 0                 S22W78X
2499  REF  27  LAST  613  30,2751  16631 1          STODL  W +152D          W76= SQ ROOT (E2-W73 SQ)
2500  REF  28  LAST  613  30,2752  02621 0                 W +144D          W72
2501                      30,2753  62405 1          DMP    SL2
2502  REF  29  LAST  613  30,2754  02623 1                 W +146D          W73
2503                      30,2755  56221 0          BDSU   DDV
2504  REF   8  LAST  613  30,2756  01122 1                 S22UUT +6D       E1
2505  REF  30  LAST  613  30,2757  02631 1                 W +152D          W76
2506                      30,2760  60400 0          BOV    SR2              B-19
2507  REF   3  LAST  613  30,2761  60763 0                 S22W78X
2508  REF  31  LAST  613  30,2762  02627 0          STORE  W +150D          W75= (E1-W72W73)/W76
2509                      30,2763  63545 0  S22W78X DLOAD  DSQ
2510  REF  32  LAST  613  30,2764  02627 0                 W +150D
2511                      30,2765  63525 0          PDDL   DSQ
2512  REF  33  LAST  613  30,2766  02621 0                 W +144D          W72
2513                      30,2767  62415 0          DAD    SL2
2514                      30,2770  50021 1          BDSU   BMN
2515  REF   9  LAST  613  30,2771  01114 1                 S22UUT           E0
2516  REF   1              30,2772  60775 1                 S22SAVET
2517                      30,2773  70566 0          SQRT   SR1              B-19
2518  REF  34  LAST  613  30,2774  02635 0          STORE  W +156D          W78= SQ RT(E0-W72 SQ-W75 SQ)
2519                      30,2775  77624 1  S22SAVET CALL
2520  REF   2  LAST  610  30,2776  62357 1                 GETTF
2521  REF   2  LAST  129  30,2777  03672 1          STORE  S22TPRIM         SAVE PRESENT TIME FOR PIOS
2522                      30,3000  77776 1  S22I=N  EXIT                   TEST I=N
2523  REF  41  LAST  588  30,3001  0 5402 1          TC     PHASCHNG
2524                      30,3002  04022 0          OCT    04022
2525  REF   7  LAST  610  30,3003  4 1745 1          CS     8KK
2526  REF   7  LAST  276  30,3004  6 1747 1          AD     8NN
2527                      30,3005  0 0006 1         EXTEND
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2528  REF   1                  30,3006  6 3222 0            BZMF   S22F244X      EXIT TO FIGURE 2.4-4
2529  REF   8  LAST  613       30,3007  3 1745 0            CA     8KK           I=I+1
2530  REF  66  LAST  600       30,3010  6 4770 0            AD     ONE
2531  REF   6  LAST  585       30,3011  55'135 0            TS     TEMPOR1
2532  REF   4  LAST  610       30,3012  3 1750 1            CA     S22LOC        ADD 7 TO LOC TO GET ADDR. OF NEXT MARK
2533  REF  12  LAST  568       30,3013  6 4774 1            AD     SEVEN
2534  REF   7  LAST  614       30,3014  55'136 0            TS     TEMPOR1 +1
2535  REF  42  LAST  613       30,3015  0 5402 1            TC     PHASCHNG
2536                            30,3016   04022 0            OCT    04022
2537  REF   8  LAST  614       30,3017  3 1135 1            CA     TEMPOR1
2538  REF   9  LAST  614       30,3020  55'745 1            TS     8KK
2539  REF   9  LAST  614       30,3021  3 1136 1            CA     TEMPOR1 +1
2540  REF   5  LAST  614       30,3022  55'750 0            TS     S22LOC
2541  REF 107  LAST  609       30,3023  0 6006 1            TC     INTPRET
2542                            30,3024   77624 1            CALL                 FOR ALL INTEGRATIONS OTHER THAN FIRST
2543  REF   5  LAST  609       30,3025   56462 1 S2INTSI                 SETINTG
2544                            30,3026   43014 0            BOFF   SET
2545  REF   5  LAST  611       30,3027   02746 0                   DMENFLG       =0 D=0 OR 6, =1 D=9
2546  REF   1                  30,3030   61035 0                   S22D6Z
2547  REF   8  LAST  610       30,3031   01476 0                   DIM FLAG
2548                            30,3032   77614 1            SETGO                D=9 PATH
2549  REF   2  LAST  588       30,3033   01435 1                   D60R9FLG
2550  REF   1                  30,3034   60531 0                   S22NXTIN      RETURN ALWAYS EXCEPT OFFSET POINT MARK 1
2551                            30,3035   43014 0 S22D6Z     BOFF   SETGO
2552  REF   8  LAST  610       30,3036   01751 0                   ORBWFLAG
2553  REF   2  LAST  614       30,3037   60531 0                   S22NXTIN      D=0,OFFSET MARK 1,NO W INTEGRATION
2554  REF   9  LAST  614       30,3040   01436 1                   DIMOFLAG
2555  REF   3  LAST  614       30,3041   60531 0                   S22NXTIN      D=6,OFFSET MARK 1, INTEGRATE W 6X6
2556                            30,3042   77624 1 S22OFF=I   CALL
2557  REF   3  LAST  613       30,3043   62357 1                   GETTF
2558  REF   8  LAST  564       30,3044   27670 0            STOVL  S22TOFF       TIME SUB OFF
2559  REF   9  LAST  612       30,3045   01072 0                   UM
2560  REF   1                  30,3046   35054 0            STCALL S22UOFF       U SUB OFF
2561  REF   1                  30,3047   61000 0                   S22I=N        TEST I=N
2562                            30,3050   77775 1 S22D=9     VLOAD                D=9 PATH
2563  REF   1                  30,3051   01701 0                   X789
2564                            30,3052   14001 0            STODL  OD            CALL PIOS TWICE TO TRANSFORM RL TO TIME
2565  REF   3  LAST  613       30,3053   03672 1                   S22TPRIM      T(SUB F) FROM TIME T PRIME
2566                            30,3054   00007 0            STORE  6D
2567                            30,3055   45135 1            SLOAD  CALL
2568  REF   4  LAST  610       30,3056   03674 1                   S22EORM       0=EARTH,NON-ZERO=MOON
2569  REF   1                  30,3057   55370 0 S2RTRP            R-TO-RP
2570                            30,3060   45006 0            PUSH   CALL          R-TO-RP LEAVES PUSHLOC AT 0
2571  REF   4  LAST  614       30,3061   62357 1                   GETTF
2572                            30,3062   00007 0            STORE  6D
2573                            30,3063   45135 1            SLOAD  CALL
2574  REF   5  LAST  614       30,3064   03674 1                   S22EORM
2575  REF   3  LAST  562       30,3065   55345 0 S2RPTR            RP-TO-R
2576  REF   2  LAST  614       30,3066   01701 0 S22BOX32   STORE  X789
2577                            30,3067   40014 0            SET    BOV
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2578	REF	8	LAST	584	30,3070	02464	0		INCORFLG	FLAG=1
2579					30,3071	61072	0		+1	CLEAR OVERFLOW
2580					30,3072	77651	0	VSU		
2581	REF	5	LAST	611	30,3073	01046	1		CSMPOS	
2582	REF	6	LAST	584	30,3074	03531	0	STORE	RCLP	RCL=RL-RC
2583					30,3075	47256	0	UNIT	VXV	USTAR=UNIT(UNIT(RCL)XUM)
2584	REF	10	LAST	614	30,3076	01072	0		UM	
2585					30,3077	40056	0	UNIT	BOV	
2586	REF	2	LAST	613	30,3100	60775	1		S22SAVET	COMPUTATION OVERFLOW,SAVE TF
2587	REF	5	LAST	580	30,3101	01102	0	STORE	USTAR	
2588					30,3102	43345	1	S22BOX12 DLOAD	DAD	
2589	REF	2	LAST	612	30,3103	24024	1		SCTVAR	B+18
2590	REF	1			30,3104	24026	0		IMUVARR	B+18
2591	REF	8	LAST	581	30,3105	27526	0	STOVL	VARIANCE	
2592	REF	7	LAST	615	30,3106	03531	0		RCLP	B-29 OR B-27
2593					30,3107	60246	1	ABVAL	NORM	
2594	REF	11	LAST	598	30,3110	00047	1		X1	
2595					30,3111	41316	0	DSQ	DMP	
2596	REF	9	LAST	615	30,3112	03526	0		VARIANCE	
2597					30,3113	56070	0	XAD,1	XAD,1	
2598	REF	12	LAST	615	30,3114	00046	0		X1	DOUBLE NORM SHIFT SINCE RCLP WAS SQUARED
2599	REF	6	LAST	614	30,3115	03673	0		S22EORM	DOUBLE EARTH OR MOON SHIFT,SAME REASON
2600					30,3116	53670	0	XAD,1	SR*	
2601	REF	7	LAST	615	30,3117	03673	0		S22EORM	
2602					30,3120	20601	1		0,1	SCALE VARIANCE B-40 FOR BOTH EARTH,MOON
2603					30,3121	77751	1	TLOAD		CHANGE MODE TO TRIPLE
2604	REF	256	LAST	603	30,3122	00155	0		MPAC	
2605	REF	10	LAST	615	30,3123	37526	1	STCALL	VARIANCE	CALC B0,B1,DELTAQ, NEW USTAR
2606	REF	2	LAST	580	30,3124	46756	1	S2BVTRS	BVECTORS	
2607					30,3125	57575	1	VLOAD	VCOMP	
2608	REF	15	LAST	584	30,3126	03502	0		BVECTOR	
2609	REF	16	LAST	615	30,3127	37516	1	STCALL	BVECTOR +12D	B2=-B0
2610	REF	2	LAST	581	30,3130	75260	1	S2INCP1	INCORP1	
2611					30,3131	77624	1	CALL		
2612	REF	13	LAST	610	30,3132	22327	1		GRP2PC	
2613					30,3133	45014	0	BOFCLR	CALL	
2614	REF	2	LAST	611	30,3134	01242	1		22DSPFLG	=1 DISPLAY DELTA R,V =0 DO NOT
2615	REF	1			30,3135	61164	0		S22BOX42	
2616	REF	14	LAST	615	30,3136	22327	1		GRP2PC	
2617					30,3137	51575	1	VLOAD	ABVAL	
2618	REF	9	LAST	582	30,3140	01114	1		DELTAX	DELTA R
2619					30,3141	53750	0	LXA,1	SR*	
2620	REF	8	LAST	615	30,3142	03673	0		S22EORM	SCALE DELTA R ALWAYS METERS B-29
2621					30,3143	20601	1		0,1	
2622	REF	10	LAST	582	30,3144	27502	0	STOVL	N49DISP	
2623	REF	10	LAST	615	30,3145	01122	1		DELTAX +6	DELTA V
2624					30,3146	53646	0	ABVAL	SR*	DELTA V=METERS/CSEC B-7 ALWAYS
2625					30,3147	20601	1		0,1	
2626	REF	11	LAST	615	30,3150	03504	0	STORE	N49DISP +2	
2627					30,3151	77776	1	EXIT		

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2628  REF   1                  30,3152  3 5030 1            CAF     V06N49EE
2629  REF 129  LAST  589       30,3153  0 4636 0            TC      BANKCALL
2630  REF   1                  30,3154  21101 1             CADR    GOFLASHR
2631  REF  21  LAST  568       30,3155  0 4103 1            TC      GOTOPOOH        V34E TERMINATE
2632                            30,3156  0 3163 0            TC      +5              INCORPORATE CHANGES
2633  REF   1                  30,3157  0 3321 1            TC      P22OVER +1      V32E RECYCLE WITHOUT CONVERTING W
2634  REF  29  LAST  597       30,3160  3 4766 1            CAF     BIT3
2635  REF   7  LAST  568       30,3161  0 5516 0            TC      BLANKET
2636  REF  65  LAST  585       30,3162  0 5205 0            TC      ENDOFJOB
2637  REF 108  LAST  614       30,3163  0 6006 1            TC      INTPRET
2638                            30,3164  77624 1  S22BOX42   CALL
2639  REF   2  LAST  582       30,3165  75472 1             INCORP2
2640                            30,3166  45154 0             LXA,2   CALL
2641  REF   9  LAST  615       30,3167  03673 0             S22EORM
2642  REF   4  LAST  610       30,3170  71327 1             CMPOS
2643                            30,3171  45014 0  CMPINCP2   BOFF    CALL
2644  REF   9  LAST  615       30,3172  02744 1             INCORFLG
2645  REF   3  LAST  615       30,3173  60775 1             S22SAVET        SAVE TF AND TEST I=N
2646  REF  15  LAST  615       30,3174  22327 1             GRP2PC
2647                            30,3175  77214 0             CLEAR   VLOAD
2648  REF  10  LAST  616       30,3176  02664 1             INCORFLG        FLAG=0
2649  REF   3  LAST  614       30,3177  01701 0             X789
2650                            30,3200  77651 0             VSU
2651  REF   6  LAST  615       30,3201  01046 1             CSMPOS
2652  REF   8  LAST  615       30,3202  37531 1             STCALL  RCLP    RCL=RL-RC
2653  REF   1                  30,3203  61102 0             S22BOX12
2654                            30,3204  77735 0  S22BOX22   SLOAD
2655  REF   1                  30,3205  02007 1             S22WSUBL
2656  REF  35  LAST  613       30,3206  02621 0             STORE   W +144D
2657  REF  36  LAST  616       30,3207  02631 1             STORE   W +152D
2658  REF  37  LAST  616       30,3210  36641 1             STCALL  W +160D
2659  REF   5  LAST  614       30,3211  62357 1             GETTF
2660                            30,3212  77624 1             CALL            COMPUTE RL
2661  REF   3  LAST  542       30,3213  26524 0             LALOTORV
2662                            30,3214  43175 0             VLOAD   BOFF
2663  REF   6  LAST  611       30,3215  02152 0             ALPHAV          RL B-29
2664  REF  15  LAST  612       30,3216  04343 1             CMOONFLG
2665  REF   1                  30,3217  61066 0             S22BOX32
2666                            30,3220  52152 0             VSL2    GOTO    SCALE RL B-27 FOR MOON
2667  REF   2  LAST  616       30,3221  61066 0             S22BOX32
2668  REF 109  LAST  616       30,3222  0 6006 1  S22F244X   TC      INTPRET
2669                            30,3223  46135 1  S22F244    SLOAD   BHIZ    FIG 2.4-4   TEST OFF=0
2670  REF   5  LAST  610       30,3224  03745 1             CXOFF
2671  REF   1                  30,3225  61256 1             S22BOX44
2672                            30,3226  67206 1             PUSH    SLOAD
2673  REF   8  LAST  613       30,3227  03750 0             BNN
2674                            30,3230  77625 0             DSU
2675                            30,3231  45040 1             BMN     CALL    OFFSET GR. NO. MARKS, FORGET IT
2676  REF   2  LAST  616       30,3232  61256 1             S22BOX44
2677  REF  16  LAST  616       30,3233  22327 1             GRP2PC          GROUP 2 PHASE CHANGE
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2678                          30,3234  77745 1            DLOAD
2679  REF   9  LAST  614     30,3235  03670 0                  S22TOFF
2680  REF  22  LAST  610     30,3236  34041 0            STCALL TDEC1          CALC RC AT OFFSET TIME
2681  REF   3  LAST  510     30,3237  27145 1                   CSMPREC
2682                          30,3240  77775 1            VLOAD
2683  REF   6  LAST  515     30,3241  00017 1                   RATT1          RC METERS B-29 OR B-27
2684  REF   7  LAST  616     30,3242  25046 1            STOVL  CSMPOS
2685  REF   2  LAST  614     30,3243  01054 1                   S22UOFF
2686  REF  11  LAST  615     30,3244  25072 0            STOVL  UM             U=UOFF
2687  REF   4  LAST  616     30,3245  01701 0                   X789
2688                          30,3246  43046 1            ABVAL  BOFF
2689  REF  16  LAST  616     30,3247  04343 1                   CMOONFLG
2690                          30,3250  61252 0                   +2
2691                          30,3251  77702 1            SR2                   SCALE MOON RO B-29 FOR S22F2410 SUBR
2692  REF   3  LAST  612     30,3252  36240 1            STCALL ERADM
2693  REF   2  LAST  611     30,3253  61331 1                   S22F2410
2694                          30,3254  77650 1            GOTO
2695  REF   1                 30,3255  61261 0                   S22BX44A
2696                          30,3256  77624 1  S22BOX44  CALL
2697  REF   6  LAST  616     30,3257  62357 1                   GETTF
2698  REF  10  LAST  617     30,3260  03670 0            STORE  S22TOFF         PRESENT TIME FOR LAT-LONG SETUP
2699                          30,3261  43175 0  S22BX44A  VLOAD  BOFF
2700  REF   5  LAST  617     30,3262  01701 0                   X789
2701  REF  17  LAST  617     30,3263  04343 1                   CMOONFLG
2702  REF   1                 30,3264  61266 1                   S22BX44B
2703                          30,3265  77742 0            VSR2                  SCALE RL MOON B-29 FOR LAT-LONG
2704  REF   7  LAST  616     30,3266  16152 0  S22BX44B  STODL  ALPHAV         RL SCALED B-29 FOR LAT-LONG
2705  REF  11  LAST  617     30,3267  03670 0                   S22TOFF        EITHER PRESENT OR OFFSET TIME
2706                          30,3270  77624 1            CALL
2707  REF   4  LAST  562     30,3271  26453 1                   LAT-LONG       **** ALT OUTPUT ALWAYS B-29
2708                          30,3272  77624 1            CALL                  DISPLAY LAT/LONG/ALT
2709  REF   1                 30,3273  62363 0                   LLASRD
2710                          30,3274  77776 1            EXIT
2711  REF   2  LAST  563     30,3275  3 5036 1            CAF    V06N89B
2712  REF 130  LAST  616     30,3276  0 4636 0            TC     BANKCALL
2713  REF  13  LAST  513     30,3277   20743 0            CADR   GOFLASH
2714  REF   1                 30,3300  0 3324 1            TC     S22GTP         V34E TERMINATE
2716  REF   1                 30,3301  0 3315 0            TC     S22.981X       PROCEED POINT  A IN IN GSOP
2717  REF 110  LAST  616     30,3302  0 6006 1            TC     INTPRET        RECYCLE SAVE LANDING SITE COORD
2718                          30,3303  77745 1            DLOAD
2719  REF  12  LAST  617     30,3304  03670 0                   S22TOFF        EITHER PRESENT OR OFFSET TIME
2720                          30,3305  24007 0            STOVL  6D             6-7D= LANDING SITE TIME FOR R-TO-RP
2721  REF   6  LAST  617     30,3306  01701 0                   X789
2722                          30,3307  00001 0            STORE  0D             0-5D= LANDING SITE VEC  FOR R-TO-RP
2723                          30,3310  45135 1            SLOAD  CALL
2724  REF   6  LAST  611     30,3311  15334 1                   HIDPHALF       ANY NON-ZERO FOR MOON
2725  REF   2  LAST  614     30,3312  55370 0                   R-TO-RP        CONVERT RLS TO MOON-FIXED COORD
2726  REF   7  LAST  562     30,3313  02026 1            STORE  RLS            LANDING SITE VECTOR
2727                          30,3314  77776 1            EXIT
2728  REF 111  LAST  617     30,3315  0 6006 1  S22.981X  TC     INTPRET
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2729                          30,3316  77624 1            CALL
2730  REF   1                 30,3317  61363 0                 9DWTO6DW
2731                          30,3320  77776 1  P22OVER   EXIT
2732  REF  43  LAST  614      30,3321  0 5402 1            TC      PHASCHNG
2733                          30,3322  04022 0            OCT     04022
2734  REF   2  LAST  561      30,3323  0 2206 1            TC      PROG22A
2735  REF 112  LAST  617      30,3324  0 6006 1  S22GTP    TC      INTPRET         CONVERT W BEFORE TC GOTOPOOH
2736                          30,3325  77624 1            CALL
2737  REF   2  LAST  618      30,3326  61363 0                 9DWTO6DW
2738                          30,3327  77776 1            EXIT
2739  REF  22  LAST  616      30,3330  0 4103 1            TC      GOTOPOOH
2740                          30,3331  77201 1  S22F2410  SETPD   VLOAD           COMPUTE FORMULA 2.4.10
2741                          30,3332  00001 0                    0D
2742  REF   8  LAST  617      30,3333  01046 1                    CSMPOS          RC B-29 EARTH,B-27 MOON
2743                          30,3334  50256 0            UNIT    DOT             UNIT ALSO SETS 36D=ABVAL(RC) USED BELOW
2744  REF  12  LAST  617      30,3335  01072 0                    UM
2745                          30,3336  57552 1            SL1     DCOMP           GSOP CHANGE 8/18/67
2746                          30,3337  63406 0            PUSH    DSQ             PD 2D 0D=COSA=-(UM.RC)/ABVAL(RC) B-1
2747                          30,3340  65221 0            BDSU    PDDL            PD 4D 2D=1-COSA SQ=SINA SQ B-2
2748  REF   1                 30,3341  15326 1                    DEC182
2749  REF   4  LAST  617      30,3342  02240 0                    ERADM           RC ALWAYS B-29 FROM SETRE
2750                          30,3343  62414 1            BOFF    SL2             SCALE RC B-27 FOR MOON
2751  REF  18  LAST  617      30,3344  04343 1                    CMOONFLG
2752                          30,3345  61346 1                    +1
2753                          30,3346  56362 0            SR1R    DDV             (RC/RC) B-1
2754                          30,3347  00045 0                    36D
2755                          30,3350  45316 1            DSQ     DSU             PD 2D (RC/RC) SQ - SINA SQ  B-2
2756                          30,3351  44366 1            SQRT    BDSU            PD 0D COSA-SQRT((RC/RC)SQ-SINA SQ) B-1
2757                          30,3352  77605 1            DMP                     DMP RESULT B-28 MOON,B-30 EARTH
2758                          30,3353  00045 0                    36D             VXSC RESULT B-29 MOON, B-31 EARTH
2759  REF   6  LAST  612      30,3354  00041 1            STORE   S22RHO          RHO FOR W INIT. OF UNKNOWN LMK B-28,B-30
2760                          30,3355  77761 1            VXSC
2761  REF  13  LAST  618      30,3356  01072 0                    UM
2762                          30,3357  53352 0            VSL2    VAD             SCALE B-27 MOON,B-29 EARTH AND ADD RC
2763  REF   9  LAST  618      30,3360  01046 1                    CSMPOS
2764  REF   7  LAST  617      30,3361  01701 0            STORE   X789
2765                          30,3362  77616 0            RVQ                     B-27 FOR EARTH OR B-29 FOR MOON
2766  REF   1                 31,2000                     SETLOC  P22S
2767                          31,2340                     BANK

27675 REF   1                                             COUNT*  $$/P22
2768  REF   1                 31,2340  00031 0  S2231X13 STORE   S221X3          MULT 3X1 BY 1X3,STORE RESULTING 3X3 IN
2769                          31,2341  77131 1            SSP     AXT,2           S22UMRL- S22UMRL +17D
2770  REF   7  LAST  538      31,2342  00052 0                    S2
2771                          31,2343  00002 0            DEC     2
2772                          31,2344  00006 1            DEC     6
2773                          31,2345  77770 1            AXT,1
2774                          31,2346  00022 1            DEC     18
2775                          31,2347  73775 0  S2231NXT VLOAD   VXSC*
2776  REF   2  LAST  618      31,2350  00031 0                    S221X3
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 2777   REF   3 LAST  612   31,2351   77746 1                    S223X1 +6,2
 2778   REF   7 LAST  612   31,2352   07524 0          STORE     S22UMRL +18D,1
 2779                       31,2353   61110 0          INCR,1    TIX,2
 2780                       31,2354   77771 0          DEC       -6
 2781   REF   1            31,2355   62347 0                    S223INXT
 2782                       31,2356   77616 0          RVQ
 2783                       31,2357   70740 0  GETTF   LXC,1     DLOAD*          SET MPAC= TF
 2784   REF   6 LAST  614   31,2360   03750 0                    S22LOC
 2785                       31,2361   00001 0                    0,1
 2786                       31,2362   77616 0          RVQ

R2787   SUBROUTINE TO MODIFY ALT AND STORE LAT TO LAT+5 IN LANDLAT TO LANDLAT+5
R2788   PRIOR TO DISPLAY.

 2789                       31,2363   70545 1  LLASRD  DLOAD     SR1
 2790   REF   7 LAST  459   31,2364   00751 1                    LONG
 2791   REF   4 LAST  563   31,2365   16351 1          STODL     LANDLONG
 2792   REF   4 LAST  291   31,2366   00753 0                    ALT
 2793   REF   3 LAST  294   31,2367   02353 0          STORE     LANDALT
 2794                       31,2370   77616 0          RVQ
R2795   SUBROUTINE TO MODIFY LANDALT AND STORE LANDALT TO LANDALT+5 IN LAT TO
R2796   LAT+5 AFTER LMK DATA LOADED BY ASTRONAUT.

 2797                       31,2371   72545 0  LLASRDA DLOAD     SL1
 2798   REF   5 LAST  619   31,2372   02351 1                    LANDLONG
 2799   REF   8 LAST  619   31,2373   14751 1          STODL     LONG
 2800   REF   4 LAST  619   31,2374   02353 0                    LANDALT
 2801   REF   5 LAST  619   31,2375   00753 0          STORE     ALT
 2802                       31,2376   77616 0          RVQ
 2803   REF   2 LAST  609   30,2000                    SETLOC    P20S6
 2804                       30,3363                    BANK

28045   REF   3 LAST  609 TO  618:   445   623*         COUNT*    $$/P22
 2805                       30,3363   40220 0  9DWTO6DW STQ       SETPD
 2806   REF   1            30,3364   01053 0                    9DWXX
 2807                       30,3365   00001 0                    0D
 2808                       30,3366   41575 0          VLOAD     PUSH            CLEAR WORKING AREA OF PUSHLIST
 2809   REF   4 LAST  542   30,3367   15336 0                    HI6ZEROS        INCLUDING P
 2810                       30,3370   41406 0          PUSH      PUSH            PD 18D
 2811                       30,3371   77731 1          SSP
 2812   REF   1            30,3372   00017 1                    9DWJ            J=29   USE 2*29 FOR DP WORDS
 2813                       30,3373   00072 1          DEC       58
 2814                       30,3374   66150 0  9DWI=J  LXA,1     SXA,1           SET I=J
 2815   REF   2 LAST  619   30,3375   00016 0                    9DWJ
 2816   REF   1            30,3376   00012 1                    9DWI
 2817                       30,3377   77624 1  9DWEPCAL CALL
 2818   REF   1            30,3400   61613 1                    ROWDOT
 2819                       30,3401   77750 0          LXA,1                     P VARIES 0-20 INSTEAD OF 20-0
 2820   REF   1            30,3402   00010 0                    9DWP
 2821   REF   1            30,3403   06641 1          STORE     EMATRIX +40D,1
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2822                          30,3404  66110 1          INCR,1  SXA,1
2823                          30,3405  00002 0          DEC     2
2824  REF   2  LAST  619      30,3406  00010 0                  9DWP
2825                          30,3407  46135 1          SLOAD   BHIZ          TEST I=0
2826  REF   2  LAST  619      30,3410  00013 0                  9DWI
2827  REF   1                 30,3411  61426 0                  9DWTESTJ
2828                          30,3412  77625 0          DSU
2829  REF   1                 30,3413  24022 1                  9DWID
2830  REF   3  LAST  620      30,3414  00013 0          STORE   9DWI
2831                          30,3415  46025 1          DSU     BHIZ          TEST I=26
2832  REF   1                 30,3416  24020 0                  9DW26D
2833  REF   1                 30,3417  61422 1                  9DWSETI2
2834                          30,3420  77650 1          GOTO                  NEXT E SUB P
2835  REF   1                 30,3421  61377 0                  9DWEPCAL
2836                          30,3422  52131 0  9DWSETI2 SSP     GOTO          I=2
2837  REF   4  LAST  620      30,3423  00013 0                  9DWI
2838                          30,3424  00004 0          DEC     4
2839  REF   2  LAST  620      30,3425  61377 0                  9DWEPCAL
2840                          30,3426  46135 1  9DWTESTJ SLOAD   BHIZ          TEST J=0
2841  REF   3  LAST  619      30,3427  00017 1                  9DWJ
2842  REF   1                 30,3430  61445 0                  9DWFIG6
2843                          30,3431  77625 0          DSU
2844  REF   2  LAST  620      30,3432  24022 1                  9DWID
2845  REF   4  LAST  620      30,3433  00017 1          STORE   9DWJ          J=J-1
2846                          30,3434  46025 1          DSU     BHIZ          TEST J=26
2847  REF   2  LAST  620      30,3435  24020 0                  9DW26D
2848  REF   1                 30,3436  61441 1                  9DWSETJ2
2849                          30,3437  77650 1          GOTO
2850  REF   1                 30,3440  61374 0                  9DWI=J
2851                          30,3441  52131 0  9DWSETJ2 SSP     GOTO          SET J=2
2852  REF   5  LAST  620      30,3442  00017 1                  9DWJ
2853                          30,3443  00004 0          DEC     4
2854  REF   2  LAST  620      30,3444  61374 0                  9DWI=J
2855                          30,3445  77624 1  9DWFIG6  CALL
2856  REF  17  LAST  616      30,3446  22327 1                  GRP2PC
2857                          30,3447  77331 0          SSP     VLOAD         START OF FIGURE 2.4-6
2858  REF   6  LAST  620      30,3450  00017 1                  9DWJ          J=29
2859                          30,3451  00072 1          DEC     58
2860  REF   5  LAST  619      30,3452  15336 0                  HI6ZEROS
2861  REF   3  LAST  620      30,3453  00011 1          STORE   9DWP          P,N,I=0
2862                          30,3454  66370 0          AXT,1   SSP
2863                          30,3455  00154 1          DEC     108           CLEAR WO TO W54
2864  REF  12  LAST  611      30,3456  00051 0                  S1
2865                          30,3457  00006 1                  6
2866  REF  38  LAST  616      30,3460  06555 1  CLEARW54 STORE   W +1080,1
2867                          30,3461  77700 0          TIX,1
2868  REF   1                 30,3462  61460 1                  CLEARW54
2869                          30,3463  66150 0  9DWI=JA  LXA,1   SXA,1         I=J
2870  REF   7  LAST  620      30,3464  00016 0                  9DWJ
2871  REF   5  LAST  620      30,3465  00012 1                  9DWI
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2872                          30,3466  77624 1            CALL
2873  REF  2  LAST  619       30,3467  61613 1                 ROWDOT
2874                          30,3470  43750 1            LXA,1  BDSU*
2875  REF  4  LAST  620       30,3471  00010 0                 9DWP
2876  REF  2  LAST  619       30,3472  02641 0                 EMATRIX +40D,1
2877                          30,3473  66110 1            INCR,1 SXA,1          -(P+1)
2878                          30,3474  00002 0                 2
2879  REF  5  LAST  621       30,3475  00010 0                 9DWP
2880                          30,3476  54140 0            LXC,1  XSU,1          -(I+N)
2881  REF  6  LAST  620       30,3477  00012 1                 9DWI
2882  REF  1                  30,3500  00014 1                 9DWN
2883                          30,3501  71244 0            BPL    DLOAD          TEST WSQ LTE 0
2884  REF  1                  30,3502  61504 1                 9DWAAA
2885  REF  6  LAST  620       30,3503  15336 0                 H16ZERO5       W=0
2886                          30,3504  77766 0  9DWAAA    SQRT                W= SQRT(WSQ)
2887  REF 39  LAST  620       30,3505  06401 1  9DWAAB    STORE  W,1
2888  REF  1                  30,3506  14001 0            STODL  WORKW
2889  REF  8  LAST  620       30,3507  00017 1                 9DWJ           TEST J=0
2890                          30,3510  77630 1            BHIZ
2891  REF  1                  30,3511  61577 0                 9DWEXITX       EXIT
2892                          30,3512  46135 1  TST2I=0   SLOAD  BHIZ          TEST I=0
2893  REF  7  LAST  621       30,3513  00013 0                 9DWI
2894  REF  1                  30,3514  61555 0                 9DWN=N+3
2895                          30,3515  77625 0            DSU
2896  REF  3  LAST  620       30,3516  24022 1                 9DWID
2897  REF  8  LAST  621       30,3517  00013 0            STORE  9DWI           I=I-1
2898                          30,3520  46025 1            DSU    BHIZ           TEST I=26
2899  REF  3  LAST  620       30,3521  24020 0                 9DW26D
2900  REF  1                  30,3522  61525 1                 9DWAAC
2901                          30,3523  77650 1            GOTO
2902  REF  1                  30,3524  61530 0                 9DWNEXEP
2903                          30,3525  77731 1  9DWAAC    SSP                 I=2
2904  REF  9  LAST  621       30,3526  00013 0                 9DWI
2905                          30,3527  00004 0                 4
2906                          30,3530  77624 1  9DWNEXEP CALL
2907  REF  3  LAST  621       30,3531  61613 1                 ROWDOT
2908                          30,3532  43750 1            LXA,1  BDSU*          (EP-ROWI*ROWJ)/W
2909  REF  6  LAST  621       30,3533  00010 0                 9DWP
2910  REF  3  LAST  621       30,3534  02641 0                 EMATRIX +40D,1
2911                          30,3535  62071 0            DDV    INCR,1         P=P+1
2912  REF  2  LAST  621       30,3536  00001 0                 WORKW
2913                          30,3537  00002 0                 2
2914                          30,3540  70130 1            SXA,1  LXC,1
2915  REF  7  LAST  621       30,3541  00010 0                 9DWP
2916  REF 10  LAST  621       30,3542  00012 1                 9DWI
2917                          30,3543  40060 0            XSU,1  BOV            -(I+N)
2918  REF  2  LAST  621       30,3544  00014 1                 9DWN
2919  REF  1                  30,3545  61550 0                 SETWIN=0
2920                          30,3546  77650 1            GOTO
2921  REF  1                  30,3547  61552 1                 9DWSETWX
```

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2922                          30,3550  77745 1  SETWIN=0  DLOAD                 W(I+N)=0
2923  REF   7  LAST  621      30,3551  15336 0                HI6ZEROS
2924  REF  40  LAST  621      30,3552  06401 1  9DWSETWX  STORE   W,1
2925                          30,3553  77650 1            GOTO
2926  REF   1                 30,3554  61512 0                TST2I=0
2927                          30,3555  62150 1  9DWN=N+3  LXA,1   INCR,1        N=N+3
2928  REF   3  LAST  621      30,3556  00014 1                9DWN
2929                          30,3557  00006 1                6
2930                          30,3560  67330 0            SXA,1   SLOAD         J=J-1
2931  REF   4  LAST  622      30,3561  00014 1                9DWN
2932  REF   9  LAST  621      30,3562  00017 1                9DWJ
2933                          30,3563  77625 0            DSU
2934  REF   4  LAST  621      30,3564  24022 1                9DWID
2935  REF  10  LAST  622      30,3565  00017 1            STORE   9DWJ
2936                          30,3566  46025 1            DSU     BHIZ          TEST J=26
2937  REF   4  LAST  621      30,3567  24020 0                9DW26D
2938  REF   1                 30,3570  61573 1                SETJ=2A
2939                          30,3571  77650 1            GOTO
2940  REF   1                 30,3572  61463 1                9DWI=JA
2941                          30,3573  52131 0  SETJ=2A   SSP     GOTO          J=2
2942  REF  11  LAST  622      30,3574  00017 1                9DWJ
2943                          30,3575  00004 0                4
2944  REF   2  LAST  622      30,3576  61463 1                9DWI=JA
2945                          30,3577  77624 1  9DWEXITX  CALL
2946  REF  18  LAST  620      30,3600  22327 1                GRP2PC
2947                          30,3601  66370 0            AXT,1   SSP           CLEAR W6,W7,W8 USED TEMP FOR EMATRIX
2948                          30,3602  00066 1            DEC     54
2949  REF  13  LAST  620      30,3603  00051 0                S1
2950                          30,3604  00006 1                6
2951                          30,3605  77775 1            VLOAD
2952  REF   8  LAST  622      30,3606  15336 0                HI6ZEROS
2953  REF  41  LAST  622      30,3607  06643 0  9DWEXXXA  STORE   W +162D,1
2954                          30,3610  52100 1            TIX,1   GOTO
2955  REF   1                 30,3611  61607 1                9DWEXXXA
2956  REF   2  LAST  619      30,3612  01053 0                9DWXX
2957                          30,3613  40131 0  ROWDOT    SSP     BOV
2958  REF   1                 30,3614  00007 0                XTMP1
2959                          30,3615  00377 1            OCT     377
2960                          30,3616  61617 0                +1
2961                          30,3617  71140 1            LXC,1   LXC,2
2962  REF  11  LAST  621      30,3620  00012 1                9DWI
2963  REF  12  LAST  622      30,3621  00016 0                9DWJ
2964                          30,3622  41545 0            DLOAD   PUSH
2965  REF   9  LAST  622      30,3623  15336 0                HI6ZEROS
2966                          30,3624  56743 1  ROWDOT1   DLOAD*  DMPR*
2967  REF  42  LAST  622      30,3625  02401 0                W,1
2968  REF  43  LAST  622      30,3626  75376 1                W,2
2969                          30,3627  41415 1            DAD     PUSH
2970                          30,3630  62000 0            BOV     INCR,1
2971  REF   1                 30,3631  61645 1                ROWDOT3
```

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2972                          30,3632  77771 0          DEC     -6
2973                          30,3633  67314 0          INCR,2  SLOAD
2974                          30,3634  77771 0          DEC     -6
2975  REF  2 LAST  622        30,3635  00007 0                  XTMP1
2976                          30,3636  70430 1          BHIZ    SR1
2977  REF  1                  30,3637  61643 1                  ROWDOT2
2978  REF  3 LAST  623        30,3640  00007 0          STORE   XTMP1
2979                          30,3641  77650 1          GOTO
2980  REF  1                  30,3642  61624 0                  ROWDOT1
2981                          30,3643  77745 1  ROWDOT2 DLOAD
2982                          30,3644  77616 0          RVQ
2983                          30,3645  77614 1  ROWDOT3 CLRGO
2984  REF  9 LAST  614        30,3646  01631 1                  ORBWFLAG
2985  REF  2 LAST  623        30,3647  61643 1                  ROWDOT2
2986                             0000          WORKW    =      0D
2987                             0006          XTMP1    =      6D
2988                             0010          9DWP     =      8D          P
2989                             0012          9DWI     =      10D         I
2990                             0014          9DWN     =      12D         N
2991                             0016          9DWJ     =      14D         J
2995                             0022          S23X1    =      18D         6
2996                             0030          S21X3    =      24D         6
2997                             0036          S22D     =      30D         2
2998                             0040          S22RHO   =      32D         2

3000  REF  1                  32,2000                  SETLOC  P20S9
3001                          32,2017                  BANK

30015 REF  1                                           COUNT*  $$/P22
3002                          32,2017  00064 0  9DW26D  2DEC    52 B-14
3002                          32,2020  00000 1
3003                          32,2021  00002 0  9DWID   2DEC    2 B-14
3003                          32,2022  00000 1
3004                          32,2023  10306 0  SCTVAR  2DEC    1.0 E-6 B+18
3004                          32,2024  36750 0
3005                          32,2025  00253 0  IMUVARR 2DEC    0.04 E-6 B+18
3005                          32,2026  31436 1
3006  REF  6 LAST  574        26,3325          DEC182   =      DP1/4TH          1 B-2
3007  REF  2 LAST  585           5030          V06N49EE =      V06N49
3008  REF  1                     5036          V06N89B  =      V06N89
3010  REF  3 LAST  586        23,2000                  SETLOC  P20S2
3011                          23,3143                  BANK
30115 REF  1                                           COUNT*  $$/R63
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P3012

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P3013   SUBROUTINE NAME:   V89CALL
R3014   MOD NO:  0                      DATE: 8 FEB 1968
R3015   MOD BY:  DIGITAL DEVEL GROUP    LOG SECTION: P20-P25

R3016   FUNCTIONAL DESCRIPTION:

R3017   CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED. CALCULATES AND
R3018   DISPLAYS FINAL GIMBAL ANGLES TO POINT CSM +X AXIS OR PREFERRED AXIS
R3019   (UNIT(Z)COS55 DEG + UNIT(X)SIN55 DEG) AT LM.

R3020   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R3021   EXIT R63, OTHERWISE CONTINUE.

R3022   2. IF IN P00, DO IMU STATUS CHECK (R02BOTH). IF IMU ON AND ITS
R3023   ORIENTATION KNOWN TO CGC, CONTINUE.

R3024   3. FLASH DISPLAY V 04 N 06. R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R3025   BE POINTED AT LM.  INITIAL CHOICE IS PREFERRED AXIS. (R2=1).
R3026   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT= 1) BY V 22 E 2 E. CONTINUE
R3027   AFTER KEYING IN PROCEED.

R3028   4. SET PREFERRED ATTITUDE FLAG ACCORDING TO OPTION DESIRED. SET FLAG
R3029   FOR PREFERRED AXIS. RESET FLAG FOR X AXIS.

R3030   5. CURRENT TIME IS STORED AND R63COMP IS CALLED

R3031        R63COMP JOB:

R3032          UPDATES CSM AND LM STATE VECTORS USING CONIC EQUATIONS

R3033          CALCULATES BOTH PREFERRED AND X AXIS TRACKING ATT FROM 3SM TO LM.

R3034          DESIRED GIMBAL ANGLES AS INDICATED BY PREFERRED ATTITUDE FLAG
R3035          ARE STORED FOR LATER R60CSM CALL.

R3036   6. FLASH DISPLAY V 06 N18 AND AWAIT RESPONSE.

R3037   7. RECYCLE- RETURN TO STEP 5.
R3038      TERMINATE- EXIT R63 ROUTINE
R3039      PROCEED- RESET 3AXISFLG AND CALL R60CSM FOR ATTITUDE MANEUVER.

R3040   CALLING SEQUENCE: V 89 E

R3041   SUBROUTINES CALLED: CHKP00H, R02BOTH, GOXDSPF, R63COMP, R60CSM

R3042   ALARMS   1. OPERATOR ERROR IF NOT IN P00
R3043            2. PROGRAM ALARM IF IMU IS OFF
R3044            3. PROGRAM ALARM IF IMU ORIENTATION IS UNKNOWN
```

R3045 ERASABLE INITIALIZATION REQUIRED: NONE

R3046 DEBRIS: OPTION1, OPTION1+1, PRFTRKAT(PREF ATT FLAG),P21TIME, 3AXISFLG

```
3047                        23,3143   00000 1  DP1MIN   2DEC   6000
3047                        23,3144   13560 0

3048   REF  13  LAST  603   E4,1706                    EBANK= R63TIME
3050   REF   1              31,2000                    SETLOC V89TAG
3051                        31,2377                    BANK
3052   REF   1                                         COUNT* $$/R63

3053   REF 131  LAST  617   31,2377   0 4636 0  V89CALL  TC     BANKCALL      IMU STATUS CHECK. RETURNS IF ORIENTATION
3054   REF   4  LAST  565   31,2400    03731 1          CADR   R02BOTH       KNOWN. ALARMS IF NOT.
3055   REF 113  LAST  618   31,2401   0 6006 1          TC     INTPRET
3056                        31,2402    71214 0          CLEAR  DLOAD
3057   REF   6  LAST  601   31,2403    05667 0                 AZIMFLAG
3058   REF  25  LAST  611   31,2404    15336 0                 ZEROVECS
3059   REF   7  LAST  559   31,2405    03740 1          STORE  UTPIT
3060   REF   7  LAST  559   31,2406    03742 0          STORE  UTYAW
3061                        31,2407    77776 1          EXIT

3062   REF   1              31,2410   3 2443 0          CAF    V06N78
3063   REF 132  LAST  626   31,2411   0 4636 0          TC     BANKCALL
3064   REF   2  LAST  616   31,2412    21101 1          CADR   GOFLASHR
3065   REF  28  LAST  522   31,2413   0 5524 1          TC     ENDEXT
3066   REF   1              31,2414   1 2421 0          TCF    V89RECL
3067                        31,2415   0 2410 0          TC     -5

3068   REF  30  LAST  616   31,2416   3 4766 1          CAF    BIT3
3069   REF   8  LAST  616   31,2417   0 5516 0          TC     BLANKET
3070   REF  66  LAST  616   31,2420   0 5205 0          TC     ENDOFJOB

3071   REF 114  LAST  626   31,2421   0 6006 1  V89RECL  TC     INTPRET
3072                        31,2422    43234 0          RTB    DAD
3073   REF  19  LAST  600   31,2423    51751 0                 LOADTIME      READ PRESENT TIME
3074   REF   1              31,2424    07144 1                 DP1MIN        INTEGRATE TO 1 MIN FROM NOW
3075   REF  14  LAST  626   31,2425    36307 0          STCALL R63TIME       STORE TIME FOR CALL TO R63COMP. R63COMP
3076   REF   1              31,2426    73171 1                 R63COMP       LEAVES DESIRED GIM ANGS IN THETAD,LOS IN
3077                        31,2427    77776 1          EXIT                 POINTVSM, AND SELECTED AXIS IN SCAXIS.
3078   REF   1              31,2430   3 5031 0          CAF    V06N18        V 06 N 18
3079   REF 133  LAST  626   31,2431   0 4636 0          TC     BANKCALL      NOUN 18 REFERS TO THE DESIRED GIMBAL
3080   REF  14  LAST  617   31,2432    20743 0          CADR   GOFLASH
3081   REF  29  LAST  626   31,2433   0 5524 1          TC     ENDEXT        TERMINATE
3082                        31,2434   0 2436 1          TC     +2            PROCEED
3083   REF   2  LAST  626   31,2435   0 2421 1          TC     V89RECL       RECYCLE
3084   REF  39  LAST  579   31,2436   0 5561 0          TC     DOWNFLAG      RESET 3 AXIS FLAG
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3085   REF   6  LAST  572   31,2437   00124 0          ADRES  3AXISFLG     RESET BIT 6 FLAG 5
3086   REF 134  LAST  626   31,2440   0 4636 0         TC     BANKCALL     PERFORMS CSM MANEUVER TO ALIGN SELECTED
3087   REF   3  LAST  572   31,2441   56074 1          CADR   R60CSM       SPACECRAFT AXIS TO LOS.
3088   REF  30  LAST  626   31,2442   1 5524 0         TCF    ENDEXT

3089                        31,2443   01516 1  VB06N78  VN     0678

3090   REF   3  LAST  395      5031               VB06N18  =      V06N18

3091   REF   2  LAST  595   35,3171               R63COMP  EQUALS R63
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P3092   PROGRAM NAME- P23 CISLUNAR MIDCOURSE NAVIGATION
R3093   MOD NO
R3094   MOD BY- TOM KNATT
R3095   FUNCTIONAL DESCRIPTION- DO MIDCOURSE NAVIGATION BY INCORPORATION OF STAR
R3096   /EARTH AND STAR/MOON OPTICAL MEASUREMENTS.
R3097   CALLING SEQUENCE- ASTRONAUT OPERATED
R3098   SUBROUTINES CALLED-R52,R53,R57,R60,ORBITAL INTEGRATION (INTEGRV)
R3099   INCORP1,INCORP2,LALOTORV,LUNPOS  ,AND DISPLAY INTERFACE ROUTINES.
R3100   NORMAL EXIT MODES- VIA ROO
R3101   ALARMS- NONE
R3102   ABORT MODES- NONE
R3103   ERASABLE INITIALIZATION REQUIRED- PAD-LOADED ERASABLES,ORBWFLAG RESET,
R3104   REFSMFLG=0 IF IMU OFF AND REFSMFLG=1 IF IMU ON
R3105   INPUTS BY USER REQUIRED- STAR NUMBER,LANDMARK LAT,LONG/2,ALT
R3106   IF LANDMARK IS USED,          NEAR OR FAR HORIZON IF HORIZON IS USED, AND
R3107   BODY TO BE MARKED ON(EARTH OR MOON).  SEE GSOP CHAPT 4.
R3108   OUTPUT-UPDATED CMC STATE VECTOR. VECTOR FROM S/C TO HORIZON OR LANDMARK
R3109   IN POINTAXS. POINTAXS CAN BE USED TO GENERATE THIS VECTOR APART FROM
R3110   P23 IF DESIRED.
R3111   DEBRIS-NO USABLE DEBRIS IS GENERATED. RENDWFLG IS RESET FOR P20 UPON
R3112   ENTRY INTO P23.    RUPTREGS AND ERASABLES USED BY DISPLAYS ARE DEBRIS
 3114   REF   1                31,2000                          SETLOC RT23
 3115                          31,2444                          BANK
 3116   REF   1                                                 COUNT* $$/P23
 3117   REF  44  LAST  590     E7,1722                          EBANK= MRKBUF1
 3118   REF  40  LAST  626     31,2444   0 5561 0  P23          TC     DOWNFLAG
 3119   REF   9  LAST  588     31,2445    00010 0               ADRES  RNDVZFLG

 3120   REF  16  LAST  609     31,2446   0 5362 0               TC     2PHSCHNG
 3121                          31,2447    00004 0               OCT    00004          LEAVE GROUP 4
 3122                          31,2450    00012 1               OCT    00012          ENTER GROUP 2
 3123   REF   3  LAST  242     31,2451   3 5052 0               CAF    PRIO13
 3124   REF   3  LAST  577     31,2452   55'262 1               TS     PHSPRDT2
 3125   REF  41  LAST  628     31,2453   0 5561 0               TC     DOWNFLAG
 3126   REF   8  LAST  610     31,2454    00131 1               ADRES  RENDWFLG
 3127   REF 115  LAST  626     31,2455   0 6006 1  P23.00       TC     INTPRET
 3128                          31,2456    45014 0               BON    CALL
 3129   REF   4  LAST  588     31,2457    01702 0               REFSMFLG       SET NOW AS INPUT, NORMALLY EXTERNAL CONT
 3130   REF   1                31,2460    62466 1               P23.05         WHEN ALIGNED,PERFORM MEASUREMENT
 3131   REF   1                31,2461    76167 0               R57            DO OPTICS CALIBRATION IF IMU NOT ALIGNED
 3132                          31,2462    77624 1               CALL
 3133   REF   1                31,2463    31571 0               R53
 3134                          31,2464    77650 1               GOTO
 3135   REF   1                31,2465    62567 1               P23.60
 3136                          31,2466    45014 0  P23.05       CALL
 3137   REF   1                31,2467    04665 0               SAVECFLG
 3138   REF   2  LAST  628     31,2470    76167 0               R57            PERFORM MARK CALIBRATION
 3139                          31,2471    45135 1  P23.06       SLOAD  CALL
 3140   REF   2  LAST  562     31,2472    23513 1               V05N70
 3141   REF   1                31,2473    63355 1               P23N7071
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3142                          31,2474   77634 0  V94ENTER RT8
3143  REF  20  LAST  626      31,2475   51751 0                LOADTIME      READ CLOCK
3144  REF  16  LAST  589      31,2476   35062 0           STCALL MARKTIME
3145  REF   1                 31,2477   63002 0                POINTAXS      RETURN LOS IN MPAC
3146  REF   2  LAST  125      31,2500   03642 1           STORE  UCLSTAR      TEMP
3147                          31,2501   77776 1           EXIT
3148  REF   1                 31,2502   3 3514 1          CAF    V50N25P
3149  REF 135  LAST  627      31,2503   0 4636 0          TC     BANKCALL
3150  REF   3  LAST  567      31,2504    21067 0          CADR   GOPERF1      GOPERF1 BLANKS OUT R2 AND R3.
3151  REF  23  LAST  618      31,2505   0 4103 1          TC     GOTOPOOH
3152                          31,2506   0 2510 1          TC     +2           PRO DO 3AXIS MANEUVER
3153  REF   1                 31,2507   0 2552 1          TC     DOVECPT      ENTER DO VECPOINT MANEUVER
3154  REF 116  LAST  628      31,2510   0 6006 1          TC     INTPRET
3155                          31,2511    53575 0          VLOAD  UNIT
3156  REF   3  LAST  629      31,2512    03642 1                 UCLSTAR
3157  REF   3  LAST  444      31,2513    36706 0          STCALL ZSM          UCL
3158  REF   1                 31,2514    62614 0                 R23.55       COMPUTE STAR VECTOR AND LEAVE IN MPAC

3159                          31,2515    53435 0  OCCLCOMP VXV    UNIT         COMPUTE CONSTRAINED BRSB MATRIX(SHAFT
3160  REF   4  LAST  629      31,2516    02706 1                 ZSM                                          =180)
3161  REF   4  LAST  444      31,2517    02700 1          STORE  YSM          UNIT(US* X UCL)
3162                          31,2520    53435 0          VXV    UNIT
3163  REF   5  LAST  629      31,2521    02706 1                 ZSM
3164  REF  25  LAST  538      31,2522    02672 0          STORE  XSM          UNIT(UNIT(US* X UCL) X UCL)
3165                          31,2523    76131 0          SSP    AXT,1
3166  REF  14  LAST  622      31,2524    00051 0                 S1
3167                          31,2525    00006 1                 6
3168                          31,2526    00022 1                 18D
3169                          31,2527    61373 1  NEXTVEC1 VLOAD* VXM          COMPUTE BRNB = (SBNB)(BRSB)
3170  REF   2  LAST  297      31,2530    06322 1                 NB1NB2 +18D,1
3171  REF  26  LAST  629      31,2531    02672 0                 XSM
3172                          31,2532    77656 1          UNIT
3173  REF   4  LAST  432      31,2533    06736 0          STORE  XNB +18D,1   STORE IN XNB FOR CALCGA
3174                          31,2534    76100 1          TIX,1  AXT,1
3175  REF   1                 31,2535    62527 0                 NEXTVEC1
3176                          31,2536    00022 1                 18D
3177                          31,2537    77773 1  NEXTVEC2 VLOAD*              LOAD REFSMMAT INTO XSM FOR CALCGA
3178  REF  23  LAST  606      31,2540    01756 1                 REFSMMAT +18D,1
3179  REF  27  LAST  629      31,2541    06714 0          STORE  XSM +18D,1
3180                          31,2542    45100 1          TIX,1  CALL
3181  REF   1                 31,2543    62537 1                 NEXTVEC2
3182  REF   2  LAST  427      31,2544    47344 1                 CALCGA       COMPUTE DESIRED CDUS
3183                          31,2545    45014 0          SET    CALL
3184  REF   7  LAST  627      31,2546    02471 1                 3AXISFLG
3185  REF   1                 31,2547    62765 1                 DDR60B
3186                          31,2550    77650 1          GOTO
3187  REF   1                 31,2551    62556 0                 P23 57A
3188  REF 117  LAST  629      31,2552   0 6006 1  DOVECPT  TC     INTPRET
3189                          31,2553    45175 0          VLOAD  CALL
3190  REF   4  LAST  629      31,2554    03642 1                 UCLSTAR
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3191   REF   2  LAST  567   31,2555   62756 1                  DOR60
3192                       31,2556   77624 1  P23.57A  CALL
3193   REF  19  LAST  622   31,2557   22327 1                  GRP2PC
3194                       31,2560   43014 0  P23.57   CLEAR   SET
3195   REF   3  LAST  566   31,2561   00666 1                  TARG2FLG
3196   REF   2  LAST  275   31,2562   04464 0                  V94FLAG
3197                       31,2563   77624 1           CALL
3198   REF   4  LAST  566   31,2564   31005 0                  R52
3199                       31,2565   77614 1           CLEAR
3200   REF   3  LAST  630   31,2566   04664 1                  V94FLAG
3201                       31,2567   77776 1  P23.60   EXIT
3202                       31,2570   0 0004 0         INHINT
3203                       31,2571   0 0006 1         EXTEND
3204   REF  45  LAST  628   31,2572   3 1723 0         DCA     MRKBUF1
3205   REF  17  LAST  629   31,2573   53'062 0         DXCH    MARKTIME
3206   REF  46  LAST  630   31,2574   3 1727 1         CA      MRKBUF1 +5
3207   REF   1              31,2575   57'754 0         XCH     TRUNION
3208                       31,2576   0 0003 1         RELINT
3209   REF  18  LAST  578   31,2577   3 6211 0         CAF     SIX
3210   REF   7  LAST  578   31,2600   0 5607 0         TC      GENTRAN
3211   REF  47  LAST  630   31,2601   01722 1          ADRES   MRKBUF1
3212   REF   6  LAST  246   31,2602   01674 0          ADRES   MARKDOWN
3213   REF 118  LAST  629   31,2603   0 6006 1         TC      INTPRET
3214                       31,2604   45014 0          SET     CALL
3215   REF   2  LAST  628   31,2605   04465 1                  SAVECFLG
3216   REF  20  LAST  630   31,2606   22327 1                  GRP2PC
3217                       31,2607   45135 1          SLOAD   CALL
3218   REF   2  LAST  562   31,2610   23514 0                  V05N71
3219   REF   2  LAST  628   31,2611   63355 1                  P23N7071
3220                       31,2612   77624 1  P23.85   CALL
3221   REF   2  LAST  629   31,2613   63002 0                  PCINTAXS
3222                       31,2614   63256 0  R23.55   UNIT    PDVL            RCLL IS IN MPAC
3223                       31,2615   00043 0                  34D             RCLL * RCLL
3224                       31,2616   24037 0          STOVL   30D             PUSH 30-31 =RCLL*RCLL 32-33=ABVAL RCLL
3225   REF   2  LAST  125   31,2617   03634 0                  VZC
3226                       31,2620   54361 1          VXSC    VSR
3227   REF   1              31,2621   23475 0                  ONE/C
3228                       31,2622   20620 1                  15D
3229                       31,2623   77655 1          VAD             PUSH UP RCLL(UNIT)
3230                       31,2624   77656 1          UNIT
3231   REF   5  LAST  629   31,2625   27642 1          STOVL   UCLSTAR
3232   REF   3  LAST  630   31,2626   03634 0                  VZC
3233                       31,2627   52342 0          VSR2    VSU
3234   REF   2  LAST   93   31,2630   02141 1                  VESU
3235                       31,2631   54361 1          VXSC    VSR
3236   REF   2  LAST  630   31,2632   23475 0                  ONE/C
3237                       31,2633   20616 1                  13D
3238                       31,2634   53455 0          VAD     UNIT
3239   REF   1              31,2635   02617 0                  US
3240                       31,2636   77614 1          BOFF
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3241  REF   3  LAST  630   31,2637   04745 0                SAVECFLG
3242  REF   1              31,2640   62515 1                OCCLCOMP
3243  REF   1              31,2641   03650 1   STORE        USSTAR
3244                       31,2642   72441 0   DOT          SL1
3245  REF   6  LAST  630   31,2643   03642 1                UCLSTAR
3246                       31,2644   74315 0   PDVL         VXSC          PD 0,1 = USSTAR(DOT)UCLSTAR
3247  REF   7  LAST  631   31,2645   03642 1                UCLSTAR
3248                       31,2646   51372 0   VSL1         BVSU
3249  REF   2  LAST  631   31,2647   03650 1                USSTAR
3250                       31,2650   77656 1   UNIT
3251  REF  17  LAST  615   31,2651   27502 0   STOVL        BVECTOR       USSTAR - COSQ(UCLSTAR
3252  REF  26  LAST  626   31,2652   15336 0                ZEROVECS
3253  REF  18  LAST  631   31,2653   03510 0   STORE        BVECTOR +6
3254  REF  19  LAST  631   31,2654   17516 0   STODL        BVECTOR +12D
3255                       31,2655   00001 0                0
3256                       31,2656   57526 1   ACOS         DCOMP
3257                       31,2657   77525 0   PDDL         EXIT
3258  REF  27  LAST  631   31,2660   15336 0                ZEROVECS
3259  REF   1              31,2661   3 3505 1  CA           VARSUBL       PUT FIXED INTO ERASABLE FOR MSU
3260  REF  71  LAST  592   31,2662   54 001 1  TS           L             INSTRUCTION COMING UP
3261  REF   2  LAST  630   31,2663   3 1754 0  CA           TRUNION       REQUIRED TO CHANGE 2:S COMPLEMENT
3262                       31,2664   0 0006 1  EXTEND                     TRUNION TO 1:S COMPLEMENT
3263  REF  72  LAST  631   31,2665   20 001 1  MSU          L             TRUNION(2'S)-00000 CONVERTS TRUNION TO
3264  REF 257  LAST  615   31,2666   54 154 0  TS           MPAC          1:S. VARSUBL=00000
3265  REF 119  LAST  630   31,2667   0 6006 1  TC           INTPRET
3266                       31,2670   67206 1   PUSH         SLOAD         PUSH IS DP. WHEN BDSU IS EXECUTED, 2ND
3267  REF   2  LAST  568   31,2671   01025 1                TRUNBIAS      HALF OF PUSHLIST IS GUARANTEED ZERO FROM
3268                       31,2672   77621 1   BDSU                       DLOAD ZEROVECS ABOVE
3269                       31,2673   43242 1   SR3          DAD
3270                       31,2674   41215 1   DAD          DMP
3271  REF   1              31,2675   23505 0                TRUN19
3272                       31,2676   00041 1                32D
3273                       31,2677   52405 1   DMP          SL3
3274  REF   2  LAST  574   31,2700   07016 1                PI/4.0
3275                       31,2701   62414 1   BOFF         SL2
3276  REF  19  LAST  618   31,2702   04343 1                CMOONFLG
3277  REF   1              31,2703   62704 0                R23.51
3278  REF   4  LAST  584   31,2704   17524 1  R23.51  STODL  DELTAQ
3279                       31,2705   00037 0                30D           RCLL * RCLL
3280                       31,2706   47005 1   DMP          RTB
3281  REF   1              31,2707   23511 0                TRUNVAR
3282  REF   2  LAST  581   31,2710   45657 1                TPMODE
3283                       31,2711   43171 1   TAD          CLEAR
3284  REF   2  LAST  631   31,2712   23506 0                VARSUBL
3285  REF   6  LAST  614   31,2713   02666 0                DMENFLG
3286  REF  11  LAST  615   31,2714   37526 1   STCALL       VARIANCE
3287  REF   3  LAST  615   31,2715   75260 1                INCORP1
3288                       31,2716   77624 1   CALL
3289  REF  21  LAST  630   31,2717   22327 1                GRP2PC
3290                       31,2720   51575 1   VLOAD        ABVAL
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3291  REF  11  LAST  615  31,2721  01122 1                    DELTAX +6
3292                      31,2722  60414 0          BOF       SR2          DISPLAY IS 2-27 IF IN LUNAR SPHERE
3293  REF  20  LAST  631  31,2723  04343 1                    CMOONFLG
3294  REF   1            31,2724  62725 0                    R23.52
3295  REF  12  LAST  615  31,2725  27504 0  R23.52   STOVL     N49DISP +2
3296  REF  12  LAST  632  31,2726  01114 1                    DELTAX
3297                      31,2727  77646 0          ABVAL
3298                      31,2730  60414 0          BOF       SR2
3299  REF  21  LAST  632  31,2731  04343 1                    CMOONFLG
3300  REF   1            31,2732  62733 1                    R23.53
3301  REF  13  LAST  632  31,2733  03502 0  R23.53   STORE     N49DISP
3302                      31,2734  77776 1          EXIT
3303  REF   3  LAST  623  31,2735  3 5030 1  R23.6   CAF       V06N49
3304  REF 136  LAST  629  31,2736  0 4636 0          TC        BANKCALL
3305  REF   3  LAST  626  31,2737   21101 1          CADR      GOFLASHR
3306  REF  24  LAST  629  31,2740  0 4103 1          TC        GOTOPOOH
3307  REF   1            31,2741  0 2750 1          TC        R23.7        INCORPORATE DATA
3308  REF  25  LAST  632  31,2742  0 4103 1          TC        GOTOPOOH
3309  REF  31  LAST  626  31,2743  3 4766 1          CAF       BIT3         BLANK OUT R3
3310  REF   9  LAST  626  31,2744  0 5516 0          TC        BLANKET
3311  REF  44  LAST  618  31,2745  0 5402 1          TC        PHASCHNG
3312                      31,2746   00012 1          OCT       00012
3313  REF  67  LAST  626  31,2747  0 5205 0          TC        ENDOFJOB
3314  REF 120  LAST  631  31,2750  0 6006 1  R23.7    TC        INTPRET
3315                      31,2751  45014 0  R23.8    SET       CALL
3316  REF   9  LAST  584  31,2752   00467 1                    VEHUPFLG
3317  REF   3  LAST  616  31,2753   75472 1                    INCORP2
3318                      31,2754   77776 1          EXIT
3319  REF  26  LAST  632  31,2755  0 4103 1  R23.END  TC        GOTOPOOH
3320                      31,2756   53521 1  DOR60    MXV       UNIT
3321  REF  24  LAST  629  31,2757   01734 0                    REFSMMAT
3322  REF  14  LAST  604  31,2760   27357 0          STOVL     PCINTVSM
3323  REF   1            31,2761   23517 0                    JCAXIS
3324  REF  19  LAST  604  31,2762   03351 0          STORE     SCAXIS
3325                      31,2763   77614 1          CLEAR
3326  REF   8  LAST  629  31,2764   02671 0                    3AXISFLG     SET UP FOR VECPOINT IN R60
3327                      31,2765   77420 1  DOR60B   STQ       EXIT
3328  REF   1            31,2766   02657 1                    SRTEMP
3329  REF   1            31,2767  3 3524 1          CAF       R60ADRS
3330  REF   4  LAST  486  31,2770  54 373 1          TS        TEMPFLSH
3331  REF  45  LAST  632  31,2771  0 5402 1          TC        PHASCHNG
3332                      31,2772   00012 1          OCT       00012
3333  REF   8  LAST  571  31,2773  0 4611 0  R60CALL  TC        E6SETTER
3334  REF 137  LAST  632  31,2774  0 4636 0          TC        BANKCALL
3335  REF   4  LAST  627  31,2775   56074 1          CADR      R60CSM
3336  REF   5  LAST  442  31,2776  0 4606 0    +3    TC        E7SETTER
3337  REF 121  LAST  632  31,2777  0 6006 1          TC        INTPRET
3338                      31,3000   77650 1          GOTO
3339  REF   2  LAST  632  31,3001   02657 1                    SRTEMP
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P3340
R3341   POINTAXIS SUBROUTINE
 3342                        31,3002   77620 0  POINTAXS STQ
 3343   REF    6  LAST  589  31,3003   01006 0                 POINTEX
 3344                        31,3004   71214 0  R23.05   BON    DLOAD
 3345   REF   10  LAST  623  31,3005   01711 1                 ORBWFLAG
 3346   REF    1             31,3006   63012 1                 R23.1
 3347   REF    1             31,3007   03001 0                 WMIDPOS
 3348                        31,3010   34001 1          STCALL 0
 3349   REF    3  LAST  610  31,3011   56612 1                 INITIALW        INITIALIZE W-MATRIX FIRST PASS IN P23
 3350                        31,3012   77624 1  R23.1    CALL
 3351   REF    6  LAST  614  31,3013   56462 1                 SETINTG         SETUP FOR CSM INTEGRATION
 3352                        31,3014   43014 0          BOFSET SET
 3353   REF   11  LAST  633  31,3015   01451 0                 ORBWFLAG
 3354   REF    1             31,3016   63020 0                 R23.2
 3355   REF   10  LAST  614  31,3017   01476 0                 DIMOFLAG
 3356                        31,3020   77624 1  R23.2    CALL
 3357   REF    8  LAST  610  31,3021   27236 0                 INTEGRV         INTEGRATE CSM STATE VEC. TO MARKTIME
 3358                        31,3022   77776 1          EXIT
 3359   REF   46  LAST  632  31,3023 0 5402 1          TC     PHASCHNG
 3360                        31,3024   04022 0          OCT    04022
 3361   REF 122  LAST  632  31,3025 0 6006 1          TC     INTPRET
 3362                        31,3026   77014 1  RECT.1   BOFF   AXT,2          SR TO SET ZMEASURE = 0 IF MEASUREMENT
 3363   REF   22  LAST  632  31,3027   04343 1                 CMOONFLG         PLANET AND PRIMARY PLANET ARE THE SAME
 3364   REF    1             31,3030   63040 0                 RECT.3           OTHERWISE = 1
 3365                        31,3031   77775 1          DEC    -2
 3366                        31,3032   77614 1          BOFF                    VEC. AND SCALE B29 AND B7
 3367   REF   11  LAST  565  31,3033   01743 0                 LUNAFLAG
 3368   REF    1             31,3034   63044 1                 RECT.4
 3369                        31,3035   52014 0  RECT.2   CLEAR  GOTO
 3370   REF    1             31,3036   00265 0                 ZMEASURE
 3371   REF    1             31,3037   63046 0                 RECT.5
 3372                        31,3040   43174 1  RECT.3   AXT,2  BOFF
 3373                        31,3041   00000 1                 0
 3374   REF   12  LAST  633  31,3042   01743 0                 LUNAFLAG
 3375   REF    1             31,3043   63035 1                 RECT.2
 3376                        31,3044   77614 1  RECT.4   SET
 3377   REF    2  LAST  633  31,3045   00065 1                 ZMEASURE
 3378                        31,3046   44575 0  RECT.5   VLOAD  VSR7
 3379   REF    2  LAST  585  31,3047   01573 1                 DELTACSM        SCALED B22  OR  B18
 3380                        31,3050   53257 1          VSR*   VAD
 3381                        31,3051   57176 0                 0,2
 3382   REF    2  LAST  585  31,3052   01607 1                 RCVCSM          SCALED B29  OR  B27
 3383                        31,3053   77657 0          VSR*
 3384                        31,3054   57176 0                 0,2
 3385   REF    2  LAST  125  31,3055   27626 0          STOVL  RZC             NOW SCALED B29
 3386   REF    1             31,3056   01601 1                 NUVCSM          SCALED B3  OR  B-1
 3387                        31,3057   53702 1          VSR4   VSR*
 3388                        31,3060   57176 0                 0,2
 3389                        31,3061   53655 1          VAD    VSR*
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3390  REF   1                    31,3062  01615 1                VCVCSM    SCALED B7  OR  B5
3391                             31,3063  57176 0                0,2
3392  REF   4  LAST  630         31,3064  03634 0          STORE VZC       NOW SCALED B7
3393                             31,3065  77614 1          BOFF
3394  REF   3  LAST  633         31,3066  00345 0                ZMEASURE  IN SPHERE OF INFLUENCE OF PRIMARY BODY
3395  REF   1                    31,3067  63101 1                R23.3
3396                             31,3070  45145 0          DLOAD CALL
3397  REF  18  LAST  630         31,3071  01062 1                MARKTIME
3398  REF   1                    31,3072  54141 1                LUNPOS
3399                             31,3073  57414 1          BON   VCOMP
3400  REF  23  LAST  633         31,3074  04303 0                CMOONFLG
3401                             31,3075  63076 0                +1
3402                             31,3076  77655 1          VAD
3403  REF   3  LAST  633         31,3077  03626 0                RZC
3404  REF   4  LAST  634         31,3100  03626 0          STORE RZC
3405                             31,3101  67201 0  R23.3   SETPD SLOAD
3406                             31,3102  00001 0                0
3407  REF  17  LAST  609         31,3103  03752 1                LANDMARK  IF LANDMARK = 0, USE HORIZ SUBR
3408                             31,3104  43030 0          BHIZ  SET
3409  REF   1                    31,3105  63114 0                R23.4
3410  REF   6  LAST  565         31,3106  00462 1                ERADFLAG
3411                             31,3107  45145 0          DLOAD CALL
3412  REF  19  LAST  634         31,3110  01062 1                MARKTIME
3413  REF   4  LAST  616         31,3111  26524 0                LALOTORV
3414                             31,3112  77650 1          GOTO
3415  REF   1                    31,3113  63337 0                R23.5
3416                             31,3114  65345 0  R23.4   DLOAD PDDL      PUSH 0-1 = -AYO SCALED B0
3417  REF   1                    31,3115  01712 1                -AYO
3418  REF   1                    31,3116  01714 1                AXO
3419                             31,3117  63325 0          PDDL  PDVL      PUSH 2-3 = +AX SCALED B0
3420  REF   8  LAST  508         31,3120  15344 0                DPPOSMAX
3421  REF   2  LAST  630         31,3121  02617 0                US
3422                             31,3122  53435 0          VXV   UNIT
3423  REF   5  LAST  634         31,3123  03626 0                RZC
3424  REF   2  LAST  125         31,3124  27620 0          STOVL UBAR2
3425                             31,3125  53435 0          VXV   UNIT      PUSH UP
3426  REF   3  LAST  634         31,3126  03620 0                UBAR2
3427  REF   3  LAST  133         31,3127  27604 0          STOVL UBAR0
3428  REF   4  LAST  634         31,3130  03620 0                UBAR2
3429                             31,3131  53435 0          VXV   UNIT
3430  REF   4  LAST  634         31,3132  03604 0                UBAR0
3431  REF   2  LAST  125         31,3133  03612 1          STORE UBAR1
3432                             31,3134  50214 0          BON   DOT
3433  REF  13  LAST  633         31,3135  01703 1                LUNAFLAG
3434  REF   1                    31,3136  63324 1                HORIZ.6
3435                             31,3137  00001 0                0         UBAR1 DOT UZ
3436  REF   8  LAST  617         31,3140  26156 1          STOVL ALPHAV +4
3437  REF   6  LAST  634         31,3141  03626 0                RZC
3438                             31,3142  41246 1          ABVAL DMP
3439  REF   1                    31,3143  03376 0                HORISLP
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3440                          31,3144  43276 0            DCOMP   DAD
3441  REF   1                 31,3145  01346 1                    HORIZALT
3442  REF   1                 31,3146  34772 1            STCALL  RATETEMP
3443  REF   1                 31,3147  26570 1                    GETERAD
3444                          31,3150  65215 1            DAD     PDDL        MPAC HAS RADIUS OF FISHER SLLIPSOID
3445  REF   2  LAST  635       31,3151  00772 0                    RATETEMP    PUSH 0-1 = RH SCALED B29
3446  REF   1                 31,3152  23477 1                    AEARTH
3447                          31,3153  41415 1            DAD     PUSH        PUSH 2-3 = AH B29
3448  REF   3  LAST  635       31,3154  00772 0                    RATETEMP
3449                          31,3155  64375 1  HORIZ.1   VLOAD   MXV
3450  REF   7  LAST  634       31,3156  03626 0                    RZC         B29
3451  REF   5  LAST  634       31,3157  03604 0                    UBARD       B1
3452                          31,3160  63372 1            VSL1    PDVL        PUSH 4-9 = RH(XH,YH,ZH) B29
3453  REF   3  LAST  634       31,3161  02617 0                    US
3454                          31,3162  76521 0            MXV     VSL1
3455  REF   6  LAST  635       31,3163  03604 0                    UBARD
3456                          31,3164  77725 1            PDDL                PUSH 10-15 = USH B1
3457                          31,3165  00003 1                    2           AH
3458                          31,3166  14043 0            STODL   34D
3459                          31,3167  00005 1                    4           XH
3460                          31,3170  77624 1            CALL
3461  REF   1                 31,3171  63344 1                    DIVIDE
3462                          31,3172  63457 1            SR*     DSQ
3463                          31,3173  20611 0                    8D,1        NOW SCALED B9
3464                          31,3174  14037 0            STODL   30D
3465                          31,3175  00001 0                    0
3466                          31,3176  14043 0            STODL   34D
3467                          31,3177  00007 0                    6           YH
3468                          31,3200  77624 1            CALL
3469  REF   2  LAST  635       31,3201  63344 1                    DIVIDE
3470                          31,3202  63457 1            SR*     DSQ
3471                          31,3203  20611 0                    8D,1        B9
3472                          31,3204  41415 1            DAD     PUSH        PUSH 16-17 =A SCALED  B13
3473                          31,3205  00037 0                    30D
3474                          31,3206  75425 0            DSU     SQRT
3475  REF   1                 31,3207  23503 0                    1.0B18
3476                          31,3210  77725 1            PDDL                PUSH 18-19  SQRT(A-1) B9
3477                          31,3211  00021 1                    16D
3478                          31,3212  14043 0            STODL   34D
3479                          31,3213  00005 1                    4           XH
3480                          31,3214  77624 1            CALL
3481  REF   3  LAST  635       31,3215  63344 1                    DIVIDE
3482                          31,3216  65257 1            SR*     PDDL
3483                          31,3217  20622 0                    17D,1       PUSH 20-21 = XH/A B29
3484                          31,3220  00007 0                    6           YH
3485                          31,3221  77624 1            CALL
3486  REF   4  LAST  635       31,3222  63344 1                    DIVIDE
3487                          31,3223  65257 1            SR*     PDDL
3488                          31,3224  20622 0                    17D,1       PUSH 22-23 = YH/A B29
3489                          31,3225  00023 0                    18D         SQRT(A-1)
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3490                          31,3226  77624 1        CALL
3491  REF  5 LAST  635        31,3227  63344 1               DIVIDE
3492                          31,3230  77657 0        SR*
3493                          31,3231  20611 0               8D,1
3494                          31,3232  14035 1        STODL  28D
3495                          31,3233  00001 0               0                BH
3496                          31,3234  14043 0        STODL  34D
3497                          31,3235  00003 1               2                AH
3498                          31,3236  77624 1        CALL
3499  REF  6 LAST  636        31,3237  63344 1               DIVIDE
3500                          31,3240  41257 1        SR*    DMP              AH/BH  SCALED  B1
3501                          31,3241  20601 1               0,1
3502                          31,3242  00035 1               28D              SQRT(A-1)/A
3503                          31,3243  72405 0        DMP    SL1
3504                          31,3244  00007 0               6                YH
3505                          31,3245  77725 1        PDDL
3506                          31,3246  00003 1               2                AH
3507                          31,3247  14043 0        STODL  34D
3508                          31,3250  00001 0               0
3509                          31,3251  77624 1        CALL
3510  REF  7 LAST  636        31,3252  63344 1               DIVIDE
3511                          31,3253  41257 1        SR*    DMP              BH/AH  SCALED  B1
3512                          31,3254  20601 1               0,1
3513                          31,3255  00035 1               28D              SQRT (A-1)/A
3514                          31,3256  72405 0        DMP    SL1
3515                          31,3257  00005 1               4                XH
3516                          31,3260  43325 1        PDDL   DAD
3517                          31,3261  00025 0               20D              XH/A
3518                          31,3262  00031 0               24D              ALPHA
3519                          31,3263  45325 1        PDDL   DSU
3520                          31,3264  00027 1               22D              YH/A
3521                          31,3265  00033 1               26D              BETA
3522                          31,3266  40206 1        PUSH   SETPD
3523                          31,3267  00021 1               16D
3524                          31,3270  45345 1        DLOAD  DSU
3525                          31,3271  00025 0               20D              XH/A
3526                          31,3272  00031 0               24D              ALPHA
3527                          31,3273  43325 1        PDDL   DAD
3528                          31,3274  00027 1               22D              YH/A
3529                          31,3275  00033 1               26D              BETA
3530                          31,3276  41525 0        PDDL   PUSH
3531  REF 28 LAST  631        31,3277  15336 0               ZEROVECS
3532                          31,3300  24041 1        STOVL  32D              ZERO THIRD COMP. OF T-0 VECTOR
3533                          31,3301  00035 1               28D
3534                          31,3302  53451 1        VSU    UNIT
3535                          31,3303  00005 1               4                RH VECTOR
3536                          31,3304  63241 0        DOT    PDVL             PUSH 22-23 A-SUB-ZERO
3537                          31,3305  00013 0               10D              USH VECTOR
3538                          31,3306  00021 1               16D              T1 VECTOR
3539                          31,3307  53451 1        VSU    UNIT
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3540                          31,3310  00005 1                  4          RH VECTOR
3541                          31,3311  41441 0          DOT     PUSH       PUSH 24-25 A-SUB-ONE
3542                          31,3312  00013 0                  13D
3543                          31,3313  50021 1          BDSU    BMN
3544                          31,3314  00027 1                  22D        A-SUB-ZERO
3545  REF   1                 31,3315  63330 1                  HORIZ.3
3546                          31,3316  77614 1          BON
3547  REF   1                 31,3317  00304 0                  NORFHOR
3548  REF   1                 31,3320  63333 1                  HORIZ.4
3549                          31,3321  52175 0  HORIZ.2 VLOAD   GOTO
3550                          31,3322  00035 1                  28D        T-0 VECTOR
3551  REF   1                 31,3323  63335 1                  HORIZ.5
3552                          31,3324  41545 0  HORIZ.6 DLOAD   PUSH
3553  REF   1                 31,3325  23501 1                  RADMOON
3554                          31,3326  52006 0          PUSH    GOTO
3555  REF   1                 31,3327  63155 0                  HORIZ.1
3556                          31,3330  77614 1  HORIZ.3 BON
3557  REF   2  LAST  637      31,3331  00304 0                  NORFHOR
3558  REF   1                 31,3332  63321 1                  HORIZ.2
3559                          31,3333  77775 1  HORIZ.4 VLOAD
3560                          31,3334  00021 1                  16D        T1 VECTOR
3561                          31,3335  76505 0  HORIZ.5 VXM     VSL1
3562  REF   7  LAST  635      31,3336  03604 0                  UBARO
3563                          31,3337  40251 0  R23.5   VSU     SETPD
3564  REF   8  LAST  635      31,3340  03626 0                  RZC
3565                          31,3341  00001 0                  0
3566                          31,3342  77650 1          GOTO
3567  REF   7  LAST  633      31,3343  01006 0                  POINTEX
3568                          31,3344  70501 1  DIVIDE  NORM    SR1
3569  REF  13  LAST  615      31,3345  00047 1                  X1
3570                          31,3346  14045 0          STODL   36D
3571                          31,3347  00043 0                  34D
3572                          31,3350  55301 0          NORM    BDDV
3573  REF  15  LAST  629      31,3351  00051 0                  S1
3574                          31,3352  00045 0                  36D
3575                          31,3353  43460 1          XSU,1   RVQ
3576  REF  16  LAST  637      31,3354  00050 1                  S1
3577  REF   8  LAST  564      31,3355  03744 0  P23N7071 STORE  22SUBSCL
3578                          31,3356  77420 1          STQ     EXIT
3579  REF   8  LAST  637      31,3357  01006 0                  POINTEX
3580  REF   9  LAST  637      31,3360  3 1743 0 DISP7071 CA     22SUBSCL
3581  REF  17  LAST  563      31,3361  0 5535 1         TC      VNFLASH
3582  REF  47  LAST  578      31,3362  0 5547 1 P23.15  TC      UPFLAG
3583  REF  14  LAST  634      31,3363  00060 1          ADRES   LUNAFLAG
3584  REF  18  LAST  634      31,3364  3 1751 0         CA      LANDMARK   IF C=2,LUNAFLAG=1. IF C=1,LUNAFLAG=0
3585                          31,3365  0 0006 1         EXTEND
3586  REF   1                 31,3366  1 3375 1         BZF     P23.151
3587  REF   4  LAST  293      31,3367  3 1752 0         CA      HORIZON
3588                          31,3370  0 0006 1         EXTEND
3589                          31,3371  1 3373 1         BZF     +2
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3590  REF   1                  31,3372  0 3445 1                TC      R23.10          OPERATOR DSKY ERROR
3591  REF  19  LAST  637       31,3373  3 1751 0                CA      LANDMARK
3592  REF   1                  31,3374  0 3400 0                TC      P23.152
3593  REF   5  LAST  637       31,3375  3 1752 0  P23.151       CA      HORIZON
3594                           31,3376  0 0006 1                EXTEND
3595  REF   2  LAST  638       31,3377  1 3445 0                BZF     R23.10
3596  REF   1                  31,3400  7 3526 1  P23.152       MASK    BITS7-9         IS C EQUAL TO 1 OR 2
3597  REF   1                  31,3401  6 5221 0                AD      NEG100
3598                           31,3402  0 0006 1                EXTEND
3599  REF   1                  31,3403  1 3410 0                BZF     P23.16
3600  REF   2  LAST  638       31,3404  6 5221 0                AD      NEG100
3601                           31,3405  0 0006 1                EXTEND
3602  REF   1                  31,3406  1 3412 1                BZF     P23.176
3603  REF   3  LAST  638       31,3407  0 3445 1                TC      R23.10
3604  REF  42  LAST  628       31,3410  0 5561 0  P23.16        TC      DOWNFLAG
3605  REF  15  LAST  637       31,3411   00060 1                ADRES   LUNAFLAG
3606  REF  48  LAST  637       31,3412  0 5547 1  P23.176       TC      UPFLAG
3607  REF   3  LAST  637       31,3413   00004 0                ADRES   NORFHOR
3608  REF   6  LAST  638       31,3414  3 1752 0                CA      HORIZON
3609                           31,3415  0 0006 1                EXTEND
3610  REF   1                  31,3416  1 3427 1                BZF     P23.20
3611  REF   1                  31,3417  7 3527 0                MASK    BITS4-6
3612  REF   1                  31,3420  6 6171 0                AD      -OCT10
3613                           31,3421  0 0006 1                EXTEND
3614  REF   1                  31,3422  1 3433 1                BZF     P23.18
3615  REF   2  LAST  638       31,3423  6 6171 0                AD      -OCT10
3616                           31,3424  0 0006 1                EXTEND
3617  REF   1                  31,3425  1 3435 1                BZF     P23.30
3618  REF   4  LAST  638       31,3426  0 3445 1                TC      R23.10
3619  REF 123  LAST  633       31,3427  0 6006 1  P23.20        TC      INTPRET
3620                           31,3430   77624 1                CALL
3621  REF   5  LAST  565       31,3431   60304 0                        P22SUBRB
3622                           31,3432   77776 1                EXIT
3623  REF  43  LAST  638       31,3433  0 5561 0  P23.18        TC      DOWNFLAG
3624  REF   4  LAST  638       31,3434   00004 0                ADRES   NORFHOR
3625  REF   7  LAST  556       31,3435  3 1140 0  P23.30        CA      STARCODE        IS STARCODE GREATER THAN OR
3626                           31,3436  0 0006 1                EXTEND                  EQUAL TO 0 AND LESS THAN 37
3627  REF   1                  31,3437  1 3464 0                BZF     LDPLANET
3628                           31,3440  0 0006 1                EXTEND
3629  REF   5  LAST  638       31,3441  6 3445 1                BZMF    R23.10
3630  REF   1                  31,3442  6 3525 0                AD      NEG37
3631                           31,3443  0 0006 1                EXTEND
3632  REF   1                  31,3444  6 3447 0                BZMF    P23.170
3633  REF  11  LAST  564       31,3445  0 4362 1  R23.10        TC      FALTON
3634  REF   1                  31,3446  0 3360 1                TC      DISP7071
3635  REF 124  LAST  638       31,3447  0 6006 1  P23.170       TC      INTPRET
3636                           31,3450   41535 1  P23.17        SLOAD   PUSH
3637  REF   8  LAST  638       31,3451   01141 1                        STARCODE
3638                           31,3452   41335 1                SLOAD   DMP
3639  REF   1                  31,3453   23516 1                        SPSIX
```

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3640                                31,3454   66150 0                LXA,1   SXA,1
3641   REF 258  LAST  631           31,3455   00155 0                        MPAC +1
3642   REF   5  LAST  233           31,3456   00302 0                        BESTI           BESTI = 6XSTAR NUMBER
3643                                31,3457   77624 1                CALL
3644   REF   1                      31,3460   30000 1                        LOWMEMRY        NEEDED TO RETRIEVE STAR VECTOR FROM LOW
3645   REF   2  LAST   98           31,3461   02617 0  P23.31        STORE   STARSAV2        STORE FOR R53,P23. US(IN P23)=STARSAV2
3646                                31,3462   77650 1                GOTO
3647   REF   9  LAST  637           31,3463   01006 0                        POINTEX
3648   REF   2  LAST  560           31,3464  3 5035 1  LOPLANET      CAF     V06N88
3649   REF  18  LAST  637           31,3465  0 5535 1                TC      VNFLASH
3650   REF 125  LAST  638           31,3466  0 6006 1                TC      INTPRET
3651                                31,3467   74375 0                VLOAD   VXSC
3652   REF   5  LAST  556           31,3470   03705 0                        STARSAV3
3653   REF   1                      31,3471   23531 1                        1DSQR3
3654                                31,3472   52056 0                UNIT    GOTO
3655   REF   1                      31,3473   63461 1                        P23.31
3656                                31,3474   26305 0  ONE/C         2DEC*   .333564049 E-6 B+21*
3656                                31,3475   05432 1
3657                                31,3476   00302 0  AEARTH        2DEC    6378166 B-29    A AXIS OF EARTH(METERS B-29)
3657                                31,3477   24533 1
3658                                31,3500   00065 1  RADMOON       2DEC    1738090 B-29    RADIUS OF MOON IN METERS
3658                                31,3501   01265 1
3659                                31,3502   00000 1  1.0818        2DEC    1.0 B-18
3659                                31,3503   02000 0
3660                                31,3504   01604 1  TRUN19        OCT     01604
3661                                31,3505   00000 1  VARSUBL       DEC     0
3662                                31,3506   01505 0  VARSUBL3      2DEC*   3.4299040 E+6 B-26*
3662                                31,3507   14100 0
3663                                31,3510   00012 1  TRUNVAR       2DEC    2.5 E-9 B+18
3663                                31,3511   27462 1
3664                                31,3512   01306 0  V05N70        VN      0570
3665                                31,3513   01307 1  V05N71        VN      0571
3666                                31,3514   00202 1  V50N25P       OCT     00202
3667                                31,3515   00006 1  SPSIX         OCT     00006
3668                                31,3516   10464 0  JCAXIS        2DEC    .2688190620     1/2(SIN 32.523 DEG)  TRACK AXIS
3668                                31,3517   12467 1
3669                                31,3520   00000 1                2DEC    0
3669                                31,3521   00000 1
3670                                31,3522   15373 1                2DEC    .4215878460     1/2(COS 32.523 DEG)
3670                                31,3523   11346 0
3671   REF   1                      31,3524   62776 0  R60ADRS       CADR    R60CALL +3
3672                                31,3525   77732 1  NEG37         DEC     -37
3673                                31,3526   00700 0  BITS7-9       OCT     700
3674                                31,3527   00070 0  BITS4-6       OCT     70
3675                                31,3530   22363 1  1DSQR3        2DEC    0.57735021
3675                                31,3531   11623 0
3676   REF 126  LAST  639           31,3532  0 6006 1  V94NTR        TC      INTPRET
3677                                31,3533   77650 1                GOTO
3678   REF   1                      31,3534   62474 1                        V94ENTER
3679   REF   1                      14,2000                SETLOC  RT53
```

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3680                        14,2000                         BANK
36805 REF    1                                              COUNT*  $$/STARS
3681                        14,2000   43573 1  LOWMEMRY     VLOAD*  RVQ
3682  REF    2  LAST  603   14,2001   33776 1               CATLOG,1
36825 REF    2  LAST  551     4000                SETLOC    FFTAG2
3683                          4546                BANK

36835 REF    1                                              COUNT*  $$/R22
3684                          4546   0 0006 1  GOTOV56      EXTEND                  P20 TERMINATES BY GOTOV56 INSTEAD OF
3685  REF    1                4547   3 4552 1               DCA     V856CADR         GOTOPOOH
3686  REF    3  LAST  382     4550   1 5214 1               TCF     SUPDXCHZ
3687  REF    7  LAST  532   E7,1777                         EBANK=  WHOCARES
3688  REF    2  LAST  249     4551   02641 0  V856CADR     2CADR   TRACKTRM
3688                          4552   66107 1
3693  REF   11  LAST  392   40,2000                SETLOC    PINBALL1
3694                        40,3636                BANK
3695  REF    1                                              COUNT*  $$/EXTVB
3696  REF  127  LAST  639   40,3636   0 6006 1  V67CALL      TC      INTPRET
3697                        40,3637    77624 1               CALL
3698  REF    1              40,3640    61706 1               V67WW
3699                        40,3641    77776 1               EXIT
3700  REF    1              40,3642   3 3770 1  V06N99DS     CAF     V06N99A
3701  REF  138  LAST  632   40,3643   0 4636 0               TC      BANKCALL
3702  REF   14  LAST  521   40,3644    20576 1               CADR    GOXDSPF
3703  REF   31  LAST  627   40,3645   1 5524 0               TCF     ENDEXT
3704  REF    1              40,3646   0 3650 1               TC      V06N9933
3705  REF    1              40,3647   0 3642 1               TC      V06N99DS
3706  REF  128  LAST  640   40,3650   0 6006 1  V06N9933     TC      INTPRET
3707                        40,3651    46135 1               SLOAD   BHIZ             IF R3 OF V67 = 0 EXIT
3708  REF    2  LAST  295   40,3652    02316 1               WWOPT
3709  REF    1              40,3653    61704 0               V67COMEX
3710                        40,3654    73150 1  V6N99INP     LXA,1   LXA,2
3711  REF    2  LAST  295   40,3655    02311 0               WWPOS
3712  REF    2  LAST  295   40,3656    02313 1               WWVEL
3713                        40,3657    45335 0               SLOAD   DSU
3714  REF    3  LAST  640   40,3660    02316 1               WWOPT
3715  REF    1              40,3661    21774 0               V67DEC2
3716                        40,3662    51030 0               BHIZ    BPL
3717  REF    1              40,3663    61672 0               V67WORB
3718  REF    1              40,3664    61677 0               V67WMID
3719                        40,3665    67130 1               SXA,1   SXA,2
3720  REF    3  LAST  580   40,3666    02000 0               WRENDPOS
3721  REF    1              40,3667    02001 1               WRENDVEL
3722                        40,3670    77650 1               GOTO
3723  REF    1              40,3671    61702 0               V67EXITX
3724                        40,3672    67130 1  V67WORB      SXA,1   SXA,2
3725  REF    2  LAST  610   40,3673    02004 1               WORBPOS
3726  REF    1              40,3674    02005 0               WORBVEL
3727                        40,3675    77650 1               GOTO
3728  REF    2  LAST  640   40,3676    61702 0               V67EXITX
```

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3729                          40,3677   67130 1  V67WMID  SXA,1    SXA,2
3730  REF   2  LAST  633      40,3700   03000 1                    WMIDPOS
3731  REF   1                 40,3701   03001 0                    WMIDVEL
3732                          40,3702   77614 1  V67EXITX CLEAR
3733  REF  12  LAST  633      40,3703   01671 0                    CRSWFLAG
3734                          40,3704   77776 1  V67COMEX EXIT
3735  REF  32  LAST  640      40,3705  1 5524 0           TCF      ENDEXT
3736                          40,3706   40020 1  V67WW     STQ      BOV
3737  REF   8  LAST  618      40,3707   00051 0                    S2
3738                          40,3710   61711 1                    +1
3739                          40,3711   77624 1           CALL
3740  REF  16  LAST  588      40,3712   27516 0                    INTSTALL
3741                          40,3713   71331 0           SSP      DLOAD
3742  REF  17  LAST  637      40,3714   00051 0                    S1
3743                          40,3715   00006 1           DEC      6
3744  REF  29  LAST  636      40,3716   15336 0                    ZEROVECS
3745  REF   3  LAST  640      40,3717   02312 0           STORE    WWPOS
3746  REF   3  LAST  640      40,3720   02314 0           STORE    WWVEL
3747  REF   4  LAST  640      40,3721   02316 1           STORE    WWOPT
3748                          40,3722   77770 1           AXT,1
3749                          40,3723   00044 1           DEC      36
3750                          40,3724   47573 0  NXPOSVEL VLOAD*   VSQ
3751  REF  44  LAST  622      40,3725   02445 0                    W +36D,1
3752                          40,3726   77615 0           DAD
3753  REF   4  LAST  641      40,3727   02312 0                    WWPOS
3754  REF   5  LAST  641      40,3730   02312 0           STORE    WWPOS
3755                          40,3731   47573 0           VLOAD*   VSQ
3756  REF  45  LAST  641      40,3732   02533 0                    W +90D,1
3757                          40,3733   77615 0           DAD
3758  REF   4  LAST  641      40,3734   02314 0                    WWVEL
3759  REF   5  LAST  641      40,3735   02314 0           STORE    WWVEL
3760                          40,3736   75500 0           TIX,1    SQRT
3761  REF   1                 40,3737   61724 1                    NXPOSVEL
3762  REF   6  LAST  641      40,3740   16314 0           STODL    WWVEL
3763  REF   6  LAST  641      40,3741   02312 0                    WWPOS
3764                          40,3742   77766 0           SQRT
3765  REF   7  LAST  641      40,3743   02312 0           STORE    WWPOS
3766                          40,3744   52000 0           BOV      GOTO
3767                          40,3745   61747 1                    +2
3768  REF   1                 40,3746   61753 1                    V67XXX
3769                          40,3747   77745 1           DLOAD
3770  REF   9  LAST  634      40,3750   15344 0                    DPPOSMAX
3771  REF   8  LAST  641      40,3751   02312 0           STORE    WWPOS
3772  REF   7  LAST  641      40,3752   02314 0           STORE    WWVEL
3773                          40,3753   45345 1  V67XXX   DLOAD    DSU
3774  REF   9  LAST  641      40,3754   02312 0                    WWPOS
3775  REF   1                 40,3755   21772 0                    FT99999
3776                          40,3756   71240 1           BMN      DLOAD
3777                          40,3757   61762 0                    +3
3778  REF   2  LAST  641      40,3760   21772 0                    FT99999
```

```
3779   REF  10  LAST  641   40,3761   02312 0            STORE   WWPOS
3780                        40,3762   66150 0            LXA,1   SXA,1
3781   REF   9  LAST  641   40,3763   00051 0                    S2
3782   REF   1               40,3764   00052 0                    QPRET
3783                        40,3765   77776 1            EXIT
3784   REF  40  LAST  556   40,3766   0 4655 0           TC      POSTJUMP
3785   REF   1               40,3767   27527 1          CADR    INTWAKE
3789                        40,3770   01543 1  V06N99A   VN      0699
3790                        40,3771   01670 1  FT99999   2DEC    30479 B-19
3790                        40,3772   17000 1
3791                        40,3773   00002 0  V67DEC2   2DEC    2 B-14
3791                        40,3774   00000 1
3792   REF   9  LAST  517   30,2000                     SBANK=  LOWSUPER
```

L P30,P31 USER'S PAGE NO. 1 EO S?

```
P0001   PROGRAM DESCRIPTION  P30    DATE 5-1-69

R0002   MOD.I BY S. ZELDIN- TO ADD P31 AND AD APT P30 FOR P31 USE.    22DEC67
R0003   MOD.II BY P.WOLFF TO REDUCE CODING AND DELETE RESTART PROTECTION 4-30-69
R0004   MOD.III BY C.BEALS TO DELETE P31 INOV69
R0005   FUNCTIONAL DESCRIPTION
R0006   P30(EXTERNAL DELTA-V TARGETTING PROGRAM)
R0007       ACCEPTS ASTRONAUT INPUTS OF TIG,DELV(LV) AND COMPUTES,FOR DISPLAY,
R0008       APOGEE,PERIGEE,DELV(MAG),MGA ASSOCIATED WITH DESIRED MANEUVER

R0009       THE FOLLOWING SUBROUTINES ARE USED IN P30
R0010          S30/31.1  COMPUTES APOGEE AND PERIGEE ALTITUDE
R0011          P30/P31 - DISPLAYS TIG
R0012          CNTUP30 - DISPLAYS DELV(LV)
R0013          CCMPTGO  CLOCKTASK COMPUTE TTOGO
R0014          LOMAT     COMPUTE X,Y,Z IN LV COORDS
R0015          PARAM30 - DISPLAYS APOGEE,PERIGEE,DELV(MAG),MGA,TIME FROM TIG,
R0016                    MARKS SINCE LAST THRUSTING MANEUVER

R0017   CALLING  SEQUENCE VIA JOB FROM V37

R0018   EXIT VIA V37 CALL OR GOTOPOOH

R0019   OUTPUT FOR POWERED FLIGHT
R0020           VTIG   X
R0021           RTIG
R0022           DELVSIN X
R0023   P30 CALCULATIONS

R0024   P30 CALC BASED ON STORED TARGET PARAMETERS(R OF IGNITION(RTIG),V OF
R0025   IGNITION(VTIG),TIME OF IGNITION(TIG),DELV(LV),COMPUTE PERIGEE ALTITUDE
R0026   APOGEE ALTITUDE AND DELTA-V REQUIRED IN REF. COORDS.(DELVSIN)
R0027   ERASABLE INITIALIZATION REQUIRED
R0028           TIG        TIME OF IGNITION                          DP     B28CS
R0029           DELVSLV    SPECIFIED DELTA-V IN LOCAL VERT.
R0030                      COORDS. OF ACTIVE VEHICLE AT
R0031           TIME OF IGNITION                                VCT.   B+7M/CS
R0032   SUBROUTINES CALLED
R0033           THISPREC
R0034   OUTPUT
R0035           RTIG          POSITION AT TIG                   VCT.   B+29M
R0036           VTIG          VELOCITY AT TIG                   VCT.   B+7M
R0037           DELVSIN       DELVSLV IN REF COORDS             VCT.   B+7M/CS
R0038   DEBRIS QTEMP    TEMP. ERASABLE
R0039          QPRET,MPAC
R0040          PUSHLIST

 0041   REF   1              35,2000                  SETLOC P30S1
 0042                       35,3433                  BANK
```

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```
0043  REF   7  LAST  561   E7,1625                          EBANK= +MGA

0044  REF   1                                              COUNT* $$/P30
0045  REF  49  LAST  638   35,3433   0 5547 1  P30         TC     UPFLAG
0046  REF   6  LAST  588   35,3434    00027 1              ADRES  UPDATFLG      SET UPDATFLG
0047  REF  50  LAST  644   35,3435   0 5547 1              TC     UPFLAG
0048  REF  10  LAST  588   35,3436    00031 0              ADRES  TRACKFLG      SET TRACKFLG
0049  REF   3  LAST  527   35,3437   3 5026 0  DSP0633     CAF    V06N33        DISPLAY TIME OF IGNITION
0050  REF  19  LAST  639   35,3440   0 5535 1              TC     VNFLASH
0051  REF   2  LAST  484   35,3441   3 4535 0              CAF    V06N81
0052  REF  20  LAST  644   35,3442   0 5535 1              TC     VNFLASH
0053  REF  51  LAST  644   35,3443   0 5547 1              TC     UPFLAG
0054  REF   2  LAST  494   35,3444    00045 0              ADRES  XDELVFLG      BIT 8 FLAG 2
0055  REF 129  LAST  640   35,3445   0 6006 1              TC     INTPRET
0056                       35,3446    71214 0              CLEAR  DLOAD
0057  REF   7  LAST  644   35,3447    00670 0                     UPDATFLG      RESET UPDATFLG
0058  REF  42  LAST  586   35,3450    03413 1                     TIG           TIME IGNITION SCALED AT 2(+28)CS
0059  REF  23  LAST  617   35,3451    34041 0              STCALL TDEC1
0060  REF   3  LAST  518   35,3452    27145 1                     THISPREC      ENCKE ROUTINE FOR

0061                       35,3453    67175 0              VLOAD  SXA,2
0062  REF  15  LAST  601   35,3454    00007 0                     VATT
0063  REF  11  LAST  538   35,3455    03746 1                     RTX2
0064  REF   3  LAST  127   35,3456    27640 0              STOVL  VTIG
0065  REF  17  LAST  601   35,3457    00001 0                     RATT
0066  REF   2  LAST  127   35,3460    03632 0              STORE  RTIG
0067  REF  21  LAST  500   35,3461    03540 0              STORE  RACT3
0068                       35,3462    53435 0              VXV    UNIT
0069  REF   4  LAST  644   35,3463    03640 0                     VTIG
0070  REF  11  LAST  500   35,3464    36617 1              STCALL UNRM
0071  REF   3  LAST  481   35,3465    72721 0                     LOMAT
0072                       35,3466    61375 1              VLOAD  VXM
0073  REF   6  LAST  185   35,3467    03405 0                     DELVSLV
0074                       35,3470    00001 0
0075                       35,3471    66172 0              VSL1   SXA,1
0076  REF   8  LAST  502   35,3472    03745 1                     RTX1
0077  REF   4  LAST  485   35,3473    03646 0              STORE  DELVSIN
0078                       35,3474    77646 0              ABVAL
0079  REF   4  LAST  294   35,3475    27763 0              STOVL  VGDISP        MAG DELV
0080  REF   3  LAST  644   35,3476    03632 0                     RTIG
0081                       35,3477    53315 0              PDVL   VAD
0082  REF   5  LAST  644   35,3500    03646 0                     DELVSIN
0083  REF   5  LAST  644   35,3501    03640 0                     VTIG
0084                       35,3502    77624 1              CALL
0085  REF   1              35,3503    54021 0                     S30/31.1
0086                       35,3504    77776 1              EXIT
0087  REF   1              35,3505   3 3553 1  PARAM30     CAF    V06N42        DISPLAY HAPO,HPER,DELTAV
0088  REF  21  LAST  644   35,3506   0 5535 1              TC     VNFLASH
0089  REF 130  LAST  644   35,3507   0 6006 1  REFTEST     TC     INTPRET
0090                       35,3510    77214 0              BOFF   VLOAD
```

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```
0091   REF   5  LAST  628   35,3511   01742 1                    REFSMFLG      TEST FOR REFSMFLAG ON
0092   REF   1              35,3512   73544 0                    NOTSET
0093   REF   6  LAST  644   35,3513   03646 0                    DELVSIN
0094                        35,3514   45006 0          PUSH      CALL
0095   REF   2  LAST  485   35,3515   56444 0                    GET+MGA
0096                        35,3516   77776 1          EXIT
0097   REF   2  LAST  485   35,3517   0 3525 0  DISPMGA TC       COMPTGO

0098   REF   2  LAST  485   35,3520   3 4536 0  DISP45  CAF      V16N45        DISPLAY MARK CNT,TFI,+MGA
0099   REF  22  LAST  644   35,3521   0 5535 1          TC       VNFLASH
0100   REF  44  LAST  638   35,3522   0 5561 0          TC       DOWNFLAG
0101   REF   3  LAST  528   35,3523    00155 0          ADRES    TIMRFLAG      RESET TIMRFLAG
0102   REF  27  LAST  632   35,3524   1 4103 0          TCF      GOTOPOOH

0103                        35,3525   0 0006 1  COMPTGO EXTEND
0104   REF   1              35,3526   23'272 1          QXCH     PHSPRDT6

0105   REF  52  LAST  644   35,3527   0 5547 1          TC       UPFLAG        SET TIMRFLAG
0106   REF   4  LAST  645   35,3530    00155 0          ADRES    TIMRFLAG
0107   REF 123  LAST  590   35,3531   3 4772 1          CAF      ZERO
0108   REF   3  LAST  531   35,3532   54 777 1          TS       NVWORD1

0109   REF  67  LAST  614   35,3533   3 4770 0          CAF      ONE
0110   REF  17  LAST  557   35,3534   0 5233 0          TC       WAITLIST
0111   REF  43  LAST  644   E7,1412                     EBANK=   TIG
0112   REF   4  LAST  528   35,3535    03225 1          2CADR    CLOKTASK
0112                        35,3536    50067 0

0113   REF  17  LAST  628   35,3537   0 5362 0          TC       2PHSCHNG
0114                        35,3540    40036 0          OCT      40036         6.3SPOT FOR CLOKTASK
0115                        35,3541    05024 1          OCT      05024         GROUP 4 CONTINUES HERE
0116                        35,3542    13000 0          OCT      13000

0116.5 REF   3  LAST  528   01,2325                6P3SPT1  =        6.3SPOT
0117   REF   2  LAST  645   35,3543   0 1272 1          TC       PHSPRDT6

0118                        35,3544    57545 1  NOTSET  DLOAD    DCOMP
0119   REF   1              35,3545    33552 0                   MARSDP
0120   REF   8  LAST  644   35,3546    03626 0          STORE    +MGA
0121                        35,3547    77634 0          RTB
0122   REF   1              35,3550    73517 0                   DISPMGA
0123                        35,3551    00000 1  MARSDP  OCT      00000         (00000) (16440)  = (+00001)
0124                        35,3552    35100 0          OCT      35100
AC125                                                             ( .01 ) DEGREES IN THE LOW ORDER REGISTE
0126                        35,3553    01452 0  V06N42  VN       0642
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L P30,P31 USER'S PAGE NO. 4 E7 S3

```
R0127   S30/31.1  SUBROUTINE USED BY P30/P31 CALCULATIONS
R0128   MOD NO 1        LOG SECTION  P30,P37
R0129   FUNCTIONAL DESCRIPTION
R0130   THROUGH A SERIES OF CALLS COMPUTES APOGEE AND PERIGEE ALTITUDE
R0131   SUBROUTINES CALLED
R0132           PERIAPO1
R0133           SHIFTR1
R0134           MAXCHK
R0135   CALLING SEQUENCE
R0136       L    CALL
R0137       L+1          S30/31.1
R0138   NORMAL EXIT MODE
R0139       AT L+2 OR CALLING SEQUENCE
R0140         OUTPUT
R0141           HAPO         APOGEE ALT.                  DP      B+29M
R0142           HPER         PERIGEE ALT.                 DP      B+29M

 0143   REF   1                26,2000                    SETLOC P30S1A
 0144                          26,2021                    BANK

 0145   REF   1                                           COUNT* $$/P30
 0146                          26,2021   45020 1  S30/31.1 STQ     CALL
 0147   REF   2  LAST  127     26,2022   03657 0                    QTEMP
 0148   REF   2  LAST  468     26,2023   45174 1                    PERIAPO1
 0149                          26,2024   77624 1          CALL
 0150   REF   2  LAST  468     26,2025   45330 0                    SHIFTR1
 0151                          26,2026   77624 1          CALL
 0152   REF   3  LAST  524     26,2027   46745 0                    MAXCHK
 0153   REF   2  LAST  291     26,2030   16357 1          STODL     HPER          PERIGEE ALT B+29
 0154                          26,2031   00005 1                    4D
 0155                          26,2032   77624 1          CALL
 0156   REF   3  LAST  646     26,2033   45330 0                    SHIFTR1
 0157                          26,2034   77624 1          CALL
 0158   REF   4  LAST  646     26,2035   46745 0                    MAXCHK
 0159   REF   3  LAST  291     26,2036   36355 1          STCALL    HAPO          APOGEE ALT B+29
 0160   REF   3  LAST  646     26,2037   03657 0                    QTEMP
```

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R0161   SUBROUTINE NAME:       DELRSPL                                  (CONTINUATION OF V 82 IN CSM IF P11 ACTI
R0163   TRANSFERRED COMPLETELY FROM SUNDISK, P30S REV 33. 9 SEPT 67.
R0164   MOD NO:  0             MOD BY:  ZELDIN              DATE:
R0165   MOD NO:  1             MOD BY:  RR BAIRNSFATHER     DATE:  11 APR 67
R0166   MOD NO:  2             MOD BY:  RR BAIRNSFATHER     DATE:  12 MAY 67    ADD UR.RT CALC WHEN BELOW 300K FT
R0168   MOD NO:  2.1           MOD BY:  RR BAIRNSFATHER     DATE: 5 JULY 67     FIX ERROR IN MOD. 2.
R0170   MOD NO:  3             MOD BY:  RR BAIRNSFATHER     DATE:  12 JUL 67    CHANGE SIGN OF DISPLAYED ERROR.
R0172   MOD 4                  MOD BY   S.ZELDIN            DATE  3 APRIL 68    CHANGE EQUATIONS FOR L/D=.18 WHICH REPLA
R0174   FUNCTION:              CALCULATE (FOR DISPLAY ON CALL) AN APPROXIMATE    MEASURE OF IN-PLANE SPLASH DOWN
R0176                          ERROR. IF THE FREE-FALL TRANSFER ANGLE TO 300K FT  ABOVE PAD RADIUS IS POSITIVE:
R0178                          SPLASH ERROR= -RANGE TO TARGET + FREE-FALL TRANSFER ANGLE + ESTIMATED ENTRY ANGLE.
R0180                          THE TARGET LOCATION AT ESTIMATED TIME OF IMPACT IS USED.  IF THE FREE-FALL TRANSFER
R0182                          ANGLE IS NEGATIVE:  SPLASH ERROR= -RANGE TO TARGET
R0183                          THE PRESENT TARGET LOCATION IS USED.
R0184   CALLING SEQUENCE      CALLED AFTER SR30.1 IF IN CSM AND IF P11 OPERATING (UNDER CONTROL OF V82)
R0186   SUBROUTINES CALLED: VGAMCALC, TFF/TRIG, LALOTORV.
R0187   EXIT                  RETURN DIRECTLY TO V 82 PROG. AT SPLRET
R0188   ERASABLE INITIALIZATION   LEFT BY SR30.1 AND V82GON1
R0189   OUTPUT:  RSP-RREC  RANGE IN REVOLUTIONS                          DSKY DISPLAY IN N. MI.
R0191   DEBRIS:  QPRET, PDL0 ...PDL7 ,PDL10

R0192           THETA(1)
R0193
```

```
0194   REF   1                32,2000                    SETLOC  DELRSPL1
0195                          32,2027                    BANK
0196   REF   1                                           COUNT*  $$/P30          PROGRAMS: P30 EXTERNAL DELTA V

0197                          32,2027   00011 1  DELRSPL  STORE   8D
0198                          32,2030   45244 1          BPL     DSU
0199   REF   1                32,2031   64077 0                  CANTOO          GONE PAST 300K FT ALT
0200   REF   1                32,2032   16425 0                  IBITDP
0201                          32,2033   45000 0          BOV     CALL
0202   REF   2  LAST  647     32,2034   64077 0                  CANTOO          POSMAX INDICATES NO 300K FT SOLUTION.
0203   REF   1                32,2035   55054 0                  VGAMCALC        +GAMMA(REV) IN PMAC,V300 MAG(B-7)=PDL 0
0204                          32,2036   45006 0          PUSH    CALL
0205   REF   1                32,2037   57052 1                  TFF/TRIG
0206                          32,2040   77624 1          CALL
0207   REF   1                32,2041   64105 1                  AUGEKUGL
0208                          32,2042   65525 0          PDDL    ACOS            T ENTRY PDL 6
0209   REF   1                32,2043   00017 1                  CDELF/2
0210                          32,2044   77615 0          DAD
0211                          32,2045   00005 1                  4
0212   REF   2  LAST   95     32,2046   26341 0  GETARG  STOVL   THETA(1)
0213   REF   9  LAST  442     32,2047   03401 1                  LAT(SPL)
0214   REF   8  LAST  538     32,2050   14747 0          STODL   LAT
0215   REF  10  LAST  622     32,2051   15336 0                  HI6ZEROS
0216   REF   6  LAST  619     32,2052   14753 0          STODL   ALT             ALT=0   = LAT +4
0217   REF   6  LAST  530     32,2053   01044 0                  PIPTIME
0218                          32,2054   71214 0          GOTO    DLOAD
```

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```
 0219  REF   4  LAST  510   32,2055  03711 0                    V37FLAG
 0220                       32,2056  64060 0                    +2
 0221  REF   6  LAST  519   32,2057  02316 1                    TSTART82
 0222                       32,2060  43225 0          DSU       DAD
 0223                       32,2061  00011 1                    8D
 0224                       32,2062  45014 0          CLEAR     CALL
 0225  REF   7  LAST  634   32,2063  00662 0                    ERADFLAG
 0226  REF   5  LAST  634   32,2064  26524 0                    LALOTORV        R RECOV. IN ALPHAV AND MPAC

 0227                       32,2065  63256 0          UNIT      PDVL
 0228  REF  14  LAST  524   32,2066  02320 1                    RONE
 0229                       32,2067  50256 0          UNIT      DOT
 0230                       32,2070  65552 0          SL1       ARCCOS
 0231                       32,2071  77621 1          BDSU                      ERROR = THETA EST - THETA TARG
A0232                                                                NEGATIVE NUMBER SIGNIFIES THAT WILL FALL SHORT.
A0233                                                                POSITIVE NUMBER SIGNIFIES THAT WILL OVERSHOOT.
 0234  REF   3  LAST  647   32,2072  02341 0                    THETA(1)
 0235  REF   3  LAST  292   32,2073  36347 1  DELRDONE STCALL   RSP-RREC        DOWNRANGE RECOVERY RANGE ERROR    /360
 0236  REF   3  LAST  515   32,2074  27525 0                    INTWAKE0
 0237                       32,2075  77624 1          CALL
 0238  REF   1              32,2076  46616 1                    SPLRET
 0239                       32,2077  65345 0  CANTDO   DLOAD     PDDL            INITIALIZE ERASE TO DOT TARGET AND UR
A0240                                                                FOR RANGE ANGLE.
 0241  REF   7  LAST  617   32,2100  15334 1                    HIDPHALF        TO PDL 0 FOR DEN IN DDV.
 0242  REF  11  LAST  647   32,2101  15336 0                    HI6ZEROS
 0243                       32,2102  77606 1          PUSH                      ZERO TO PDL 2 FOR PHI ENTRY
 0244                       32,2103  34011 0          STCALL    8D
 0245  REF   1              32,2104  64046 1                    GETARG          GO SET RSP-RREC =0

 0246                       32,2105  77775 1  AUGEKUGL VLOAD
 0247  REF   1              32,2106  24266 0                    X1CON -2
 0248  REF  14  LAST  637   32,2107  14045 0          STODL     X1 -2
 0249                       32,2110  00001 0                    0
 0250                       32,2111  50025 0          DSU       BMN
 0251  REF   1              32,2112  24260 0                    V(21K)
 0252  REF   1              32,2113  64140 0                    LOOPSET
 0253                       32,2114  65060 1          XSU,1     XCHX,2
 0254  REF  18  LAST  641   32,2115  00050 1                    S1
 0255  REF  15  LAST  648   32,2116  00046 0                    X1
 0256                       32,2117  45324 0          XCHX,2    DSU
 0257  REF  19  LAST  648   32,2120  00050 1                    S1
 0258  REF   1              32,2121  24246 1                    V(3K)
 0259                       32,2122  65040 0          BMN       XCHX,2
 0260  REF   2  LAST  648   32,2123  64140 0                    LOOPSET
 0261  REF  20  LAST  648   32,2124  00050 1                    S1
 0262                       32,2125  50025 0          DSU       BMN
 0263  REF   1              32,2126  24256 0                    V(4K)
 0264  REF   3  LAST  648   32,2127  64140 0                    LOOPSET
 0265                       32,2130  65124 0          XCHX,2    XCHX,2
 0266  REF  21  LAST  648   32,2131  00050 1                    S1
```

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```
0267   REF  16  LAST  648    32,2132   00046 0                    X1
0268                        32,2133   50025 0          DSU       BMN
0269   REF   1              32,2134   24242 0                    V(400)
0270   REF   4  LAST  648    32,2135   64140 0                    LOOPSET
0271                        32,2136   77730 0          SXA,1
0272   REF  22  LAST  648    32,2137   00050 1                    S1
0273                        32,2140   52110 0  LOOPSET INCR,1     GOTO
0274                        32,2141   00001 0          DEC       1
0275   REF   1              32,2142   64145 0                    K1K2LOOP
0276                        32,2143   77730 0  K2CALC  SXA,1
0277   REF  23  LAST  649    32,2144   00050 1                    S1
0278                        32,2145   44745 1  K1K2LOOP DLOAD     DSU*
0279                        32,2146   00001 0                    0
0280   REF   1              32,2147   24255 0                    V(32K) +1,1
0281                        32,2150   42603 1          DMP*      DAD*
0282   REF   1              32,2151   24241 0                    YK1K2 +1,1
0283   REF   1              32,2152   24225 1                    CK1K2 +1,1
0284                        32,2153   60125 1          PDDL      TIX,1
0285                        32,2154   00003 1                    2
0286   REF   1              32,2155   64143 0                    K2CALC
0287                        32,2156   55225 1          DSU       BDDV
0288                        32,2157   40006 0          PUSH      BOV              PHI ENTRY PDL 40
0289   REF   1              32,2160   64203 1                    MAXPHI
0290                        32,2161   45240 0          BMN       DSU
0291   REF   2  LAST  649    32,2162   64203 1                    MAXPHI
0292   REF   1              32,2163   24210 1                    MAXPHIC
0293                        32,2164   77644 1          BPL
0294   REF   3  LAST  649    32,2165   64203 1                    MAXPHI
0295                        32,2166   45345 1  PHICALC DLOAD     DSU
0296                        32,2167   00001 0                    0
0297   REF   1              32,2170   24266 0                    V(26K)
0298                        32,2171   71244 0          BPL       DLOAD
0299   REF   1              32,2172   64200 1                    TGR26
0300   REF   1              32,2173   24262 1                    TLESS26
0301                        32,2174   77671 1          DDV
0302                        32,2175   00001 0                    0
0303                        32,2176   43405 1  TENT    DMP       RVQ
0304                        32,2177   00005 1                    4D
0305                        32,2200   52145 0  TGR26   DLOAD     GOTO
0306   REF   1              32,2201   24264 1                    TGR26CON
0307   REF   1              32,2202   64176 0                    TENT


0308                        32,2203   65345 0  MAXPHI  DLOAD     PDDL
0309   REF   2  LAST  649    32,2204   24210 1                    MAXPHIC
0310                        32,2205   77650 1          GOTO
0311   REF   1              32,2206   64166 1                    PHICALC
0312                        32,2207   02755 1  MAXPHIC 2DEC      .09259298        2000 NM FOR MAXIMUM PHI ENTRY
0312                        32,2210   01307 1
0313   REF   2 LAST  647 TO  649:    114   114*          COUNT*    $$/P30
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AC314 BELOW
AC315 <<<< TABLE IS INDEXED. KEEP IN ORDER >>>

```
0316  32,2211  00013 0          2DEC   7.07304526 E-4  5500
0316  32,2212  22652 0
0317  32,2213  00005 1          2DEC   3.08641975 E-4  2400
0317  32,2214  01642 0
0318  32,2215  00005 1          2DEC   3.08641975 E-4  2400
0318  32,2216  01642 0
0319  32,2217  77556 1          2DEC   -8.8888888 E-3  -3.2
0319  32,2220  53522 1
0320  32,2221  00055 1          2DEC   2.7777777 E-3   1
0320  32,2222  20266 1
0321  32,2223  00155 0  CK1K2    2DEC   6.6666666 E-3   2.4
0321  32,2224  07202 0
0322  32,2225  00000 1          2DEC   0               0
0322  32,2226  00000 1
0323  32,2227  77730 0          2DEC*  -1.86909989 E-5 B7*      -.443
0323  32,2230  71525 0
0324  32,2231  00000 1          2DEC   0
0324  32,2232  00000 1
0325  32,2233  04445 0          2DEC*  1.11639691 E-3 B7*      .001225
0325  32,2234  10102 0
0326  32,2235  03726 1          2DEC*  9.56911636 E-4 B7*      .00105
0326  32,2236  31201 0
0327  32,2237  01040 1  YK1K2    2DEC*  2.59733157 E-4 B7*           .000285
0327  32,2240  26313 1
0328  32,2241  00234 1  V(40K)   2DEC   1.2192 B-7
0328  32,2242  01660 0
0329  32,2243  25254 0  V(28K)   2DEC   85.344 B-7
0329  32,2244  01014 0
0330  32,2245  02222 1  V(3K)    2DEC   9.144 B-7
0330  32,2246  15646 1
0331  32,2247  22223 1  V(24K)   2DEC   73.152 B-7
0331  32,2250  16457 0
0332  32,2251  25254 0          2DEC   85.344 B-7
0332  32,2252  01014 0
0333  32,2253  30304 0  V(32K)   2DEC   97.536 B-7
0333  32,2254  23351 1
0334  32,2255  03030 1  V(4K)    2DEC   12.192 B-7
0334  32,2256  22335 1
0335  32,2257  20001 1  V(21K)   2DEC   64.008 B-7
0335  32,2260  00611 1
0336  32,2261  00033 1  TLESS26  2DEC*  5.70146688 E7 B-35*    8660PHI/V
0336  32,2262  05763 0
0337  32,2263  00053 1  TGR26CON 2DEC   7.2 E5 B-28     PHI/3
0337  32,2264  36200 0
0338  32,2265  23637 1  V(26K)   2DEC   79.248 B-7      26000
0338  32,2266  27636 1
0339  32,2267  00012 1  X1CON    DEC    10
```

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```
 0340                32,2270   00010 0          DEC     8
 0341                32,2271   00006 1          DEC     6
A0342                                          <<<< TABLE IS INDEXED. KEEP IN ORDER >>>>
A0343                                                ABOVE
```

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```
P0344   ..... AVFLAGA/P .....

R0345   SUBROUTINES USED

R0346           UPFLAG
R0347           DOWNFLAG
 0348   REF   2  LAST  487      4000                        SETLOC  P30SUBS
 0349                           4553                        BANK
 0349S  REF   1                                             COUNT*  $$/P30
 0350   REF  12  LAST  507   E4,1760                       EBANK=  SUBEXIT
 0351                           4553   0 0006 1  AVFLAGA   EXTEND                  AVFLAG = CSM
 0352   REF  13  LAST  652      4554  23'760 1             QXCH    SUBEXIT
 0353   REF  45  LAST  645      4555   0 5561 0             TC      DOWNFLAG
 0354   REF   5  LAST  500      4556    00050 1             ADRES   AVFLAG          BIT 5  FLAG 2
 0355   REF   6  LAST  632      4557   0 4606 0             TC      E7SETTER
 0356   REF   2  LAST  185   E7,1424                       EBANK=  ECSTEER
 0357   REF  24  LAST  529      4560   3 4754 0             CAF     BIT13
 0358   REF   3  LAST  652      4561  55'424 0             TS      ECSTEER          SET ECSTEER = 1
 0359   REF   2  LAST  428      4562   3 4756 1             CAF     EBANK4
 0360   REF  18  LAST  572      4563   54 003 0             TS      EBANK
 0361   REF  14  LAST  652   E4,1760                       EBANK=  SUBEXIT
 0362   REF  15  LAST  652      4564   0 1760 1             TC      SUBEXIT
 0363                           4565   0 0006 1  AVFLAGP    EXTEND                  AVFLAG = LEM
 0364   REF  16  LAST  652      4566  23'760 1             QXCH    SUBEXIT
 0365   REF  53  LAST  645      4567   0 5547 1             TC      UPFLAG
 0366   REF   6  LAST  652      4570    00050 1             ADRES   AVFLAG          BIT 5  FLAG 2
 0367   REF  17  LAST  652      4571   0 1760 1             TC      SUBEXIT
 0368                           4572   0 0006 1  P20FLGON   EXTEND
 0369   REF  18  LAST  652      4573  23'760 1             QXCH    SUBEXIT
 0370   REF  54  LAST  652      4574   0 5547 1             TC      UPFLAG
 0371   REF  11  LAST  644      4575    00031 0             ADRES   TRACKFLG
 0372   REF  55  LAST  652      4576   0 5547 1             TC      UPFLAG
 0373   REF   8  LAST  644      4577    00027 1             ADRES   UPDATFLG
 0373S  REF  46  LAST  652      4600   0 5561 0             TC      DOWNFLAG
 0373U  REF   5  LAST  586      4601    00244 0             ADRES   PCFLAG
 0374   REF  19  LAST  652      4602   0 1760 1             TC      SUBEXIT
```

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```
P0375
 0376   REF   1                  04,2000                    SETLOC  P31TAG
 0377                            04,3303                    BANK

 03775  REF   1                                             COUNT*  $$/P3136
 0378   REF   3  LAST  472       04,3303   0 4553 0  P31     TC      AVFLAGA
 0379   REF   3  LAST  472       04,3304   0 4572 0          TC      P20FLGON      SET TRACK,UPDATE, CLEAR FINAL FLAGS
 0380   REF 131  LAST  644       04,3305   0 6006 1          TC      INTPRET
 0381                            04,3306    45014 0  P31ALMRT CLEAR   CALL
 0382   REF   3  LAST  217       04,3307    05671 1          CSISFLAG
 0383   REF   1                  04,3310    11546 0          INPUTDSP
 0391                            04,3311    74014 1          BOFF    AXC,1
 0392   REF  24  LAST  634       04,3312    04343 1          CMOONFLG
 0393   REF   1                  04,3313    11315 0          COMPMU
 0394                            04,3314    00012 1          10D
 0395                            04,3315    51575 1  COMPMU  VLOAD   ABVAL
 0396   REF   6  LAST  555       04,3316    01555 0          RRECTCSM
 0397                            04,3317    62606 0          PUSH    PDVL*                          PL AT D4D
 0398   REF   3  LAST  496       04,3320    22301 0          MUTABLE,1     RTX1=1/MU B+34,B+28, RTMU=SQRT(MU)
 0399   REF   9  LAST  644       04,3321    27746 1          STOVL   RTX1  B-18,B-15, RTSR1/MU=1/SQRT(MU) B+17,B+14
 0400   REF   2  LAST  528       04,3322    01563 0          VRECTCSM
 0401                            04,3323    57236 1          VSQ     DMPR
 0402   REF  10  LAST  653       04,3324    03746 1          RTX1    VSQ/MU                         B+2 ,B+18
 0403                            04,3325    52405 1          DMP     SL3     R VSQ/MU          PL AT 02D  B-6
 0404                            04,3326    74421 0          BDSU    SR1R
 0405   REF   1                  04,3327    33416 1          D1/32   ( 2 - R VSQ/MU )                 B-7
 0406                            04,3330    41471 0          DDV     PUSH    ( 2 - R VSQ/MU )/R   AT 00D  B+22,B+20
 0407                            04,3331    55366 1          SQRT    BDDV    2 PI R/(2 - R VSQ/MU)      B-15,B-14
 0408   REF   1                  04,3332    33430 0          2PISC
 0409                            04,3333    65205 0          DMP     PDDL    2PI R SQRT(MU)/(2MU-R VSQ)  B-2,B-
 0410   REF   3  LAST  496       04,3334    03752 1          RTSR1/MU
 0411                            04,3335    65301 0          NORM    PDDL
 0412   REF  17  LAST  649       04,3336    00047 1          X1
 0413                            04,3337    56257 1          SL*     DDV
 0414                            04,3340    20172 1          0 -7D,1       HAFPA1 = PERIOD/2            B-28
 0415                            04,3341    77621 1          BDSU          TIG = ( TCSI - HAFPA1 )      B-28
 0416   REF   5  LAST  283       04,3342    02463 1          TCSI
 0418   REF  44  LAST  645       04,3343    03413 1          STORE   TIG   TIG = ( TCSI - PERIOD/2 )   B-28
 0419                            04,3344    77776 1          EXIT
 0420   REF   4  LAST  644       04,3345  3 5026 0          CA      V06N33
 0421   REF  23  LAST  645       04,3346  0 5535 1          TC      VNFLASH
 0422   REF 132  LAST  653       04,3347  0 6006 1          TC      INTPRET
 0423                            04,3350    77624 1  P31ONWRD CALL
 0424   REF   3  LAST  472       04,3351    11217 0          SELECTMU
 0425                            04,3352    71214 0  P31RECYC SET     DLOAD
 0426   REF   1                  04,3353    05470 1          HAFLAG
 0427   REF   6  LAST  653       04,3354    02463 1          TCSI
 0428                            04,3355    77624 1          CALL
 0429   REF   1                  04,3356    11441 0          P31ENT
 0430                            04,3357    77775 1  P31RT   VLOAD
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```
0433  REF   7  LAST  602   04,3360  11762 1                ZEROVEC
0434  REF  16  LAST  514   04,3361  17405 0          STODL DELVLVC
0435  REF   3  LAST  293   04,3362  02633 0                DIFFALT          DELTA H AT CDH
0436                       04,3363  57215 0          DAD   DMPR
0437  REF   2  LAST   96   04,3364  02370 1                HAMDELH          METERS          B-29
0438  REF   1              04,3365  11376 0                25THOUS          K = -.025                       B-
0439                       04,3366  45061 1          SL    CALL
0440                       04,3367  20206 1                5D
0441  REF   1              04,3370  24005 1                N90/N81
0442                       04,3371  77624 1          CALL                                  X
0443  REF   4  LAST  496   04,3372  73027 0                VN1645           S32/33.1,DISPLAYS AND COMPUTES DELVLVC
0444                       04,3373  77650 1          GOTO                  AND DELVSIN.
0445  REF   1              04,3374  11352 0                P31RECYC
0447                       04,3375  56574 1  25THOUS 2DEC* -.411447084 2 E-5 B+17*                        B+17
0447                       04,3376  47556 1
04471                      04,3377  13434 0  130DEGLO OCT    13434
04472                      04,3400  16163 1          OCT    16163
04473                      04,3401  22407 1  208DEGLO OCT    22407
04474                      04,3402  36673 0          OCT    36673
0448  REF   1              22,2000                  SETLOC P36TAG
0449                       22,3334                  BANK
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```
R0450                PLANE CHANGE TARGETING PROGRAM  P36
R0451   PURPOSE

R0452                TO COMPUTE PARAMETERS FOR PLANE CHANGE MANEUVER
R0453   INPUT

R0454                TCSI
R0455   OUTPUT

R0456                TIG    TIME OF PLANE CHANGE MANEUVER  COMPUTED TO BE
R0457                TCSI + 90 DEG TRANSFER TIME
R0458                DELVLVC DELTA VELOCITY AT PC - LOCAL VERTICAL
R0459                DELVSIN DELTA VELOCITY AT PC - REFERENCE

 04595  REF   1                                          COUNT*  $$/P3136
 0460   REF   4  LAST  653   22,3334  0 4553 0  P36     TC      AVFLAGA
 0461   REF   4  LAST  653   22,3335  0 4572 0          TC      P20FLGON      SET TRACK,UPDATE - CLEAR PC FLAGS
 0462   REF  56  LAST  652   22,3336  0 5547 1          TC      UPFLAG
 0463   REF   6  LAST  652   22,3337    00244 0         ADRES   PCFLAG

 0464   REF 133  LAST  653   22,3340  0 6006 1          TC      INTPRET
 0465                        22,3341    77624 1         CALL
 0466   REF   4  LAST  653   22,3342    11217 0                 SELECTMU
 0467                        22,3343    71214 0  P36A    SET     CLOAD
 0468   REF   3  LAST  644   22,3344    01067 1                 XDELVFLG
 0469   REF   7  LAST  653   22,3345    02463 1                 TCSI
 0470   REF  24  LAST  644   22,3346    34041 0         STCALL  TDEC1
 0471   REF   5  LAST  600   22,3347    27170 1                 CSMCONIC      INTEGRATE STATES TO TCSI
 0472                        22,3350    43145 0         DLOAD   SET
 0473   REF  30  LAST  641   22,3351    15336 0                 ZEROVECS
 0474   REF   3  LAST  468   22,3352    03466 0                 RVSW
 0475   REF   4  LAST  468   22,3353    16734 0         STODL   CSTH          COS 90 DEGREES
 0476   REF   1              22,3354    05547 1                 CS359+
 0477   REF   4  LAST  468   22,3355    26732 0         STOVL   SNTH          SINE 90 DEGREES
 0478   REF  18  LAST  644   22,3356    00001 0                 RATT
 0479                        22,3357    45115 0         PDVL    CALL
 0480   REF  16  LAST  644   22,3360    00007 0                 VATT
 0481   REF   1              22,3361    45320 1                 VECSHIFT
 0482   REF   6  LAST  498   22,3362    26746 0         STOVL   VVEC
 0483                        22,3363    77626 0         STADR
 0484   REF   4  LAST  498   22,3364    41120 1         STCALL  RVEC          COMPUTE TRANSFER TIME OF 90 DEG
 0485   REF   3  LAST  468   22,3365    25002 1                 TIMETHET
 0486                        22,3366    77615 0         DAD
 0487   REF   8  LAST  655   22,3367    02463 1                 TCSI
 0488   REF  45  LAST  653   22,3370    03413 1         STORE   TIG
 0489                        22,3371    77776 1         EXIT
 0490   REF   5  LAST  653   22,3372  3 5026 0          CAF     V06N33
 0491   REF  24  LAST  653   22,3373  0 5535 1          TC      VNFLASH
 0492   REF 134  LAST  655   22,3374  0 6006 1          TC      INTPRET
 0493                        22,3375    77624 1         CALL
```

L P30,P31 USER'S PAGE NO. 14 E4 S3

```
0494  REF   5  LAST  654   22,3376  73027 0                    VN1645
0495                       22,3377  45175 0  P36RECYC VLOAD    CALL
0496  REF  31  LAST  655   22,3400  15336 0                    ZEROVECS
0497  REF   2  LAST  654   22,3401  24005 1                    N90/N81        DISPLAY N90,N81 COMPUTE YDOT
0498                       22,3402  77624 1           CALL
0499  REF   6  LAST  656   22,3403  73027 0                    VN1645
0500                       22,3404  77650 1           GOTO
0501  REF   1              22,3405  45377 0                    P36RECYC
0502  REF   1              12,2000                    SETLOC   N90TAG
0503                       12,2005                    BANK
```

L P30,P31 USER'S PAGE NO. 15 E4 S3

```
P0504   ...... N90/N81 ....... COMPUTES YDOT, DISPLAYS N90 AND N81 FOR P31,P36
 05045  REF   1                          COUNT* $$/P3136
 0505                      12,2005  77620 0  N90/N81  STQ
 0506   REF   2  LAST  105  12,2006  02551 1           N90RET
 0507   REF  17  LAST  654  12,2007  17405 0           STODL   DELVLVC
 0508   REF  46  LAST  655  12,2010  03413 1           TIG
 0509   REF  25  LAST  655  12,2011  34041 0           STCALL  TDEC1
 0510   REF   3  LAST  472  12,2012  45236 1           PRECSET
 0511                      12,2013  43014 0           BON     SET
 0512   REF   7  LAST  496  12,2014  01311 0           FINALFLG
 0513                      12,2015  24017 1           +2
 0514   REF   9  LAST  652  12,2016  00470 1           UPDATFLG
 0515                      12,2017  77775 1       +2  VLOAD
 0516   REF  13  LAST  500  12,2020  03546 0           VACT3
 0517   REF   6  LAST  644  12,2021  27640 0           STOVL   VTIG
 0518   REF  22  LAST  644  12,2022  03540 0           RACT3
 0519   REF   4  LAST  644  12,2023  37632 1           STCALL  RTIG
 0520   REF   1                    12,2024  15756 1           DISPN90
 0525                      12,2025  77624 1           CALL
 0526   REF   4  LAST  644  12,2026  72721 0           LOMAT
 0527                      12,2027  61375 1           VLOAD   VXM
 0528   REF  18  LAST  657  12,2030  03405 0           DELVLVC         ROTATE DV (LV TO REF)
 0529                      12,2031  00001 0           GD
 0530                      12,2032  77772 0           VSL1
 0531   REF   7  LAST  645  12,2033  37646 1           STCALL  DELVSIN
 0532   REF   3  LAST  657  12,2034  02551 1                   N90RET
```

L P32-P33, P72-P73 USER'S PAGE NO. 1 EO 53

PC010 COELLIPTIC SEQUENCE INITIATION (CSI) PROGRAMS (P32 AND P72)

R0011 MOD NO -1 LOG SECTION - P32-P35, P72-P75
R0012 MOD BY WHITE.P DATE 1JUNE67

R0013 PURPOSE

R0014 (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE FOLLOWING
R0015 CONCENTRIC FLIGHT PLAN MANEUVERS - THE CO-ELLIPTIC SEQUENCE
R0016 INITIATION (CSI) MANEUVER AND THE CONSTANT DELTA ALTITUDE
R0017 (CDH) MANEUVER.

R0018 (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0019 APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0020 (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R0021 ASSOCIATED WITH THE CONCENTRIC FLIGHT PLAN MANEUVERS FOR
R0022 APPROVAL BY THE ASTRONAUT/GROUND.

R0023 (4) TO STORE THE CSI TARGET PARAMETERS FOR USE BY THE DESIRED
R0024 THRUSTING PROGRAM.

R0025 ASSUMPTIONS

R0026 (1) AT A SELECTED TPI TIME THE LINE OF SIGHT BETWEEN THE ACTIVE
R0027 AND PASSIVE VEHICLES IS SELECTED TO BE A PRESCRIBED ANGLE (E)
R0028 FROM THE HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE
R0285 POSITION.

R0029 (2) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION MUST BE
R0030 COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0031 COMPLETION OF THE PROGRAM.

R0032 (3) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION MUST BE
R0033 COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0034 COMPLETION OF THE PROGRAM.

R0035 (4) CDH DELTA V IS SELECTED TO MINIMIZE THE VARIATION OF THE
R0036 ALTITUDE DIFFERENCE BETWEEN THE ORBITS.

R0037 (5) CSI BURN IS DEFINED SUCH THAT THE IMPULSIVE DELTA V IS IN THE
R0038 HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION AT CSI
R0385 IGNITION.

R0039 (6) THE PERICENTER ALTITUDE OF THE ORBIT FOLLOWING CSI AND CDH
R0040 MUST BE GREATER THAN 35,000 FT (LUNAR ORBIT) OR 85 NM (EARTH
R0041 ORBIT) FOR SUCCESSFUL COMPLETION OF THIS PROGRAM.

R0042 (7) THE CSI AND CDH MANEUVERS ARE ORIGINALLY ASSUMED TO BE
R0043 PARALLEL TO THE PLANE OF THE CSM ORBIT. HOWEVER CREW

MODIFICATION OF DELTA V (LV) COMPONENTS MAY RESULT IN AN OUT-OF-PLANE CSI MANEUVER.

(8) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 10).

(9) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY THE GROUND. THESE STORAGE CAPABILITIES ARE NORMALLY LIMITED ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

(10) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM OR CSM STATE VECTORS FOR THIS PROGRAM. IF RADAR USE IS DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY PREVIOUS SELECTION OF P20. RADAR SIGHTING MARKS WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH THRUSTING MANEUVER.

(11) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

(12) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH CALCULATES THE MANEUVER PARAMETERS. SET AT THE START OF EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY CYCLE.

EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

(13) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO A THRUSTING MANEUVER.

(14) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

P32 IF THIS VEHICLE IS ACTIVE VEHICLE.

P72 IF THIS VEHICLE IS PASSIVE VEHICLE.

INPUT

(1) TCSI TIME OF THE CSI MANEUVER

```
RC112          (2) NN        NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
RC113                        VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
RC114                        MANEUVER POINT
RC115          (3) ELEV      DESIRED LOS ANGLE AT TPI
RC116          (4) TTPI      TIME OF THE TPI MANEUVER
RC130    OUTPUT

RC131          (1) TRKMKCNT  NUMBER OF MARKS
RC132          (2) TTOGO     TIME TO GO
RC133          (3) +MGA      MIDDLE GIMBAL ANGLE
RC134          (4) DIFFALT   DELTA ALTITUDE AT CDH
RC135          (5) T1TOT2    DELTA TIME FROM CSI TO CDH
RC136          (6) T2TOT3    DELTA TIME FROM CDH TO TPI
RC137          (7) DELVLVC   DELTA VELOCITY AT CSI - LOCAL VERTICAL COORDINATES
RC138          (8) DELVLVC   DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

RC139    DOWNLINK

RC1391         (1) TCSI      TIME OF THE CSI MANEUVER
RC1392         (2) TCDH      TIME OF THE CDH MANEUVER
RC1393         (3) TTPI      TIME OF THE TPI MANEUVER
RC1394         (4) TIG       TIME OF THE CSI MANEUVER
RC1395         (5) DELVEET1  DELTA VELOCITY AT CSI - REFERENCE COORDINATES
RC1396         (6) DELVEET2  DELTA VELOCITY AT CDH - REFERENCE COORDINATES
RC1397         (7) DIFFALT   DELTA ALTITUDE AT CDH
RC1398         (8) NN        NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
RC1399                       VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
RC140                        MANEUVER POINT
RC1401         (9) ELEV      DESIRED LOS ANGLE AT TPI

RC1402   COMMUNICATION TO THRUSTING PROGRAMS

RC1403         (1) TIG       TIME OF THE CSI MANEUVER
RC1404         (2) RTIG      POSITION OF ACTIVE VEHICLE AT CSI - BEFORE ROTATION
RC1405                       INTO PLANE OF PASSIVE VEHICLE
RC1406         (3) VTIG      VELOCITY OF ACTIVE VEHICLE AT CSE - BEFORE ROTATION
RC1407                       INTO PLANE OF PASSIVE VEHICLE
RC1408         (4) DELVSIN   DELTA VELOCITY AT CSI - REFERENCE COORDINATES
RC1409         (5) DELVSAB   MAGNITUDE OF DELTA VELOCITY AT CSI
RC141          (6) XDELVFLG  SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

RC150    SUBROUTINES USED

RC151          AVFLAGA
RC152          AVFLAGP
RC1525         P20FLGON
RC153          VARALARM
RC154          BANKCALL
RC155          GOFLASH
RC156          GOTOPOOH
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RC1562          VNPOOH
RC1564          GOFLASHR
RC157           BLANKET
RC158           ENDOFJOB
RC159           SELECTMU
RC160           ADVANCE
RC161           INTINT
RC162           PASSIVE
RC163           CSI/A
RC164           S32/33.1
RC165           DISDVLVC
RC166           VN1645

  0401   REF   1                  04,2000                          SETLOC  CSI/CDH1
  0402                            04,3403                          BANK
  0403   REF  20  LAST  652       E4,1760                          EBANK=  SUBEXIT
  0404   REF   1                                                   COUNT*  $$/P3272
  0500   REF   5  LAST  655       04,3403   0 4553 0  P32         TC      AVFLAGA
  0502   REF   1                  04,3404   0 3424 0              TC      P32/P72A

  0503   REF   3  LAST  472       04,3405   0 4565 0  P72         TC      AVFLAGP
  05031  REF   2  LAST  661       04,3406   0 3424 0              TC      P32/P72A
  05032                           04,3407    77734 1  ALMXITA     SXA,2
  05033  REF   2  LAST  133       04,3410    03664 0                      CSIALRM
  05034                           04,3411    77740 1  ALMXIT      LXC,1
  05035  REF   3  LAST  661       04,3412    03664 0                      CSIALRM
  05038                           04,3413    77533 1              SLOAD*  EXIT
  05039  REF   1                  04,3414    13270 0                      ALARM/TB -1,1
  0504   REF 259  LAST  639       04,3415  3 0154 1              CA      MPAC
  05041  REF   2  LAST  167       04,3416   0 5770 1              TC      VARALARM
  05042  REF   2  LAST  467       04,3417   3 5023 0              CAF     V05N09
  05043  REF 139  LAST  640       04,3420   0 4636 0              TC      BANKCALL
  05044  REF  15  LAST  626       04,3421    20743 0              CADR    GOFLASH
  05045  REF  28  LAST  645       04,3422   0 4103 1              TC      GOTOPOOH
  05046                           04,3423   0 3417 0              TC      -4
  0505   REF   5  LAST  655       04,3424   0 4572 0  P32/P72A    TC      P20FLGON
  05051  REF 135  LAST  655       04,3425   0 6006 1              TC      INTPRET
  0506                            04,3426    45014 0              BON     CALL
  0507   REF   2  LAST  653       04,3427    05710 1                      HAFLAG
  0508   REF   1                  04,3430    11306 1                      P31ALMRT
  0509   REF   2  LAST  653       04,3431    11546 0                      INPUTDSP
  0521                            04,3432    71214 0              CLEAR   DLOAD
  05215  REF   4  LAST  653       04,3433    05671 1                      CSISFLAG
  0522   REF   9  LAST  655       04,3434    02463 1                      TCSI
  0523   REF  47  LAST  657       04,3435    37413 0              STCALL  TIG
  0524   REF   5  LAST  655       04,3436    11217 0                      SELECTMU
  0525                            04,3437    77745 1  P32/P72B    DLOAD
  05251  REF  48  LAST  661       04,3440    03413 1                      TIG
  05252                           04,3441    77624 1  P31ENT      CALL
  0526   REF   2  LAST  220       04,3442    76560 0                      ADVANCE
```

```
0527                                  04,3443  77201 1                SETPD   VLOAD
0528                                  04,3444  00001 0                        0D
0529   REF    1                       04,3445  03512 1                        VPASS1
0530                                  04,3446  65315 0                PDVL    PDDL
0531   REF    2  LAST  133            04,3447  03756 0                        RPASS1
0532   REF   10  LAST  661            04,3450  02463 1                        TCSI
0533                                  04,3451  65325 0                PDDL    PDDL
0534   REF   11  LAST  476            04,3452  03663 1                        TTPI
0535   REF    2  LAST  653            04,3453  33430 0                        2PISC
0536                                  04,3454  41512 1                SL2     PUSH
05365                                 04,3455  77624 1                CALL
0537   REF    3  LAST  481            04,3456  72740 1                        INTINT
0538                                  04,3457  77624 1                CALL
0539   REF    3  LAST  500            04,3460  45314 0                        PASSIVE
0540                                  04,3461  77624 1                CALL
0541   REF    1                       04,3462  15672 0                        CSI7A
0542                                  04,3463  43214 1  P32/P72C      BONCLR  DAD
05421  REF    3  LAST  661            04,3464  05610 0                        HAFLAG
05422  REF    1                       04,3465  11357 0                        P31RT
05423  REF    2  LAST  231            04,3466  26731 0                        600SECS
05424  REF    2  LAST  293            04,3467  03656 1                STORE   T2TOT3

05425                                 04,3470  43014 0                BON     SET
0543   REF    8  LAST  657            04,3471  01311 0                        FINALFLG
0544   REF    1                       04,3472  11474 0                        P32/P72D
0545   REF   10  LAST  657            04,3473  00470 1                        UPDATFLG
0546                                  04,3474  77745 1  P32/P72D      DLOAD
0547   REF    3  LAST  293            04,3475  02547 0                        T1TOT2
0548   REF    4  LAST  662            04,3476  02547 0  P32/P72E      STORE   T1TOT2
0549                                  04,3477  51025 1                DSU     BPL
0550   REF    1                       04,3500  13267 0                        60MIN
0551   REF    1                       04,3501  11476 1                        P32/P72E
0552                                  04,3502  77745 1                DLOAD
0553   REF    3  LAST  662            04,3503  03656 1                        T2TOT3
0554   REF    4  LAST  662            04,3504  03656 1  P32/P72F      STORE   T2TOT3
0555                                  04,3505  51025 1                DSU     BPL
0556   REF    2  LAST  662            04,3506  13267 0                        60MIN
0557   REF    1                       04,3507  11504 0                        P32/P72F
0558                                  04,3510  77414 0                BON     EXIT            BYPASS N75 IN MINKEY
05581  REF   13  LAST  580            04,3511  05310 0                        AUTOSEQ
05582  REF    1                       04,3512  11516 0                        PASS75

0559   REF    1                       04,3513  3 4605 0               CAF     V06N75
0560   REF   25  LAST  655            04,3514  0 5535 1               TC      VNFLASH
0561   REF  136  LAST  661            04,3515  0 6006 1               TC      INTPRET
0562                                  04,3516  77624 1  PASS75        CALL
0563   REF    1                       04,3517  76537 1                        DISPVLVC        ROTATE TO LV, DISP N90, ROTATE TO REF
0564                                  04,3520  77775 1                VLOAD
0565   REF    2  LAST  105            04,3521  02453 1                        RACT2
0566   REF    2  LAST  105            04,3522  36541 1                STCALL  RACT1
```

L P32-P33, P72-P73 USER'S PAGE NO. 6 E4 S3

```
C0567  REF   2  LAST  220   04,3523   32050 0                 S32/33.X        GET REF/LV MATRIX AT OD
C0568                      04,3524   64375 1          VLOAD  MXV
C0569  REF   4  LAST  220   04,3525   03667 0                 DELVEET2
C0570                      04,3526   00001 0                 OD
C0571                      04,3527   77772 0          VSL1
C0572  REF  14  LAST  514   04,3530   03540 0          STORE  DELVOV          LV FOR N 82 DISPLAY
C0573                      04,3531   77414 0          BON    EXIT
C0574  REF  14  LAST  662   04,3532   05310 0                 AUTOSEQ
C0575  REF   1              04,3533   11537 0                 PASS82
C0576  REF   1              04,3534   3 3545 0         CAF    V06N82
C0577  REF  26  LAST  662   04,3535   0 5535 1         TC     VNFLASH
C0578  REF 137  LAST  662   04,3536   0 6006 1         TC     INTPRET
C0579                      04,3537   77745 1 PASS82   DLOAD
C0580  REF  12  LAST  662   04,3540   03663 1                 TTPI
C0581  REF   1              04,3541   36465 0          STCALL TTPI0
C0582  REF   7  LAST  656   04,3542   73027 0                 VN1645
C0583                      04,3543   77650 1          GOTO
C0584  REF   1              04,3544   11437 1                 P32/P72B
C0585                      04,3545   01522 0 V06N82   VN     0682

C5855  REF   1              15,3432             HIGH1  EQUALS ONEBIT +1

C58552                     04,3546   71220 1 INPUTDSP STQ    DLOAD
C58554 REF   4  LAST  657   04,3547   02551 1                 N90RET
C58556 REF   1              04,3550   11400 0                 130DEGLO
C58558 REF   7  LAST  468   04,3551   17754 1          STODL  CENTANG
C5856  REF   1              04,3552   11402 1                 208DEGLO
C58562 REF  12  LAST  476   04,3553   03744 0          STORE  ELEV
C58564                     04,3554   67214 1          BON    SLOAD
C58566 REF   5  LAST  661   04,3555   05711 0                 CSISFLAG
C58568 REF   1              04,3556   11561 0                 PASSNN
C5857  REF   1              04,3557   33433 0                 HIGH1
C58572 REF  10  LAST  479   04,3560   03766 0          STORE  NN
C58574                     04,3561   77776 1 PASSNN   EXIT
C58576 REF   1              04,3562   3 4603 0         CAF    V06N11
C58578 REF  27  LAST  663   04,3563   0 5535 1         TC     VNFLASH
C5858  REF   3  LAST  467   04,3564   3 4533 0         CAF    V06N55
C58582 REF  28  LAST  663   04,3565   0 5535 1         TC     VNFLASH
C58584 REF   3  LAST  467   04,3566   3 4532 1         CAF    V06N37
C58586 REF  29  LAST  663   04,3567   0 5535 1         TC     VNFLASH
C58588 REF 138  LAST  663   04,3570   0 6006 1         TC     INTPRET
C5859                      04,3571   77650 1          GOTO
C58592 REF   5  LAST  663   04,3572   02551 1                 N90RET
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P0586 CONSTANT DELTA HEIGHT (CDH) PROGRAMS (P33 AND P73)

R0587 MOD NO -1 LOG SECTION - P32-P35, P72-P75
R0588 MOD BY WHITE.P DATE 1JUNE67
R0589 PURPOSE

R0590 (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE CONSTANT DELTA
R0591 ALTITUDE MANEUVER (CDH).

R0592 (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0593 APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0594 (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R0595 ASSOCIATED WITH THE CDH MANEUVER FOR APPROVAL BY THE
R0596 ASTRONAUT/GROUND.

R0597 (4) TO STORE THE CDH TARGET PARAMETERS FOR USE BY THE DESIRED
R0598 THRUSTING PROGRAM.

R0599 ASSUMPTIONS

R0600 (1) THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF THE
R0601 CO-ELLIPTIC SEQUENCE INITIATION (CSI) PROGRAM (P32/P72).
R0602 THERFORE -

R0603 (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R0604 BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R0605 A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R0606 HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R0607 (B) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION WAS
R0608 COMPUTED TO BE GREATER THAN 10 MINUTES.

R0609 (C) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R0610 COMPUTED TO BE GREATER THAN 10 MINUTES.

R0611 (D) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R0612 ORBITS WAS MINMIZED.

R0613 (E) CSI BURN WAS DEFINED SUCH THAT THE IMPULSIVE DELTA V WAS
R0614 IN THE HORIZONTAL PLANE DEFINED BY ACTIVE VEHICLE

R0615 POSITION AT CSI IGNITION.

R0616 (F) THE PERICENTER ALTITUDES OF THE ORBITS FOLLOWING CSI AND
R0617 CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
R0618 ORBIT OR 85 NM FOR EARTH ORBIT.

R0619 (G) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R0620 THE PLANE OF THE PASSIVE VEHICLE ORBIT. HOWEVER, CREW

RC621 MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED
RC622 IN AN OUT-OF-PLANE MANEUVER.

RC623 (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
RC624 STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 4).

RC625 (3) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY
RC626 THE GROUND. THESE STORAGE CAPABILITES ARE NORMALLY LIMITED
RC627 ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME
RC628 EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

RC629 (4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
RC630 OR CSM STATE VECTORS FOR THIS PROGRAM. IF RADAR USE IS
RC631 DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
RC632 PREVIOUS SELECTION OF P20. RADAR SIGHTING MARKS WILL BE MADE
RC633 AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
RC634 TRACK AND UPDATE FLAGS (SEE P20). THE RENDEZVOUS TRACKING
RC635 MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
RC636 THRUSTING MANEUVER.

RC637 (5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

RC638 (6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

RC639 ACTIVE VEGICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
RC640 DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
RC641 CALCULATES THE MANEUVER PARAMETERS. SET AT THE START OF
RC642 EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

RC643 FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
RC644 COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY
RC645 CYCLE.

RC646 EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF
RC647 STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE
RC648 THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS
RC649 PROGRAM.

RC650 (7) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO
RC651 A THRUSTING MANEUVER.

RC652 (8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

RC653 P33 IF THIS VEHICLE IS ACTIVE VEHICLE.

RC654 P73 IF THIS VEHICLE IS PASSIVE VEHICLE.

RC655 INPUT

RC656 (1) TTPI0 TIME OF THE TPI MANEUVER - SAVED FROM P32/P72

```
RC657          (2) ELEV      DESIRED LOS ANGLE AT TPI - SAVED FROM P32/P72
RC658          (3) TCDH      TIME OF THE CDH MANEUVER

RC659    OUTPUT

RC660          (1) TRKMKCNT NUMBER OF MARKS
RC661          (2) TTOGO     TIME TO GO
RC662          (3) +MGA      MIDDLE GIMBAL ANGLE
RC663          (4) DIFFALT   DELTA ALTITUDE AT CDH
RC664          (5) T2TOT3    DELTA TIME FROM CDH TO COMPUTED TPI
RC665          (6) NOMTPI    DELTA TIME FROM NOMINAL TPI TO COMPUTED TPI
RC666          (7) DELVLVC   DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

RC667    DOWNLINK

RC668          (1) TCDH      TIME OF THE CDH MANEUVER
RC669          (2) TTPI      TIME OF THE TPI MANEUVER
RC670          (3) TIG       TIME OF THE CDH MANEUVER
RC671          (4) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
RC672          (5) DIFFALT   DELTA ALTITUDE AT CDH
RC673          (6) ELEV      DESIRED LOS ANGLE AT TPI
RC674    COMMUNICATION TO THRUSTING PROGRAMS

RC675          (1) TIG       TIME OF THE CDH MANEUVER
RC676          (2) RTIG      POSITION OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
RC677                        INTO PLANE OF PASSIVE VEHICLE
RC678          (3) VTIG      VELOCITY OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
RC679                        INTO PLANE OF PASSIVE VEHICLE
RC680          (4) DELVSIN   DELTA VELOCITY AT CDH - REFERENCE COORDINATES
RC681          (5) DELVSAB   MAGNITUDE OF DELTA VELOCITY AT CDH
RC682          (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

RC683    SUBROUTINES USED

RC684          AVFLAGA
RC685          AVFLAGP
RC686          P20FLGON
RC687          VNPOOH
RC688          SELECTMU
RC689          ADVANCE
RC690          CDHMVR
RC691          INTINT3P
RC692          ACTIVE
RC693          PASSIVE
RC694          S33/34.1
RC695          ALARM
RC696          BANKCALL
RC697          GOFLASH
RC698          GOTOPOOH
RC699          S32/33.1
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```
R0700          VN1645

 0701   REF    1                                          COUNT* $$/P3373
 0702   REF    6  LAST  661   04,3573  0 4553 0  P33      TC     AVFLAGA
 0703   REF    1             04,3574  0 3576 0           TC     P33/P73A
 0704   REF    4  LAST  661   04,3575  0 4565 0  P73      TC     AVFLAGP
 0705   REF    6  LAST  661   04,3576  0 4572 0  P33/P73A TC     P20FLGON
 0708   REF    1             04,3577  3 4604 1           CAF    V06N13          TCDH
 0709   REF   30  LAST  663   04,3600  0 5535 1           TC     VNFLASH
 0710   REF  139  LAST  663   04,3601  0 6006 1           TC     INTPRET
 0711                         04,3602    77745 1           DLOAD
 0712   REF    2  LAST  663   04,3603    02465 1                  TTPI0
 0713   REF   13  LAST  663   04,3604    17663 1           STODL  TTPI
 0714   REF    6  LAST  586   04,3605    02461 0                  TCDH
 0715   REF   49  LAST  661   04,3606    37413 0           STCALL TIG
 0716   REF    6  LAST  661   04,3607    11217 0                  SELECTMU
 0717                         04,3610    45145 0  P33/P73B DLOAD  CALL
 07175  REF   50  LAST  667   04,3611    03413 1                  TIG
 0718   REF    3  LAST  661   04,3612    76560 0                  ADVANCE
 0719                         04,3613    77624 1           CALL
 0720   REF    2  LAST  220   04,3614    56674 1                  CDHMVR
 0721   REF    3  LAST  180   04,3615    02445 0           STORE  DELVEET1        CDH DV TO USE DISDVLVC SUB FOR N81 DISP
 0722                         04,3616    77201 1           SETPD  VLOAD
 0723                         04,3617    00001 0                  0D
 0724   REF   14  LAST  657   04,3620    03546 0                  VACT3
 0725                         04,3621    45115 0           PDVL   CALL
 0726   REF    3  LAST  662   04,3622    02453 1                  RACT2
 0727   REF    1             04,3623    63615 0                  INTINT3P
 0728                         04,3624    77624 1           CALL
 0729   REF    3  LAST  500   04,3625    45304 1                  ACTIVE
 0730                         04,3626    77201 1           SETPD  VLOAD
 0731                         04,3627    00001 0                  0D
 0732   REF    2  LAST  105   04,3630    02617 0                  VPASS2
 0733                         04,3631    45115 0           PDVL   CALL
 0734   REF    2  LAST  105   04,3632    02625 1                  RPASS2
 0735   REF    2  LAST  667   04,3633    63615 0                  INTINT3P
 0736                         04,3634    77624 1           CALL
 0737   REF    4  LAST  662   04,3635    45314 0                  PASSIVE
 0738                         04,3636    43145 0           DLOAD  SET
 0739   REF    8  LAST  654   04,3637    11762 1                  ZEROVEC
 0740   REF    5  LAST  473   04,3640    03461 1                  ITSWICH
 0741   REF    7  LAST  483   04,3641    36355 1           STCALL NOMTPI
 0742   REF    2  LAST  467   04,3642    72251 1                  S33/34.1
 0743                         04,3643    77454 1           BZE    EXIT
 0744   REF    1             04,3644    24035 1                  P33/P73C
 0745   REF   23  LAST  607   04,3645  0 5671 1           TC     ALARM
 0746                         04,3646    00611 1           OCT    611
 0747   REF    3  LAST  661   04,3647  3 5023 0           CAF    V05N09
 0748   REF  140  LAST  661   04,3650  0 4636 0           TC     BANKCALL
 0749   REF   16  LAST  661   04,3651    20743 0           CADR   GOFLASH
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C750   REF  29 LAST  661   04,3652  0 4103 1            TC      GOTOPOOH
C751                       04,3653  0 3655 1            TC      +2
C752   REF   2 LAST  667   04,3654  0 3576 0            TC      P33/P73A
C753   REF 140 LAST  667   04,3655  0 6006 1            TC      INTPRET
C754                       04,3656  77745 1             DLOAD
C755   REF   9 LAST  667   04,3657  11762 1                    ZEROVEC
C756   REF   8 LAST  667   04,3660  36355 1             STCALL  NOMTPI
C757   REF   2 LAST  667   04,3661  24035 1                    P33/P73C
C758   REF   1             12,2000                     SETLOC  CSI/CDH2
C759                       12,2035                     BANK

C7595  REF   1                                         COUNT*  $$/P3373
C760                       12,2035  43014 0  P33/P73C  BON     SET
C761   REF   9 LAST  662   12,2036  01311 0                    FINALFLG
C762   REF   1             12,2037  24041 1                    P33/P73D
C763   REF  11 LAST  662   12,2040  00470 1                    UPDATFLG
C764                       12,2041  43345 1  P33/P73D  DLOAD   DAD
C765   REF   9 LAST  668   12,2042  02355 0                    NOMTPI
C766   REF  14 LAST  667   12,2043  03663 1                    TTPI
C767   REF  15 LAST  668   12,2044  03663 1             STORE   TTPI
C768                       12,2045  52025 1             DSU     GOTO
C769   REF   7 LAST  667   12,2046  02461 0                    TCDH
C770   REF   1             12,2047  11662 0                    P33/P73E
C771   REF   2 LAST  661   04,2000                     SETLOC  CSI/CDH1
C772                       04,3662                     BANK

C7725  REF   2 LAST  667 TO  668:    55    55*         COUNT*  $$/P3373
C773                       04,3662  51025 1  P33/P73E  DSU     BPL
C774   REF   3 LAST  662   04,3663  13267 0                    60MIN
C775   REF   2 LAST  668   04,3664  11662 0                    P33/P73E
C776                       04,3665  77615 0             DAD
C777   REF   4 LAST  668   04,3666  13267 0                    60MIN
C778   REF   5 LAST  662   04,3667  16547 0             STODL   T1TOT2
C779   REF  16 LAST  668   04,3670  03663 1                    TTPI
C780                       04,3671  41425 1             DSU     PUSH
C781   REF   3 LAST  667   04,3672  02465 1                    TTPIC
C782                       04,3673  45246 0  P33/P73F  ABS     DSU
C783   REF   5 LAST  668   04,3674  13267 0                    60MIN
C784                       04,3675  43244 1             BPL     DAD
C785   REF   1             04,3676  11673 0                    P33/P73F
C786   REF   6 LAST  668   04,3677  13267 0                    60MIN
C787                       04,3700  45565 0             SIGN    STADR
C788   REF   5 LAST  662   04,3701  74121 0             STORE   T2TOT3
C789                       04,3702  77414 0             BON     EXIT
C790   REF  15 LAST  663   04,3703  05310 0                    AUTOSEQ
C791   REF   1             04,3704  11710 1                    SKIP75

C792   REF   2 LAST  662   04,3705  3 4605 0             CAF     V06N75
C793   REF  31 LAST  667   04,3706  0 5535 1             TC      VNFLASH
C794   REF 141 LAST  668   04,3707  0 6006 1             TC      INTPRET
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0795                                04,3710  77624 1  SKIP75   CALL
0796  REF   2  LAST  662            04,3711  76537 1           DISDVLVC      PUT UP N81, COMPUTE DELVSIN
0797                                04,3712  77624 1           CALL
0798  REF   8  LAST  663            04,3713  73027 0           VN1645
0799                                04,3714  77650 1           GOTO
0800  REF   1                       04,3715  11610 0           P33/P73B
0801  REF   3  LAST  592             4000                     SETLOC FFTAG12
0802                                  4603                     BANK

0802.5 REF  1                                                  COUNT* $$/P3272
0803                                  4603   01413 0  V06N11   VN     0611
0804                                  4604   01415 0  V06N13   VN     0613
0805                                  4605   01513 1  V06N75   VN     0675
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P0807   ..... DISDVLVC .....

R0808   SUBROUTINES USED

R0809         S32/33.X
R0810          VNPOOH

 0811   REF   1                37,2000                        SETLOC  CDHTAG3
 0812                          37,2537                        BANK

 C8125  REF   1                                               COUNT*  $$/CSI
 0813                          37,2537   45020 1  DISDVLVC    STQ     CALL
 0814   REF  15  LAST  500     37,2540   01023 1                      NORMEX
 0815   REF   3  LAST  663     37,2541   32050 0                      S32/33.X
 0816                          37,2542   64375 1              VLOAD   MXV
 0817   REF   4  LAST  667     37,2543   02445 0                      DELVEET1
 0818                          37,2544   00001 0                      0D
 0819                          37,2545   77772 0              VSL1
 0820   REF  19  LAST  657     37,2546   37405 1              STCALL  DELVLVC          REF TO L V
 0821   REF   2  LAST  657     37,2547   15756 1                      DISPN90
 0826                          37,2550   77624 1              CALL
 0827   REF   4  LAST  670     37,2551   32050 0                      S32/33.X
 0828                          37,2552   61375 1              VLOAD   VXM
 0829   REF  20  LAST  670     37,2553   03405 0                      DELVLVC
 0830                          37,2554   00001 0                      0D
 0831                          37,2555   77772 0              VSL1
 0832   REF   8  LAST  657     37,2556   37646 1              STCALL  DELVSIN          L V TO REF
 0833   REF  16  LAST  670     37,2557   01023 1                      NORMEX
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P0834   ..... CSI/A     .....

R0835   SUBROUTINES USED

R0836           VECSHIFT
R0837           TIMETHET
R0838           PERIAPO
R0839           SHIFTR1
R0840           INTINT2C
R0841           CDHMVR
R0842           PERIAPO1
R0843           INTINT
R0844           ACTIVE

 0846   REF   1                 05,2000                         SETLOC  CSITAG1
 0847                           05,3266                         BANK
 0848   REF  21  LAST  661      E4,1760                         EBANK=  SUBEXIT
 0849   REF   1                                                 COUNT*  $$/CSI
 0850                           05,3266   00025 0  60MIN       2DEC    360000
 0850                           05,3267   37100 1
 0855                           05,3270   00600 1  ALARM/TB    OCT     00600           NO 1
 0856                           05,3271   00601 0               OCT     00601             2
 0857                           05,3272   00602 0               OCT     00602             3
 0858                           05,3273   00603 1               OCT     00603             4
 0859                           05,3274   00604 0               OCT     00604             5
 0860                           05,3275   00605 1               OCT     00605             6
 0861                           05,3276   00606 1               OCT     00606             7
 0862   REF   1                 15,3416                 LOOPMX  =       D1/1024 -1      16 B-28
 0863                           05,3277   00003 1       INITST  2DEC    .03048 B-7            INITIAL DELDV = 10 FPS
 0863                           05,3300   34661 1
 0864                           05,3301   00606 1       DVMAX1  2DEC    3.0480 B-7            MAXIMUM DV1 = 1000 FPS
 0864                           05,3302   04467 0
 0865                           05,3303   00601 0       DVMAX2  2DEC    3.014472 B-7                              989 FPS
 0865                           05,3304   33216 1
 0866   REF   2  LAST   34      15,3411                 1DPB2   =       D1/4            1 B-2
 0867   REF   2  LAST  663      15,3431                 1DPB28  =       ONEBIT          1 B-28
 0868                           05,3305   00000 1       EPSILN1 2DEC    .0003048 B-7          .1 FPS
 0868                           05,3306   01177 1
 0869                           05,3307   77754 1       FIFPSDP 2DEC    -.152400 B-7          50  FPS
 0869                           05,3310   57611 0
 0870                           05,3311   00116 1       DELMAX1 2DEC    .6096000 B-7          200 FPS
 0870                           05,3312   00730 0
 0871   REF   4  LAST  488      35,2000                         SETLOC  CSI/CDH
 0872                           35,3554                         BANK
 0872S  REF   1                                                 COUNT*  $$/CSI
 0873                           35,3554   00004 0       PMINE   2DEC    157420 B-29     84 NM.   - MUST BE 8 WORDS BEFORE PMINM
 0873                           35,3555   31566 0
 0874                           35,3556   00002 0       NICKELDP 2DEC   .021336 B-7     7 FPS
 0874                           35,3557   27311 1
 0875                           35,3560   00003 1       INITST1 2DEC    .03048 B-7      INITIAL DELDV = 10 FPS
 0875                           35,3561   34661 1
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0876                          35,3562  00000 1  CNETHTH  2DEC    .0001 B-3
0876                          35,3563  06433 0
0877                          35,3564  00000 1  PMINM    2DEC    10668 B-29      35000 FT - MUST BE 8 WORDS AFTER PMINE.
0877                          35,3565  12326 0
0878  REF   1                 06,2000                   SETLOC  CSIPROG
0879                          06,3672                   BANK

08795 REF   1                                           COUNT*  $$/CSI
0880                          06,3672  43014 0  CSI/A    CLEAR   SET             INITIALIZE INDICATORS
0881  REF   1                 06,3673  05660 1                  S32.1F1         DVT1 HAS EXCEEDED MAX INDICATOR
0882  REF   1                 06,3674  05461 1                  S32.1F2         FIRST PASS FOR NEWTON ITERATION INDICATR
0883                          06,3675  43014 0          CLEAR   SET
0884  REF   1                 06,3676  05662 0                  S32.1F3A        00=1ST 2 PASSES 2ND CYCLE 01=FIRST CYCLE
0885  REF   1                 06,3677  05463 0                  S32.1F3B        10=2ND CYCLE 11=50FPS STAGE 2ND CYCLE
0886                          06,3700  77745 1          DLOAD
0887  REF  10  LAST  668      06,3701  11762 1                  ZEROVEC
0888  REF   2  LAST  133      06,3702  03764 1          STORE   LOOPCT
0889  REF   4  LAST  661      06,3703  03665 1          STORE   CSIALRM
0890                          06,3704  77201 1  CSI/B    SETPD   VLOAD
0891                          06,3705  00001 0                  0D
0892  REF   3  LAST  662      06,3706  02541 0                  RACT1
0893                          06,3707  41446 1          ABVAL   PUSH            RA1                             B29 PL02D
0894                          06,3710  70501 1          NORM    SR1
0895  REF  11  LAST  612      06,3711  00050 1                  X2                                      B29-N2+ B1 PL04D
0896                          06,3712  51515 1          PDVL    ABVAL
0897  REF  11  LAST  500      06,3713  03554 0                  RPASS3
0898                          06,3714  55301 0          NORM    BDDV            RA1/RP3                         B1 PL02D
0899  REF  18  LAST  653      06,3715  00047 1                  X1
0900                          06,3716  53664 0          XSU,2   SR*                                             B2
0901  REF  19  LAST  672      06,3717  00046 0                  X1
0902                          06,3720  57175 0                  1,2
0903                          06,3721  41215 1          DAD     DMP             (I+(RA1/RP3))RA1        B29+B2=B31 PL00D
0904  REF   1                 06,3722  33412 0                  1DPB2
0905                          06,3723  65301 0          NORM    PDDL                                            PL02D
0906  REF  20  LAST  672      06,3724  00047 1                  X1
0907  REF   3  LAST  496      06,3725  03750 0                  RTMU
0908                          06,3726  56342 1          SR1     DDV                             B38-B31=  B7 PL00D
0909                          06,3727  75457 0          SL*     SQRT                                            B7
0910                          06,3730  20172 1                  0 -7,1
0911                          06,3731  53515 0          PDVL    UNIT                                            PL02D
0912  REF   4  LAST  672      06,3732  02541 0                  RACT1
0913                          06,3733  47315 0          PDVL    VXV
0914  REF   5  LAST  500      06,3734  02611 0                  UP1
0915                          06,3735  77656 1          UNIT                    UNIT(URP1 X UVP1 X URA1) = UH1
0916                          06,3736  72441 0          DOT     SL1             VA1 . UH1                       B7
0917  REF   2  LAST  133      06,3737  03504 0                  VACT1
0918                          06,3740  45421 1          BDSU    STADR                                           PL00D
0919  REF   2  LAST  133      06,3741  60315 0          STODL   DELVCSI
0920  REF   1                 06,3742  13300 0                  INITST          10 FPS
0921  REF   2  LAST  133      06,3743  03464 1          STORE   DELDV
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0922                                  06,3744  43345 1  CSI/B1   DLOAD   DAD              IF LOOPCT = 16
0923   REF  3  LAST  672              06,3745  03764 1                   LOOPCT
0924   REF  1                         06,3746  33432 1                   1DPB28
0925   REF  4  LAST  673              06,3747  03764 1           STORE   LOOPCT
0926                                  06,3750  77025 0           DSU     AXT,2
0927   REF  1                         06,3751  33417 0                   LOOPMX
0928                                  06,3752  00006 1                   6
0929                                  06,3753  52044 0           BPL     GOTO
0930   REF  1                         06,3754  63566 1                   SCNDSOL
0931   REF  1                         06,3755  24050 1                   CSI/B2

0932   REF  1                         12,2000                   SETLOC  CSIPROG2
0933                                  12,2050                   BANK

0935   REF  1                                                   COUNT*  $$/CSI
0934                                  12,2050  77601 0  CSI/B2   SETPD
0935                                  12,2051  00001 0                   0D
0936                                  12,2052  51545 1           DLOAD   ABS
0937   REF  3  LAST  672              12,2053  03462 1                   DELVCSI
0938                                  12,2054  50025 0           DSU     BMN
0939   REF  1                         12,2055  13302 1                   DVMAX1
0940   REF  1                         12,2056  45406 1                   CSI/B23
0941                                  12,2057  43174 1           AXT,2   BON
0942                                  12,2060  00007 0                   7
0943   REF  2  LAST  672              12,2061  05700 0                   S32.1F1
0944   REF  2  LAST  673              12,2062  63566 1                   SCNDSOL
0945                                  12,2063  43014 0           BOFF    BON
0946   REF  2  LAST  672              12,2064  05742 0                   S32.1F3A
0947   REF  1                         12,2065  24070 0                   CSI/B22          FLAG 3 NEQ 3
0948   REF  2  LAST  672              12,2066  05703 0                   S32.1F3B
0949   REF  3  LAST  673              12,2067  63566 1                   SCNDSOL
0950                                  12,2070  71214 0  CSI/B22  SET     DLOAD
0951   REF  3  LAST  673              12,2071  05460 0                   S32.1F1
0952   REF  1                         12,2072  13304 1                   DVMAX2
0953                                  12,2073  77765 0           SIGN
0954   REF  4  LAST  673              12,2074  03462 1                   DELVCSI
0955   REF  5  LAST  673              12,2075  37462 0           STCALL  DELVCSI
0956   REF  2  LAST  673              12,2076  45406 1                   CSI/B23

0957   REF  1                         22,2000                   SETLOC  CSIPROG3
0958                                  22,3406                   BANK

0959   REF  1                                                   COUNT*  $$/CSI
0959                                  22,3406  41575 0  CSI/B23  VLOAD   PUSH
0960   REF  5  LAST  672              22,3407  02541 0                   RACT1
0961                                  22,3410  63256 0           UNIT    PDVL
0962   REF  6  LAST  672              22,3411  02611 0                   UP1
0963                                  22,3412  53435 0           VXV     UNIT             UNIT(URP1 X UVP1 X URAI) = UHI
0964                                  22,3413  76561 1           VXSC    VSL1
0965   REF  6  LAST  673              22,3414  03462 1                   DELVCSI
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0966   REF   5  LAST  670   22,3415  02445 0          STORE  DELVEET1
0967                       22,3416  40055 0          VAD    BOV
0968   REF   3  LAST  672   22,3417  03504 0                 VACT1
0969   REF   1              22,3420  45421 1                 CSI/B23D
0970   REF   2  LAST  133   22,3421  37474 1 CSI/B23D STCALL VACT4
0971   REF   2  LAST  655   22,3422  45320 1                 VECSHIFT
0972   REF   7  LAST  655   22,3423  26746 0          STOVL  VVEC
0973                       22,3424  77614 1          SET
0974   REF   4  LAST  655   22,3425  03466 0                 RVSW
0975   REF   5  LAST  655   22,3426  26657 1          STOVL  RVEC
0976   REF   1              22,3427  05545 0                 SN359+
0977   REF   5  LAST  655   22,3430  36732 1          STCALL SNTH            ALSO CSTH
0978   REF   4  LAST  655   22,3431  25002 1                 TIMETHET
0979                       22,3432  72142 0          SR1    LXA,1
0980   REF  11  LAST  653   22,3433  03745 1                 RTX1
0981   REF   1              22,3434  37472 1          STCALL HAFPA1
0982   REF   1              22,3435  45204 0                 PERIAPO
0983                       22,3436  77624 1          CALL
0984   REF   4  LAST  646   22,3437  45330 0                 SHIFTR1
0985   REF   2  LAST  133   22,3440  17460 0          STODL  POSTCSI
0986   REF   8  LAST  663   22,3441  03754 1                 CENTANG
0987                       22,3442  52054 1          BZE    GOTO
0988                       22,3443  45445 0                 +2
0989   REF   1              22,3444  47161 1                 CIRCL
0990                       22,3445  77745 1          DLOAD
0991   REF   2  LAST  100   22,3446  02754 0                 ECC
0992                       22,3447  50025 0          DSU    BMN
0993   REF   1              22,3450  33563 1                 ONETHTH
0994   REF   2  LAST  674   22,3451  47161 1                 CIRCL
0995                       22,3452  45145 0          DLOAD  CALL
0996   REF   1              22,3453  00041 1                 R1
0997   REF   5  LAST  674   22,3454  45330 0                 SHIFTR1
0998                       22,3455  60201 1          SETPD  NORM
0999                       22,3456  00003 1                 2D
1000   REF  21  LAST  672   22,3457  00047 1                 X1
1001                       22,3460  50315 0          PDVL   DOT                                    PL04D
1002   REF   6  LAST  673   22,3461  02541 0                 RACT1
1003   REF   3  LAST  674   22,3462  03474 0                 VACT4
1004                       22,3463  56246 1          ABS    DDV
1005                       22,3464  00003 1                 2D             (/RDOTV/)/R1           B36-B29= B7
1006                       22,3465  45257 0          SL*    DSU
1007                       22,3466  20201 0                 0,1
1008   REF   1              22,3467  33557 0                 NICKELDP
1009                       22,3470  71240 1          BMN    DLOAD
1010   REF   3  LAST  674   22,3471  47161 1                 CIRCL
1011   REF   2  LAST  100   22,3472  02742 1                 P
1012                       22,3473  45312 0          SL2    DSU
1013   REF   1              22,3474  15326 1                 IRTEB2         I.B.2
1014                       22,3475  14017 1          STODL  14D
1015   REF   4  LAST  653   22,3476  03752 1                 RTSR1/MU
```

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```
1016                          22,3477  56342 1          SR1     DDV      (1/RODTMU)/R1      B-16-B29 = B-45 PL02D
1017                          22,3500  41325 0          PDDL    DMP
1018  REF   3  LAST  674      22,3501  02742 1                  P
1019  REF   2  LAST  674      22,3502  00041 1                  R1
1020                          22,3503  77624 1          CALL
1021  REF   6  LAST  674      22,3504  45330 0                  SHIFTR1
1022                          22,3505  72412 0          SL4     SL1
1023                          22,3506  41366 1          SQRT    DMP      ((P/MU)**.5)/R1    B14+B-45 = B-31 PL02D
1024                          22,3507  52414 1          BOFF    SL3
1025  REF  25  LAST  653      22,3510  04343 1                  CMOONFLG
1026  REF   1                 22,3511  45512 0                  CSI/B3
1027                          22,3512  50315 0  CSI/B3   PDVL    DOT
1028  REF   7  LAST  674      22,3513  02541 0                  RACT1
1029  REF   4  LAST  674      22,3514  03474 0                  VACT4
1030  REF   2  LAST  133      22,3515  03502 0          STORE   RDOTV
1031                          22,3516  77646 0          ABS
1032                          22,3517  41301 0          NORM    DMP      ((P/MU)**.5)RDOTV/R1                PL02D
1033  REF  12  LAST  672      22,3520  00050 1                  X2
1034                          22,3521  53660 1          XSU,1   SL*                    B-31+B36-B3= B2
1035  REF  13  LAST  675      22,3522  00047 1                  X2
1036                          22,3523  20204 0                  3,1
1037                          22,3524  14015 0          STODL   120
1038  REF  32  LAST  656      22,3525  15336 0                  ZEROVECS
1039                          22,3526  00021 1          STORE   160
1040                          22,3527  53575 0          VLOAD   UNIT
1041                          22,3530  00015 0                  120
1042  REF   6  LAST  674      22,3531  26732 0          STOVL   SNTH             ALSO STORES CSTH AND 0
1043  REF   8  LAST  675      22,3532  02541 0                  RACT1
1044                          22,3533  75315 1          PDVL    SIGN
1045  REF   5  LAST  675      22,3534  03474 0                  VACT4
1046  REF   3  LAST  675      22,3535  03502 0                  RDOTV
1047                          22,3536  45076 1          VCOMP   CALL
1048  REF   3  LAST  674      22,3537  45320 1                  VECSHIFT
1049  REF   8  LAST  674      22,3540  26746 0          STOVL   VVEC
1050                          22,3541  77614 1          SETGO
1051  REF   5  LAST  674      22,3542  03426 1                  RVSW
1052  REF   1                 22,3543  47145 1                  CSINEXT

1053                          22,3544  77776 1  SN359+   2DEC    -.000086601
1053                          22,3545  62460 1
1054                          22,3546  17777 0  CS359+   2DEC    +.499999992
1054                          22,3547  37776 0
1055  REF   1                 23,2000                   SETLOC  CSIPROG4
1056                          23,3145                   BANK

10565 REF   1                                           COUNT*  $$/CSI
1057  REF   6  LAST  674      23,3145  36657 0  CSINEXT  STCALL  RVEC
1058  REF   5  LAST  674      23,3146  25002 1                  TIMETHET
1059                          23,3147  43206 1          PUSH    DAD
1060  REF  11  LAST  662      23,3150  02463 1                  TCSI
```

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1061   REF   2  LAST  217   23,3151   16351 1          STODL   TCSI2          TIME OF NEXT CSI
1062   REF   4  LAST  675   23,3152   03502 0                  RDOTV
1063                        23,3153   77644 1          BPL
1064   REF   1              23,3154   47165 0                  NTP/2
1065                        23,3155   45345 1          DLOAD   DSU
1066   REF   2  LAST  674   23,3156   03472 0                  HAFPAI
1067                        23,3157   52006 0          PUSH    GOTO
1068   REF   2  LAST  676   23,3160   47165 0                  NTP/2
1069                        23,3161   71201 1  CIRCL   SETPD   DLOAD
1070                        23,3162   00001 0                  00D
1071   REF  33  LAST  675   23,3163   15336 0                  ZEROVECS
1072                        23,3164   77606 1          PUSH
10721                       23,3165   72545 0  NTP/2   DLOAD   SL1
10722  REF   3  LAST  676   23,3166   03472 0                  HAFPAI
10723                       23,3167   77615 0          DAD
10724  REF  12  LAST  675   23,3170   02463 1                  TCSI
10725  REF   3  LAST  676   23,3171   16351 1          STODL   TCSI2
10726  REF  11  LAST  663   23,3172   03766 0                  NN             COMPUTE NEXT CSI 1 REV AWAY
10727                       23,3173   45342 0          SR1     DSU
10728  REF   1              23,3174   07140 0                  HIGH2
10729                       23,3175   77654 0          BZE                    NN = 4
10729S REF   1              23,3176   47233 0                  HMCSI
1073                        23,3177   41345 0  NTP/2A  DLOAD   DMP
1074   REF  12  LAST  676   23,3200   03766 0                  NN
1075   REF   4  LAST  676   23,3201   03472 0                  HAFPAI
1076                        23,3202   45261 0          SL      DSU
1077                        23,3203   20217 1                  14D
1078                        23,3204   77615 0          DAD
1079   REF  13  LAST  676   23,3205   02463 1                  TCSI
1080   REF   8  LAST  668   23,3206   02461 0          STORE   TCDH
1081                        23,3207   77021 1          BDSU    AXT,2
1082   REF  17  LAST  668   23,3210   03663 1                  TTPI
1083                        23,3211   00005 1                  5D
1084                        23,3212   40240 0          BMN     SETPD
1085   REF   4  LAST  673   23,3213   63566 1                  SCNDSOL
1086                        23,3214   00001 0                  0D
1087                        23,3215   63375 0          VLOAD   PDVL
1088   REF   6  LAST  675   23,3216   03474 0                  VACT4
1089   REF   9  LAST  675   23,3217   02541 0                  RACT1
1090                        23,3220   77624 1          CALL
1091   REF   1              23,3221   63606 1                  INTINT2C
1092   REF   4  LAST  667   23,3222   26453 1          STOVL   RACT2
1093   REF  17  LAST  655   23,3223   00007 0                  VATT
1094   REF   2  LAST  105   23,3224   26533 0          STOVL   VACT2
1095   REF   2  LAST  662   23,3225   03512 1                  VPASS1
1096                        23,3226   63201 1          SETPD   PDVL
1097                        23,3227   00001 0                  0D
1098   REF   3  LAST  662   23,3230   03756 0                  RPASS1
1099                        23,3231   77650 1          GOTO
1100   REF   1              23,3232   34012 0                  CSINEXT1
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11001                          23,3233  43345 1  HMCSI    DLOAD    DAD          COMPUTE NEXT CSI 1 + 1/2 REVS AWAY
11002  REF   5  LAST  676      23,3234  03472 0           BHFPA1   HAFPA1
11003  REF   4  LAST  676      23,3235  02351 1           BTCSI2   TCSI2
11004  REF   5  LAST  677      23,3236  36351 0           STCALL   TCSI2
11005  REF   1                 23,3237  47177 0           BNTP/2A  NTP/2A
1101   REF   1                 16,2000                    SETLOC   CSIPROG5
1102                           16,2012                    BANK

11025  REF   1                                            COUNT*   $$/CSI
1103                           16,2012  77624 1  CSINEXT1 CALL
1104   REF   2  LAST  676      16,2013  63606 1           BINTINT2C INTINT2C
1105   REF   3  LAST  667      16,2014  26625 1           STOVL    RPASS2
1106   REF  18  LAST  676      16,2015  00007 0           BVATT    VATT
1107   REF   3  LAST  667      16,2016  36617 1           STCALL   VPASS2
1108   REF   3  LAST  667      16,2017  56674 1           BCDHMVR  CDHMVR
1109                           16,2020  40375 1           VLOAD    SETPD
1110   REF   5  LAST  676      16,2021  02453 1           BRACT2   RACT2
1111                           16,2022  00001 0           OD
1112                           16,2023  45115 0           PDVL     CALL
1113   REF  15  LAST  667      16,2024  03546 0           BVACT3   VACT3
1114   REF   3  LAST  646      16,2025  45174 1           BPERIAPO1 PERIAPO1
1115                           16,2026  77624 1           CALL
1116   REF   7  LAST  675      16,2027  45330 0           BSHIFTR1 SHIFTR1
1117   REF   3  LAST  133      16,2030  27472 0           STOVL    POSTCDH
1118   REF  16  LAST  677      16,2031  03546 0           BVACT3   VACT3
1119                           16,2032  63201 1           SETPD    PDVL
1120                           16,2033  00001 0           OD
1121   REF   6  LAST  677      16,2034  02453 1           BRACT2   RACT2
1122                           16,2035  65325 0           PDDL     PDDL
1123   REF   9  LAST  676      16,2036  02461 0           BTCDH    TCDH
1124   REF  18  LAST  676      16,2037  03663 1           BTTPI    TTPI
1125                           16,2040  62525 1           PDDL     SL2
1126   REF   3  LAST  662      16,2041  33430 0           B2PISC   2PISC
1127                           16,2042  45006 0           PUSH     CALL
1128   REF   4  LAST  662      16,2043  72740 1           BINTINT  INTINT
1129                           16,2044  77624 1           CALL
1130   REF   4  LAST  667      16,2045  45304 1           BACTIVE  ACTIVE
1131                           16,2046  77745 1           DLOAD
1132   REF  13  LAST  663      16,2047  03744 0           BELEV    ELEV
1133                           16,2050  73401 0           SETPD    SINE
1134                           16,2051  00007 0           6D
1135                           16,2052  53515 0           PDVL     UNIT
1136   REF  23  LAST  657      16,2053  03540 0           BRACT3   RACT3
1137                           16,2054  00001 0           STORE    CDU          URA3 AT CDU
1138                           16,2055  47315 0           PDVL     VXV          PL14D,PL 8D
1139   REF   7  LAST  673      16,2056  02611 0           BUPI     UPI
1140                           16,2057  77656 1           UNIT
1141                           16,2060  71525 0           PDDL     COSINE       UNIT(URA3XUVA3XURA3) = UH3      B1 PL14D
1142   REF  14  LAST  677      16,2061  03744 0           BELEV    ELEV
1143                           16,2062  45561 1           VXSC     STADR        (COSLOS)(UH3)                   B2 PL08D
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1144                        16,2063  43754 0          STCALL 18D                          PLUS
1145  REF   1               16,2064  16440 0                 CSINEXT2

1146  REF   1               07,2000                  SETLOC CSIPROG6
1147                        07,2440                  BANK

11475 REF   1                                        COUNT* $$/CSI
1148                        07,2440  74345 0 CSINEXT2 DLOAD  VXSC      (SINLOS)(URA3) = U                  B2 PL00D
1149                        07,2441  76455 1         VAD    VSL1
1150                        07,2442  00023 0                 18D                                          B1
1151                        07,2443  50206 0         PUSH   DOT                                              PL06D
1152  REF  24 LAST  677     07,2444  03540 0                 RACT3     (U . RA3) = TEMP1      B1 +B29=B30
1153                        07,2445  41552 0         SL1    PUSH                                          B29 PL08D
1154                        07,2446  72316 0         DSQ    TLOAD     TEMP1**2                            B58
1155  REF 260 LAST  661     07,2447  00155 0                 MPAC
1156                        07,2450  50315 0         PDVL   DOT                                              PL11D
1157  REF  25 LAST  678     07,2451  03540 0                 RACT3
1158  REF  26 LAST  678     07,2452  03540 0                 RACT3
1159                        07,2453  57551 1         TLOAD  DCOMP     RA3.RA3
1160  REF 261 LAST  678     07,2454  00155 0                 MPAC
1161                        07,2455  50315 0         PDVL   DOT       RP3.RP3                             B58 PL14D
1162  REF  12 LAST  672     07,2456  03554 0                 RPASS3
1163  REF  13 LAST  678     07,2457  03554 0                 RPASS3                                          PL11D
1164                        07,2460  76371 0         TAD    TAD       TEMP1**2+RA3.RA3+RP3.RP3=TEMP2        PL08D
1165                        07,2461  71244 0         BPL    DLOAD
1166  REF   1               07,2462  16500 0                 K1ORK2
1167  REF   5 LAST  673     07,2463  03764 1                 LOOPCT
1168                        07,2464  77025 0         DSU    AXT,2
1169  REF   2 LAST  673     07,2465  33432 1                 1DPB28
1170                        07,2466  00001 0                 1D
1171                        07,2467  77654 0         BZE
1172  REF   1               07,2470  11407 1                 ALMXITA
1173                        07,2471  70545 1         DLOAD  SR1
1174  REF   3 LAST  672     07,2472  03464 1                 DELDV
1175  REF   4 LAST  678     07,2473  03464 1         STORE  DELDV
1176                        07,2474  77621 1         BDSU
1177  REF   2 LAST  133     07,2475  03470 1                 DVPREV
1178  REF   7 LAST  673     07,2476  37462 0         STCALL DELVCSI
1179  REF   1               07,2477  15744 1                 CSI/B1
1180                        07,2500  41566 1 K1ORK2   SQRT   PUSH      TEMP3 = TEMP2**.5                   B29 PL10D
1181                        07,2501  45276 0         DCOMP  DSU
1182                        07,2502  00007 0                 C6D       -TEMP1-TEMP3 =K2 AT 10D
1183                        07,2503  14013 0         STODL  10D                                                 PL08D
1184                        07,2504  45425 0         DSU    STADR                                               PL06D
1185                        07,2505  77762 1         STORE  12D       -TEMP1+TEMP3 =K1 AT 12D
1186                        07,2506  77646 0         ABS
1187                        07,2507  14017 1         STODL  14D
1188                        07,2510  00013 0                 10D
1189                        07,2511  45246 0         ABS    DSU
1190                        07,2512  00017 1                 14D
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1191                        07,2513  71240 1          BMN     DLOAD
1192  REF   1               07,2514  50123 1                  K2.
1193                        07,2515  00015 0                  12D
1194                        07,2516  34013 1          STCALL  TOD              K EQUALS K1
1195  REF   2  LAST  679    07,2517  50123 1                  K2.

1196  REF   1               24,2000                   SETLOC  CSIPROG7
1197                        24,2123                   BANK

11975 REF   1                                         COUNT*  $$/CSI
1198                        24,2123  77745 1  K2.     DLOAD
1199                        24,2124  00013 0                  TOD
1200                        24,2125  76561 1          VXSC    VSL1
1201                        24,2126  53455 0          VAD     UNIT             V=RA3+KU  UNIT                  B1
1202  REF  27  LAST  678    24,2127  03540 0                  RACT3
1203                        24,2130  53515 0          PDVL    UNIT                                             PL06D
1204  REF  14  LAST  678    24,2131  03554 0                  RPASS3
1205                        24,2132  53515 0          PDVL    UNIT                                             PL12D
1206  REF  12  LAST  500    24,2133  03562 0                  VPASS3
1207                        24,2134  63235 0          VXV     PDVL             UVP3 X URP3                     PL18D
1208                        24,2135  00007 0                  06D
1209                        24,2136  00007 0                  06D
1210                        24,2137  50235 0          VXV     DOT
1211                        24,2140  00001 0                  00D
1212                        24,2141  77626 0          STADR                                                    PL12D
1213                        24,2142  53762 1          STOVL   12D              (URP3XV).(UVP3XURP3)=TEMP       PL06D
1214                        24,2143  72441 0          DOT     SL1                                              PL00D
1215                        24,2144  75326 1          ARCCOS  SIGN
1216                        24,2145  00015 0                  12D                                      B0
1217                        24,2146  41542 1          SR1     PUSH             GAMMA=SIGN(TEMP)ARCOS(UNITV.URP3)  PL02D
1218                        24,2147  71214 0          BON     DLOAD
1219  REF   2  LAST  672    24,2150  05701 1                  S32.1F2
1220  REF   1               24,2151  50206 0                  FRSTPAS
1221                        24,2152  00001 0                  00D              NOT THE FIRST PASS OF A CYCLE
1222                        24,2153  65225 1          DSU     PDDL             GAMMA-GAMPREV                   B1 PL04D
1223  REF   2  LAST  133    24,2154  03466 0                  GAMPREV
1224  REF   8  LAST  678    24,2155  03462 1                  DELVCSI
1225                        24,2156  60225 1          DSU     NORM                                             B7
1226  REF   3  LAST  678    24,2157  03470 1                  DVPREV
1227  REF  22  LAST  674    24,2160  00047 1                  X1
1228                        24,2161  65265 0          BDDV    PDDL             (GAM-GAMPREV)/(DV-DVPREV)   B-6+N1 PL06D
1229                        24,2162  00003 1                  02D                      = SLOPE
1230  REF   9  LAST  679    24,2163  03462 1                  DELVCSI
1231  REF   4  LAST  679    24,2164  03470 1          STORE   DVPREV
1232                        24,2165  43014 0          BOFF    BOFF
1233  REF   3  LAST  673    24,2166  05742 0                  S32.1F3A
1234  REF   1               24,2167  20323 1                  THRDCHK
1235  REF   3  LAST  673    24,2170  05743 1                  S32.1F3B
1236  REF   2  LAST  679    24,2171  20323 1                  THRDCHK
1237                        24,2172  41345 0          DLOAD   DMP
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1238                              24,2173  00003 1                    02D
1239  REF   3  LAST  679         24,2174  03466 0                    GAMPREV
1240                              24,2175  71244 0            BPL     DLOAD
1241  REF   1                    24,2176  20330 0                    FIFTYFPS
1242  REF   1                    24,2177  33561 0                    INITSTL
1243                              24,2200  77765 0            SIGN
1244  REF   5  LAST  678         24,2201  03464 1                    DELDV
1245  REF   6  LAST  680         24,2202  03464 1            STORE   DELDV
1246                              24,2203  43014 0            SET     CLEAR
1247  REF   4  LAST  679         24,2204  05462 1                    S32.1F3A
1248  REF   4  LAST  679         24,2205  05663 1                    S32.1F3B
1249                              24,2206  77745 1  FRSTPAS   DLOAD
1250                              24,2207  00001 0                    00D
1251  REF   4  LAST  680         24,2210  17466 0            STODL   GAMPREV
1252  REF  10  LAST  679         24,2211  03462 1                    DELVCSI
1253  REF   5  LAST  679         24,2212  37470 0            STCALL  DVPREV
1254  REF   1                    24,2213  20316 1                    CSINEXT3

1255  REF   1                    10,2000                     SETLOC  CSIPROG8
1256                             10,2316                     BANK

12565 REF   1                                                COUNT*  $$/CSI
1257                             10,2316  43025 1  CSINEXT3  DSU     CLEAR
1258  REF   7  LAST  680         10,2317  03464 1                    DELDV
1259  REF   3  LAST  679         10,2320  05661 0                    S32.1F2
1260  REF  11  LAST  680         10,2321  37462 0            STCALL  DELVCSI
1261  REF   2  LAST  678         10,2322  15744 1                    CSI/B1
1262                             10,2323  43014 0  THRDCHK   BON     BON
1263  REF   5  LAST  680         10,2324  05702 1                    S32.1F3A
1264  REF   1                    10,2325  20347 0                    NEWTN
1265  REF   5  LAST  680         10,2326  05703 0                    S32.1F3B
1266  REF   2  LAST  680         10,2327  20347 0                    NEWTN
1267                             10,2330  75345 1  FIFTYFPS  DLOAD   SIGN
1268  REF   1                    10,2331  13310 1                    FIFPSDP
1269                             10,2332  00005 1                    04D
1270                             10,2333  77765 0            SIGN
1271  REF   5  LAST  680         10,2334  03466 0                    GAMPREV
1272  REF   8  LAST  680         10,2335  03464 1            STORE   DELDV
1273                             10,2336  43276 0            DCOMP   DAD
1274  REF  12  LAST  680         10,2337  03462 1                    DELVCSI
1275  REF  13  LAST  680         10,2340  17462 1            STODL   DELVCSI
1276                             10,2341  00001 0                    00D
1277                             10,2342  43014 0            SET     SET
1278  REF   6  LAST  680         10,2343  05463 0                    S32.1F3B
1279  REF   6  LAST  680         10,2344  05462 1                    S32.1F3A
1280  REF   6  LAST  680         10,2345  37466 1            STCALL  GAMPREV
1281  REF   2  LAST  673         10,2346  24050 1                    CSI/B2
1282                             10,2347  60345 0  NEWTN     DLOAD   NORM
1283                             10,2350  00005 1                    04D
1284  REF  14  LAST  675         10,2351  00050 1                    X2
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1285                          10,2352  54065 0          BDDV   XSU,1
1286                          10,2353  00001 0                 GOD
1287  REF  15 LAST  680       10,2354  00047 1                 X2
1288                          10,2355  77657 0          SR*
1289                          10,2356  20601 1                 0,1
1290  REF   9 LAST  680       10,2357  17464 1          STODL  DELDV
1291                          10,2360  00001 0                 GOD
1292  REF   7 LAST  680       10,2361  03466 0          STORE  GAMPREV
1293                          10,2362  51545 1          DLOAD  ABS
1294  REF  10 LAST  681       10,2363  03464 1                 DELDV
1295                          10,2364  45206 1          PUSH   DSU                                    PL08D
1296  REF   1                 10,2365  13306 0                 EPSILN1
1297                          10,2366  71240 1          BMN    DLOAD
1298  REF   1                 10,2367  20404 0                 CSI/SOL
1299                          10,2370  50025 0          DSU    BMN
1300  REF   1                 10,2371  13312 0                 DELMAX1
1301  REF   1                 10,2372  20377 0                 CSISTEP
1302                          10,2373  75345 1          DLOAD  SIGN
1303  REF   2 LAST  681       10,2374  13312 0                 DELMAX1
1304  REF  11 LAST  681       10,2375  03464 1                 DELDV
1305  REF  12 LAST  681       10,2376  03464 1          STORE  DELDV
1306                          10,2377  45345 1 CSISTEP  DLOAD  DSU
1307  REF  14 LAST  680       10,2400  03462 1                 DELVCSI
1308  REF  13 LAST  681       10,2401  03464 1                 DELDV
1309  REF  15 LAST  681       10,2402  37462 0          STCALL DELVCSI
1310  REF   3 LAST  680       10,2403  15744 1                 CSI/BI
1311                          10,2404  77145 1 CSI/SOL  DLOAD  AXT,2
1312  REF   3 LAST  674       10,2405  03460 0                 POSTCSI
1313                          10,2406  00002 0                 2
1314                          10,2407  52150 1          LXA,1  GOTO
1315  REF  12 LAST  674       10,2410  03745 1                 RTX1
1316  REF   1                 10,2411  63535 1                 CSINEXT4

1317  REF   1                 31,2000                  SETLOC CSIPROG9
1318                          31,3535                  BANK

13185 REF   1                                          COUNT* $$/CSI
1319                          31,3535  50023 0 CSINEXT4 DSU*   BMN
1320  REF   1                 31,3536  33553 1                 PMINE -2,1
1321  REF   5 LAST  676       31,3537  63566 1                 SCNDSOL
1322                          31,3540  71374 1          AXT,2  DLOAD
1323                          31,3541  00003 1                 3
1324  REF   4 LAST  677       31,3542  03472 0                 POSTCDH
1325                          31,3543  50023 0          DSU*   BMN
1326  REF   2 LAST  681       31,3544  33553 1                 PMINE -2,1
1327  REF   6 LAST  681       31,3545  63566 1                 SCNDSOL
1328                          31,3546  45345 1          DLOAD  DSU
1329  REF  10 LAST  677       31,3547  02461 0                 TCDH
1330  REF  14 LAST  676       31,3550  02463 1                 TCSI
1331  REF   6 LAST  668       31,3551  02547 0          STORE  T1TOT2
```

```
1332                                31,3552  45374 0                AXT,2  DSU
1333                                31,3553  00004 0                       4
1334  REF   3  LAST  461           31,3554  36161 1                       600SEC
1335                                31,3555  77040 0                BMN    AXT,2
1336  REF   7  LAST  681           31,3556  63566 1                       SCNDSOL
1337                                31,3557  00005 1                       5
1338                                31,3560  45345 1                DLOAD  DSU
1339  REF  19  LAST  677           31,3561  03663 1                       TTPI
1340  REF  11  LAST  681           31,3562  02461 0                       TCDH
1341                                31,3563  51025 1                DSU    BPL
1342  REF   4  LAST  682           31,3564  36161 1                       600SEC
1343  REF   1                     31,3565  11463 0                       P32/P72C
1344                                31,3566  43014 0  SCNDSOL       BON    BOFF
1345  REF   7  LAST  680           31,3567  05702 1                       S32.1F3A
1346  REF   1                     31,3570  11411 0                       ALMXIT
1347  REF   7  LAST  680           31,3571  05743 1                       S32.1F3B
1348  REF   2  LAST  682           31,3572  11411 0                       ALMXIT
1349                                31,3573  71334 0                SXA,2  DLOAD
1350  REF   5  LAST  672           31,3574  03664 0                       CSIALRM
1351  REF  34  LAST  676           31,3575  15336 0                       ZEROVECS
1352                                31,3576  43014 0                CLEAR  SET
1353  REF   4  LAST  673           31,3577  05660 1                       S32.1F1
1354  REF   4  LAST  680           31,3600  05461 1                       S32.1F2
1355                                31,3601  43014 0                CLEAR  CLEAR
1356  REF   8  LAST  682           31,3602  05662 0                       S32.1F3A
1357  REF   8  LAST  682           31,3603  05663 1                       S32.1F3B
1358  REF   6  LAST  678           31,3604  37764 0                STCALL LOOPCT
1359  REF   1                     31,3605  15704 0                       CSI7B
```

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```
P1360   ..... ADVANCE   .....

R1361   SUBROUTINES USED

R1362           PRECSET
R1363           ROTATE

 1364   REF   2 LAST  670    37,2000                        SETLOC  CDHTAG3
 1365                        37,2560                        BANK

13655   REF   1                                            COUNT*  $$/CDH
 1366                        37,2560   77620 0  ADVANCE     STQ
 1367   REF  22 LAST  671    37,2561   02360 0              SUBEXIT
 1369   REF  26 LAST  657    37,2562   34041 0              STCALL  TDEC1
 1370   REF   4 LAST  657    37,2563   45236 1              PRECSET
 1371                        37,2564   77214 0              SET     VLOAD
 1372   REF   4 LAST  655    37,2565   01067 1                      XDELVFLG
 1373   REF  13 LAST  679    37,2566   03562 0                      VPASS3
 1374   REF   4 LAST  677    37,2567   02617 0              STORE   VPASS2
 1375   REF   3 LAST  676    37,2570   27512 1              STOVL   VPASS1
 1376   REF  15 LAST  679    37,2571   03554 0                      RPASS3
 1377   REF   4 LAST  677    37,2572   02625 1              STORE   RPASS2
 1378   REF   4 LAST  676    37,2573   27756 0              STOVL   RPASS1
 1379   REF  28 LAST  679    37,2574   03540 0                      RACT3
 1380   REF   5 LAST  657    37,2575   37632 1              STCALL  RTIG
 1381   REF   1               37,2576   16520 1                      ROTATE
 1382   REF   7 LAST  677    37,2577   02453 1              STORE   RACT2
 1383   REF  10 LAST  676    37,2600   26541 0              STOVL   RACT1
 1384   REF  17 LAST  677    37,2601   03546 0                      VACT3
 1385   REF   7 LAST  657    37,2602   37640 1              STCALL  VTIG
 1386   REF   2 LAST  683    37,2603   16520 1                      ROTATE
 1387   REF   3 LAST  676    37,2604   02533 0              STORE   VACT2
 1388   REF   4 LAST  674    37,2605   37504 1              STCALL  VACT1
 1389   REF  23 LAST  683    37,2606   02360 0                      SUBEXIT
```

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```
P1390   ..... ROTATE    .....

 1391   REF   2 LAST  678   07,2000                    SETLOC  CSIPROG6
 1392                       07,2520                    BANK

13925   REF   2 LAST  678 TO  679:     48     48*               COUNT*  $$/CSI
 1393                       07,2520    41406 0  ROTATE  PUSH    PUSH
 1394                       07,2521    74241 0          DOT     VXSC
 1395   REF   8 LAST  677   07,2522    02611 0                  UP1
 1396   REF   9 LAST  684   07,2523    02611 0                  UP1
 1397                       07,2524    51352 1          VSL2    BVSU
 1398                       07,2525    63256 0          UNIT    PDVL
 1399                       07,2526    74246 1          ABVAL   VXSC
 1400                       07,2527    43572 0          VSL1    RVQ
```

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```
P1401   .... DISPN90 .....
 14011  REF   2 LAST  672    06,2000                    SETLOC  CSIPROG
 14012                       06,3756                    BANK
 14015  REF   2 LAST  672 TO  673:     52     52*       COUNT*  $$/CSI
 1402                        06,3756   77620 0  DISPN90  STQ
 1403   REF   1              06,3757   02356 0           ANEXIT
 1411                        06,3760   57575 1           VLOAD   VCOMP
 14115  REF   3 LAST  500    06,3761   02601 1           AUTOY
 1412   REF   3 LAST  294    06,3762   15756 1           STODL   YCSM          COMPLEMENT VALUES FOR N90 DISPLAYS.
 1413   REF   4 LAST  500    06,3763   02603 0           CMYDOT
 1414   REF  21 LAST  670    06,3764   03407 1           STORE   DELVLVC +2
 14141                       06,3765   51414 1           BOFF    ABS
 14142  REF   7 LAST  655    06,3766   05356 1           PCFLAG
 14143  REF   1              06,3767   45550 0           CKN81   NOT IN P36
 14144                       06,3770   51025 1           DSU     BPL     IS YDOT LESS THAN .1 FPS
 14145  REF   1              06,3771   13306 0           1/10FPS
 14146  REF   2 LAST  685    06,3772   45550 0           CKN81   NO
 14147                       06,3773   77775 1           VLOAD           YES - FORCE DSKY DISPLAY TO BE 0
 14148  REF  11 LAST  672    06,3774   11762 1           ZEROVEC
 14149  REF  22 LAST  685    06,3775   37405 1           STCALL  DELVLVC
 141491 REF   3 LAST  685    06,3776   45550 0           CKN81

 141492 REF   2 LAST  673    22,2000                    SETLOC  CSIPROG3
 141493                      22,3550                    BANK
 141494 REF   2 LAST  673 TO  675:     98     98*       COUNT*  $$/CSI
 1415                        22,3550    77776 1  CKN81   EXIT
 1416   REF   1              22,3551   3 5037 0           CA      V06N90
 1417   REF  32 LAST  668    22,3552   0 5535 1           TC      VNFLASH

 1418   REF   3 LAST  644    22,3553   3 4535 0           CAF     V06N81
 14185  REF  33 LAST  685    22,3554   0 5535 1           TC      VNFLASH

 1419   REF 142 LAST  668    22,3555   0 6006 1           TC      INTPRET
 1420                        22,3556    77650 1           GOTO
 1421   REF   2 LAST  685    22,3557    02356 0                   ANEXIT

 14211  REF   2 LAST  681    05,3305              1/10FPS  =       EPSILN1         .1 FPS
```

```
P1422   ..... INTINTNA .....

 1423   REF   1                31,2000                        SETLOC  CDHTAG2
 1424                         31,3606                        BANK

 14245  REF   1                                               COUNT*  $$/CDH
 1425                         31,3606   65325 0  INTINT2C    PDDL    PDDL
 1426   REF  15  LAST  681    31,3607   02463 1               TCSI
 1427   REF  12  LAST  682    31,3610   02461 0               TCDH
 1428                         31,3611   41525 0              PDDL    PUSH
 1429   REF   3  LAST  479    31,3612   33143 1               TWOPI
 1430                         31,3613   77650 1              GOTO
 1431   REF   5  LAST  677    31,3614   72740 1               INTINT
 1432                         31,3615   65325 0  INTINT3P    PDDL    PDDL
 1433   REF  13  LAST  686    31,3616   02461 0               TCDH
 1434   REF  20  LAST  682    31,3617   03663 1               TTPI
 1435                         31,3620   41525 0              PDDL    PUSH
 1436   REF   4  LAST  686    31,3621   33143 1               TWOPI           FOR CONIC INTEGRATION
 1437                         31,3622   77650 1              GOTO
 1438   REF   6  LAST  686    31,3623   72740 1               INTINT
```

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P1439 ..... S32/33.X .....

```
1440  REF   1                15,2000                        SETLOC  CDHTAGS
1441                         15,2050                        BANK

14415 REF   1                                               COUNT*  $$/CDH
1442                         15,2050   77201 1   S32/33.X   SETPD   VLOAD
1443                         15,2051   00007 0              6D
1444  REF   10  LAST  684    15,2052   02611 0              UP1
1445                         15,2053   63276 1              VCOMP   PDVL
1446  REF   11  LAST  683    15,2054   02541 0              RACT1
1447                         15,2055   57456 1              UNIT    VCOMP
1448                         15,2056   47206 0              PUSH    VXV
1449  REF   11  LAST  687    15,2057   02611 0              UP1
1450                         15,2060   77772 0              VSL1
1451                         15,2061   00001 0              STORE   0D
1452                         15,2062   77616 0              RVQ
```

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```
P1453   ..... CDHMVR .....

R1454   SUBROUTINES USED

R1455           VECSHIFT
R1456           TIMETHET
R1457           SHIFTR1

 1458   REF  1                  27,2000                 SETLOC  CDHTAG
 1459                           27,2674                 BANK

14595   REF  1                                          COUNT*  $$/CDH
 1460                           27,2674  77220 1 CDHMVR STQ     VLOAD
 1461   REF 24 LAST  683        27,2675  02360 0                SUBEXIT
 1462   REF  8 LAST  683        27,2676  02453 1                RACT2
 1463                           27,2677  53406 0        PUSH    UNIT
 1464   REF  1                  27,2700  27546 0        STOVL   UNVEC           UR SUB A
 1465   REF  5 LAST  683        27,2701  02625 1                RPASS2
 1466                           27,2702  50256 0        UNIT    DOT
 1467   REF  2 LAST  688        27,2703  03546 0                UNVEC
 1468                           27,2704  72406 0        PUSH    SL1
 1469   REF  5 LAST  655        27,2705  16734 0        STODL   CSTH
 1470                           27,2706  65316 0        DSQ     PDDL
 1471   REF  7 LAST  623        27,2707  15326 1                OP1/4TH
 1472                           27,2710  45302 1        SR2     DSU
 1473                           27,2711  72566 1        SQRT    SL1
 1474                           27,2712  57515 1        PDVL    VCOMP
 1475                           27,2713  77635 1        VXV
 1476   REF  6 LAST  688        27,2714  02625 1                RPASS2
 1477                           27,2715  65241 0        DOT     PDDL
 1478   REF 12 LAST  687        27,2716  02611 0                OP1
 1479                           27,2717  45565 0        SIGN    STADR
 1480   REF  7 LAST  675        27,2720  51045 1        STOVL   SNTH
 1481   REF  7 LAST  688        27,2721  02625 1                RPASS2
 1482                           27,2722  45115 0        PDVL    CALL
 1483   REF  5 LAST  683        27,2723  02617 0                VPASS2
 1484   REF  4 LAST  675        27,2724  45320 1                VECSHIFT
 1485   REF  9 LAST  675        27,2725  26746 0        STOVL   VVEC
 1486                           27,2726  77614 1        CLEAR
 1487   REF  6 LAST  675        27,2727  03666 1                RVSW
 1488   REF  7 LAST  675        27,2730  36657 0        STCALL  RVEC
 1489   REF  6 LAST  675        27,2731  25002 1                TIMETHET
 1490                           27,2732  53754 1        LXA,2   VSL*
 1491   REF 12 LAST  644        27,2733  03746 1                RTX2
 1492                           27,2734  57576 1                0,2
 1493                           27,2735  00023 0        STORE   18D
 1494                           27,2736  76441 1        DOT     SL1R
 1495   REF  3 LAST  688        27,2737  03546 0                UNVEC
 1496                           27,2740  51515 1        PDVL    ABVAL           OD = V SUB PV
 1497                           27,2741  63257 1        SL*     PDVL
```

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```
1498                          27,2742  57576 1                 0,2
1499  REF   9 LAST  683       27,2743  02453 1                 RACT2
1500                          27,2744  65246 1  ABVAL  PDDL   2D = LENGTH OF R SUB A
1501                          27,2745  77625 0  DSU
1502                          27,2746  00003 1                 02D
1503  REF   4 LAST  654       27,2747  16633 0  STODL  DIFFALT DELTA H IN METERS          B+29
1504  REF   2 LAST  100       27,2750  02744 1                 R1A
1505                          27,2751  65301 0  NORM   PDDL   2 - R V**/MU                      04D
1506  REF  23 LAST  679       27,2752  00047 1                 X1
1507  REF   3 LAST  675       27,2753  00041 1                 R1
1508                          27,2754  77624 1  CALL
1509  REF   8 LAST  677       27,2755  45330 0                 SHIFTR1
1510                          27,2756  56362 0  SR1R   DDV
1511                          27,2757  41457 1  SL*    PUSH
1512                          27,2760  20174 1                 0 -5,1
1513                          27,2761  65225 1  DSU    PDDL   A SUB A                  B+29     04D
1514  REF   5 LAST  689       27,2762  02633 0                 DIFFALT
1515                          27,2763  56302 0  SR2    DDV    A SUB P                  B+31
1516                          27,2764  00005 1                 04D                      B+2
1517                          27,2765  75406 1  PUSH   SQRT      A SUB P/A SUB A          06D
1518                          27,2766  41275 1  DMPR   DMP
1519                          27,2767  00007 0                 06D
1520                          27,2770  00001 0                 00D
1521                          27,2771  65272 0  SL3R   PDDL   V SUB AV METERS/CS          B+7      08D
1522                          27,2772  00003 1                 02D                      B+29
1523                          27,2773  65301 0  NORM   PDDL
1524  REF  24 LAST  689       27,2774  00047 1                 X1
1525  REF   4 LAST  672       27,2775  03750 0                 RTMU
1526                          27,2776  56342 1  SR1    DDV    2MU  B+38
1527                          27,2777  65257 1  SL*    PDDL     2 MU/R SUBAA     B+14     10D
1528                          27,3000  20174 1                 0 -5,1
1529                          27,3001  00005 1                 04D                      B+29
1530                          27,3002  65301 0  NORM   PDDL
1531  REF  16 LAST  681       27,3003  00050 1                 X2
1532  REF   5 LAST  689       27,3004  03750 0                 RTMU
1533                          27,3005  56342 1  SR1    DDV
1534                          27,3006  44257 1  SL*    BDSU
1535                          27,3007  57604 1                 0 -6,2                   2U/R - U/A   B+14 (METERS/CS)SQ
1536                          27,3010  63525 0  PDDL   DSQ                                                    10D
1537                          27,3011  00011 1                 08D
1538                          27,3012  75421 1  BDSU   SQRT
1539                          27,3013  47315 0  PDVL   VXV                              SQRT(MU(2/R SUB A-1/A SUB A)-VSUBA2)10D
1540  REF  13 LAST  688       27,3014  02611 0                 UP1
1541  REF   4 LAST  688       27,3015  03546 0                 UNVEC
1542                          27,3016  74256 0  UNIT   VXSC
1543                          27,3017  00013 0                 10D
1544                          27,3020  74315 0  PDVL   VXSC
1545  REF   5 LAST  689       27,3021  03546 0                 UNVEC
1546                          27,3022  00011 1                 08D
1547                          27,3023  76455 1  VAD    VSL1
```

```
1548                                27,3024  77626 0        STADR
1549  REF  18  LAST  683            27,3025  74231 1        STORE   VACT3
1550                                27,3026  77651 0        VSU
1551  REF   4  LAST  683            27,3027  02533 0                VACT2
1552  REF   5  LAST  663            27,3030  37667 1        STCALL  DELVEET2     DELTA VCDH - REFERENCE COORDINATES
1553  REF  25  LAST  688            27,3031  02360 0                SUBEXIT
```

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```
P1293   NAME        P40 - TVC (SPS BURN)
R12932              MOD BY ALBERT, BEALS, AND DEMERY TO REORGANIZE
R12934              AND REDUCE CODING 15AUG69
R1294   FUNCTION    TO CONTROL THE SEQUENCE OF THE CMC DURING THE COUNTDOWN
R1295               AND THRUSTING MANEUVER OF AN SPS BURN

R12952                  CLOKTASK  COMPUTE TIME-TO-GO TO IGNITION(FOR N35/40),
R12954                            RECALL CLOKTASK, AND AFTER S40.6 COMPLETION
R12956                            CALL CLOCKJOB TO DISPLAY V06N40

R1296                   R02BOTH   CHECK STATUS OF IMU

R1297                   S40.1     COMPUTE: INTIAL THRUST DIRECTION AND
R1298                                      INTIAL VALUE OF VELOCITY-TO-BE-
R1299                                      GAINED VECTOR (VGTIG)

R1300                   S40.2,3   COMPUTE: GIMBAL ANGLES IF THRUSTING WILL
R1301                                      OCCUR WITH PRESENT IMU ORIENTATION,
R1302                                      XAXIS OF ENGINE BELL,
R1303                                      PREFERRED IMU ORIENTATION, AND
R1304                                      DESIRED THRUST DIRECTION IN SM COORDS

R1305                   R60CSM    PERFORM ATTITUDE MANEUVER

R1306                   S40.6     HANDLE GIMBAL TEST AND TRIM OR TRIM ONLY

R1307                   MIDTOAV1  EXTRAPOLATE CSM STATE VECTOR TO TIG-29.96 SECS

R1311                   TIGBLNK   BLANK DSKY AT TIG-35 SECS AND
R1312                             WAITLIST TIGAVEG IN 5 SECS

R1313                   TIGAVEG   UNBLANK DSKY,
R1314                             WAITLIST TIG-5 IN 24.96 SECS, AND
R1315                             START SERVICER

R1316                   TIG-5     DISPLAY FLASHING V99N40:
R1317                             ENGINE IGNITION ENABLE,
R1318                             WAITLIST TIG-0 IN 5 SECS, AND
R1319                             FINDVAC S40.13 TO DETERMINE IF THIS IS
R1320                             AN IMPULSIVE OR STEERING BURN

R1321                   TIG-0     CHECK IF ASTRONAUT HAS O.K.ED IGNITION (PRIOR
R1322                             PROCEED TO V99N40) - IF NOT, IGNITION WILL BE
R1323                             ENTERED BY CLOCKJOB IN RESPONSE TO V99N40

R1324                   CLOCKJOB  (CALLED EVERY SEC)
R1325                             DISPLAY V06N40 EXCEPT WHEN SIGNALED BY TIG-5
R1326                             TO FLASH V99N40 AND
R1327                             CALL IGNITION WHEN PROCEED RESPONSE TO V99N40
R1328                             HAS OCCURRED AND TIG HAS PASSED
```

```
R1329                IGNITION  TURN ON ENGINE,
R1330                          CHECK IF IMPULSIVE BURN, AND IF SO
R1331                          SET UP ENGINOFF COMMAND

R1332                S40.8     UPDATE VELOCITY TO-BE-GAINED VECTOR,
R1333                          GENERATE ANGULAR RATE STEERING COMMANDS
R1334                          FOR AUTO PILOT,
R13345               UPDATE CSMMASS,
R1335                          ESTABLISH ENGINE CUT-OFF SIGNAL AT
R1336                          APPROPRIATE TIME, AND
R1337                          INITIATE R40, IF THRUST FAILS

R1338                S40.9     (AIMPOINT MANEUVERS ONLY)
R1339                          GENERATE REQUIRED VEL-TO-BE-GAINED VECTOR AND
R1340                          UPDATE B-VECTOR WHICH IS USED IN FINAL
R1341                          CALCULATION OF EXTRAPOLATING THE VG VECTOR

R1342                ENGINOFF  WIPE OUT TVC,
R1343                          TURN OFF CLOKTASK,
R1344                          SHUT DOWN ENGINE,
R1345                          ADJUST VEHICLE MASS PROPERTIES,
R1346                          TURN ON RCS DAP, AND
R1347                          UPDATE ENGINE TRIMS

R1348                POSTBURN  DISPLAY FLASHING V16N40,
R1349                          CLEAN UP AFTER ENGINE CUT-OFF, AND
R1350                          MAINTAIN VG COMP FOR POSSIBLE RCS TRIM

R1351                ************************************************
R1352                PROVIDE RESTART PROTECTION AT ALL CRITICAL POINTS
R1353                ************************************************

R1354   INPUT        XDELVFLG = 1 EXTERNAL DELTA V

R1355                    DELVSIN   CHANGE OF VELOCITY (VECTOR)
R1357                    RTIG      CSM POSITION AT TIG
R1358                    VTIG      CSM VELOCITY AT TIG
R1359                    TIG       IGNITION TIME
R1360                    CSTEER =  0

R1361                XDELVFLG = 0 LAMBERT(AIMPOINT)

R1362                    RTARG     AIMPOINT POSITION VECTOR
R1363                    TPASS4    TIME OF ARRIVAL AT AIMPOINT
R1364                    TIG       IGNITION TIME
R1365                    CSTEER =  1

R1366   ALARMS       1407          VG INCREASING
R1367                1703          INSUFFICIENT TIME FOR INTEGRATION
R1368                              TIG WAS SLIPPED
```

```
P1369
 1370   REF  16  LAST  292   E6,1465                          EBANK=  DAPDATR1
 1371   REF   1               24,2000                          SETLOC  P40S
 1372                        24,2214                          BANK
 1373   REF   1                                              COUNT*  $$/P40
 1376   REF 143  LAST  685   24,2214   0 6006 1  P40CSM      TC      INTPRET
 1377                        24,2215    67214 1               CLEAR   SLOAD
 1378   REF   1               24,2216    00664 0                       ENG2FLAG
 1379   REF   4  LAST  652   24,2217    03425 1                       ECSTEER
 1380                        24,2220    71214 0               BOFF    DLOAD
 1381   REF   5  LAST  683   24,2221    01347 0                       XDELVFLG        EXTERNAL DELTA V ?
 1382   REF   1               24,2222    50224 0                       P40S/C          NO CSTEER = ECSTEER
 1383   REF  12  LAST  648   24,2223    15336 0                       HI6ZEROS        YES CSTEER = ZERO
 1384   REF   3  LAST  180   24,2224    17703 0  P40S/C       STODL   CSTEER
 1385   REF   1               24,2225    11532 0                       FENG            SET UP THRUST FOR S40.1
 1386   REF   2  LAST  128   24,2226    17727 0  P40S/F       STODL   F               P41 ENTERS HERE
 1387   REF  51  LAST  667   24,2227    03413 1                       TIG             ORIGINAL TIG MAY BE SLIPPED BY P40S/SV
 1388   REF   5  LAST  513   24,2230    17450 0               STODL   NOMTIG         SET ORIGINAL TIME OF IGNITION FOR S40.9
13882   REF   1               24,2231    11530 1                       SEC29.96
13884   REF   5  LAST  531   24,2232    03460 0               STORE   AVEGDT          START AVERAGEG AT TIG-29.96
 1389                        24,2233    77414 0               CLEAR   EXIT
13891   REF   3  LAST  220   24,2234    05265 0                       BURNFLAG
13892   REF  41  LAST  642   24,2235   0 4655 0  TFIGINIT    TC      POSTJUMP        START CLOKTASK TO
13894   REF   1               24,2236    73566 0               CADR    STARTTGO        CALCULATE TFI FOR N35/40
 1390   REF 141  LAST  667   24,2237   0 4636 0      +2      TC      BANKCALL
 1391   REF   5  LAST  626   24,2240    03731 1               CADR    R02BOTH         IMU STATUS CHECK
```

```
P1392  NAME      S40.1
R1393  FUNCTIONAL DESCRIPTION
R1394            COMPUTE INITIAL THRUST DIRECTION(UT) AND INITIAL VALUE OF VG
R1395            VECTOR(VGTIG).
R1396  SUBROUTINES CALLED
R1397            CSMPREC
R1398            INITVEL
R1399            CALCGRAV
R1400            MIDGIM
R1401  ERASABLE INITIALIZATION REQUIRED
R1402            WEIGHT/G    ANTICIPATED MAG. OF VEHICLE MASS      SP B16KGM
R1403            XDELVFLG        1=DELTA-V MANEUVER,0=AIMPT STEER
R1404         IF DELTA-V MANEUVER
R1405            DELVSIN     SPECIFIED DELTA-V REQUIRED IN
R1406                        INERTIAL COORDS. OF ACTIVE VEHICLE
R1407                        AT TIME OF IGNITION                    VECTOR B7M/CS
R1409            RTIG        POSITION AT TIME OF IGNITION         VECTOR B29M
R1410            VTIG        VELOCITY AT TIME OF IGNITION         VECTOR B7M/CS
R1411            CSTEER = 0                DP
R1412         IF AIMPOINT    STEERING
R1413            TIG         TIME OF IGNITION                      DP     B28CS
R1414            RTARG       POSITION TARGET TIME                 VECTOR B29M
R1415            TPASS4      TIME OF ARRIVAL AT AIMPOINT
R1416            CSTEER =    ECSTEER(GR 0) DP B1
R1417  OUTPUT
R1418            UT     1/2  UNIT VECTOR ALIGNED WITH THRUST DIRECTION IN REF COOR
R1419            VGTIG       INITIAL VALUE OF VELOCITY
R1420                        TO BE GAINED (INERT. COORD.)          VECTOR B7M/CS
R1421            DELVLVC     VGTIG IN LOC. VERT. COORDS.
R1422            F           NOMINAL THRUST FOR ENGINE                DP B7 M-NEWT
R1423            BDT         V REQUIRED AT TIG -V REQUIRED AT (TIG-2SEC)
R1424            -GDT        FOR S40.13                                VECT  B7M/CS
R1425            RTIG        CALC IN S40.1B(AIMPT) FOR S40.2,3     VECTOR B29M
R1426                        POSITION AT TIME OF IGNITION

  14269  REF   1                                          COUNT*  $$/S40.1
  1427   REF 144  LAST  693   24,2241  0 6006 1  S40.1   TC      INTPRET
  1428            LAST  693   24,2242   77214 0          SET     VLOAD
  1429   REF   1              24,2243   01070 1                  FIRSTFLG
  1430   REF  13  LAST  693   24,2244   15336 0                  HIGZEROS
  1431   REF   2  LAST  128   24,2245   03705 0          STORE   BDT
  1432            LAST  693   24,2246   77614 1          BOFF
  1433   REF   6  LAST  693   24,2247   01347 0                  XDELVFLG
  1434   REF   1              24,2250   34065 0                  S40.1B          LAMBERT
  1435            LAST  670   24,2251   51575 1          VLOAD   ABVAL           EXTERNAL DELTA-V
  1436   REF   9  LAST  670   24,2252   03646 0                  DELVSIN
  1437   REF   2  LAST  127   24,2253   27654 0          STOVL   DELVSAB
  1438   REF   8  LAST  683   24,2254   03640 0                  VTIG
  1439   REF   9  LAST  495   24,2255   03576 0          STORE   VINIT
  1440            LAST  670   24,2256   53435 0          VXV     UNIT
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1441  REF  6  LAST  683   24,2257  03632 0          RTIG
1442  REF  2  LAST  128   24,2260  27713 1   STOVL  UT          UP IN UT
1443  REF  7  LAST  695   24,2261  03632 0          RTIG
1444  REF 10  LAST  495   24,2262  03570 0   STORE  RINIT
1445                      24,2263  65236 0   VSQ    PDDL
1446                      24,2264  00045 0          36D
1447                      24,2265  56275 1   DMPR   DDV
1448  REF  1              24,2266  17051 0          THETACON
1449                      24,2267  41205 0   DMP    DMP
1450  REF  3  LAST  694   24,2270  03654 0          DELVSAB
1451  REF  1              24,2271  03076 0          WEIGHT/G
1452                      24,2272  77671 1   DDV
1453  REF  3  LAST  693   24,2273  03727 0          F
1454                      24,2274  24017 1   STOVL  14D
1455  REF 10  LAST  694   24,2275  03646 0          DELVSIN
1456                      24,2276  74241 0   DOT    VXSC
1457  REF  3  LAST  695   24,2277  03713 1          UT
1458  REF  4  LAST  695   24,2300  03713 1          UT
1459                      24,2301  41552 0   VSL2   PUSH         (DELTAV.UP)UP SCALED AT 2(+7) P.D.L. 0
1460                      24,2302  65245 1   BVSU   PDDL         DELTA VP SCALED AT 2(+7) P.D.L. 6
1461  REF 11  LAST  695   24,2303  03646 0          DELVSIN
1462                      24,2304  00017 1          14D
1463                      24,2305  63356 1   SIN    PDVL
1464                      24,2306  00007 0          6D
1465                      24,2307  53435 0   VXV    UNIT
1466  REF  5  LAST  695   24,2310  03713 1          UT
1467                      24,2311  45561 1   VXSC   STADR
1468  REF  7  LAST  183   24,2312  50056 1   STOVL  VGTIG        UNIT(VPXUP)SIN(THETAT)IN VGTIG
1469                      24,2313  65256 0   UNIT   PDDL         UNIT(DELTA VP) IN P.D.L. 6
1470                      24,2314  00017 1          14D
1471                      24,2315  74346 0   COS    VXSC
1472                      24,2316  74255 0   VAD    VXSC
1473  REF  8  LAST  695   24,2317  03721 0          VGTIG
1474                      24,2320  00045 0          36D
1475                      24,2321  53352 0   VSL2   VAD
1476                      24,2322  77626 0   STADR
1477  REF  9  LAST  695   24,2323  74056 1   STORE  VGTIG        VG IGNITION SCALED AT 2(+7)M/CS
1478                      24,2324  77656 1   UNIT
1479  REF  6  LAST  695   24,2325  27713 1   STOVL  UT           THRUST DIRECTION SCALED AT 2(+1)
1480  REF 10  LAST  695   24,2326  03721 0          VGTIG
1481                      24,2327  45006 0   PUSH   CALL
1484  REF  1              24,2330  11200 0          GET.LVC      VGTIG IN LV COOR AT 2(+7)M/CS IN DELVLVC
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P1485   NAME      S40.2,3
R1486   FUNCTIONAL DESCRIPTION
R1487             COMPUTE GIMBAL ANGLES IF THRUSTING OCCURRED WITH PRESENT IMU
R1488             ORIENTATION, WINGS LEVEL SPACECRAFT,HEADS UP
R1489             COMPUTE X AXIS OF ENGINE BELL
R1490             COMPUTE PREFERRED IMU ORIENTATION(XSCREF)
R1491             FOR THIS CALCULATION,ASSUME X AXIS OF SC ALONG UT INITIALLY,
R1492             YSC=UNIT(XXR),ZSC=UNIT(XX(XXR)) AND ROTATE ENGINE BELL ALONG UT
R1493             NEW SC AXES WILL BE APPROX. WINGS LEVEL AND NEW SC AXES IN REF.
R1494             COORDS. WILL BE PREFERRED IMU ORIENTATION.
R1495             COMPUTE DESIRED THRUST DIRECTION IN SM COORDS.
R1496   SUBROUTINES CALLED
R1497             CALCGA
R1498   ERASABLE INITIALIZATION REQUIRED
R1499             PACTOFF       TOTAL PITCH TRIM ANGLE      SP  AT 1.0795111 REV.
R1500             YACTOFF       TOTAL YAW   TRIM ANGLE      SP  AT 1.0795111 REV.
R1501             UT            DESIRED THRUST DIRECTION            VECT.B2M/(CS.CS)
R1502             RTIG          POSITION AT TIME OF IGNITION        VECT.    B29M
R1503             ENG2FLAG      ON=RCS OFF=SPS
R1504   OUTPUT
R1505             SCAXIS        UNIT VECT. ALIGNED WITH ENG BELL IN SC COOR B1
R1506             XSCREF        UNIT VECTORS ALIGNED WITH PREFERRED IMU     B1
R1507             YSCREF
R1508             ZSCREF
R1509             GIMBAL ANGLES IN THETAD
R1510             POINTVSM      UNIT VECT ALONG DESIRED THRUST DIRECTION IN SM B1

15109  REF   1                                                  COUNT*  $$/S40.2
1511                                 24,2331   64375 1  S40.2,3 VLOAD   MXV
1512   REF   7  LAST  695           24,2332   03713 1          UT
1513   REF  25  LAST  632           24,2333   01734 0          REFSMMAT
1514                                 24,2334   40372 0          VSL1    SETPD
1515                                 24,2335   00001 0          0D
1516   REF  15  LAST  632           24,2336   17357 0          STODL   POINTVSM
1517   REF  14  LAST  694           24,2337   15336 0          HIGZEROS
1518                                 24,2340   41414 0          BON     PUSH
1519   REF   2  LAST  693           24,2341   00704 1          ENG2FLAG
1520   REF   1                      24,2342   34157 0          S40.2,3B
1521                                 24,2343   41335 1          SLOAD   DMP
1522   REF   4  LAST  292           24,2344   03025 0          YACTOFF
1523   REF   1                      24,2345   11542 1          TRIMSCAL
1524                                 24,2346   43352 1          SL1     DAD
1525   REF   1                      24,2347   11544 1          YBIAS
1526                                 24,2350   71406 0          PUSH    COS
1527                                 24,2351   73525 1          PDDL    SIN
1528                                 24,2352   67206 1          PUSH    SLOAD
1529   REF  11  LAST  292           24,2353   03024 1          PACTOFF
1530                                 24,2354   72405 0          DMP     SL1
1531   REF   2  LAST  696           24,2355   11542 1          TRIMSCAL
1532                                 24,2356   41415 1          DAD     PUSH
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1533  REF  1                 24,2357  11546 0              PBIAS
1534                         24,2360  65346 0        COS   PDDL     COS(P +P0) PDL 6
1535                         24,2361  41556 1        SIN   PUSH     SIN(P +P0) PDL 8D
1536  REF  1                 24,2362  14323 0        STODL ZSCREF   SIN(P+P0)
1537                         24,2363  00007 0              6
1538                         24,2364  72405 0        DMP   SL1
1539                         24,2365  00005 1              4
1540                         24,2366  65276 1        DCOMP PDDL     -SIN(Y+Y0)COS(P+P0) PDL 10
1541                         24,2367  00007 0              6
1542                         24,2370  72405 0        DMP   SL1
1543                         24,2371  00003 1              2
1544                         24,2372  77666 1        VDEF
1545  REF  1                 24,2373  14307 0        STODL XSCREF   PD POINTER AT 6 NEW SC X AXIS SCALED AT
1546  REF  2  LAST  697      24,2374  00323 0              ZSCREF
1547                         24,2375  72405 0        DMP   SL1
1548                         24,2376  00005 1              4
1549                         24,2377  41325 0        PDDL  DMP
1550  REF  3  LAST  697      24,2400  00323 0              ZSCREF
1551                         24,2401  00003 1              2
1552                         24,2402  57552 1        SL1   DCOMP
1553                         24,2403  77666 1        VDEF
1554  REF  4  LAST  697      24,2404  14323 0        STODL ZSCREF   PD POINTER AT 4 NEW SCZ AXIS SCALED AT 2
1555                         24,2405  77666 1        VDEF
1556  REF  1                 24,2406  14315 0        STODL YSCREF   PD POINTER AT0 NEW SC Y AXIS SCALED AT 2
1557  REF  5  LAST  697      24,2407  00323 0              ZSCREF
1558                         24,2410  65325 0        PDDL  PDDL
1559  REF  2  LAST  697      24,2411  00315 0              YSCREF
1560  REF  2  LAST  697      24,2412  00307 0              XSCREF
1561                         24,2413  77666 1        VDEF
1562  REF  20  LAST  632     24,2414  27351 0        STOVL SCAXIS   ENGINE BELL SCALED AT 2
1563  REF  8  LAST  696      24,2415  03713 1              UT
1564                         24,2416  53515 0        PDVL  UNIT
1565  REF  8  LAST  695      24,2417  03632 0              RTIG
1566                         24,2420  57435 1        VXV   VCOMP
1567                         24,2421  00001 0              0
1568                         24,2422  41456 0        UNIT  PUSH
1569                         24,2423  77624 1        CALL
1570  REF  1                 24,2424  61702 0              TSTRXOT
1571                         24,2425  57435 1        VXV   VCOMP
1572                         24,2426  00001 0              0
1573                         24,2427  63372 1        VSL1  PDVL     2 RF/SC  IN PDL  120
1574  REF  3  LAST  697      24,2430  00307 0              XSCREF
1575                         24,2431  76505 0        VXM   VSL1
1576                         24,2432  00001 0              0
1577  REF  4  LAST  697      24,2433  24307 0        STOVL XSCREF   X OF PREF IMU,X OF SC IN REF COOR. AT 2
1578  REF  3  LAST  697      24,2434  00315 0              YSCREF
1579                         24,2435  76505 0        VXM   VSL1
1580                         24,2436  00001 0              0
1581  REF  4  LAST  697      24,2437  24315 0        STOVL YSCREF   Y OF PREF.IMU,Y OF SC IN REF COOR. AT 2
1582  REF  6  LAST  697      24,2440  00323 0              ZSCREF
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1583                          24,2441   76505 0          VXM     VSL1
1584                          24,2442   00001 0                  0
1585  REF   7 LAST  697       24,2443   00323 0          STORE   ZSCREF      Z OF PREF. IMU,Z OF SC IN REF COOR. AT 2
15855 REF   2 LAST  693 TO  694:    21     21*           COUNT*  $$/P40

1586                          24,2444   77414 0 P40SXTY  SET     EXIT
1587  REF   1                 24,2445   01073 1          SET     PFRATFLG
1588  REF   3 LAST  559       24,2446   0 3202 1         TCR     SETMINDB -1  NARROW DEADBAND FOR MANEUVER (EBANK6)
1589  REF  47 LAST  652       24,2447   0 5561 0         TC      DOWNFLAG
15895 REF   9 LAST  632       24,2450   00124 0          ADRES   BAXISFLG
1590  REF 142 LAST  693       24,2451   0 4636 0         TC      BANKCALL
1591  REF   5 LAST  632       24,2452   56074 1          CADR    R60CSM       ATTITUDE MANEUVER
15912 REF  47 LAST  633       24,2453   0 5402 1         TC      PHASCHNG     COMPTGO DESTROYS
15914                         24,2454   00014 1          OCT     00014        4.1 RESTART SETUP
1592  REF  68 LAST  645       24,2455   4 4770 1         CS      ONE          FOR UPDATEVG
1593  REF   2 LAST  110       24,2456   55'724 0         TS      NBRCYCLS
1594  REF 145 LAST  694       24,2457   0 6006 1         TC      INTPRET
1595                          24,2460   77614 1          BON
1597  REF   3 LAST  696       24,2461   00704 1                  ENG2FLAG     P40 OR P41 ?
1598  REF   1                 24,2462   51626 1                  P41/DSP
1599                          24,2463   51575 1          VLOAD   ABVAL        FOR R2
1600  REF  11 LAST  695       24,2464   03721 0                  VGTIG
1601  REF   5 LAST  644       24,2465   17763 0          STODL   VGDISP
1602  REF  15 LAST  696       24,2466   15336 0                  HI6ZEROS
1603  REF   8 LAST  537       24,2467   17426 1          STODL   DVTOTAL
1604  REF   1                 24,2470   11560 1                  S40.8ADS
1605  REF   4 LAST  528       24,2471   01062 1          STORE   AVEGEXIT
1606                          24,2472   77776 1          EXIT
1607  REF   1                 24,2473   3 3517 1 P40GMB  CAF     P40CKLS2     (4.1 PROTECTION)
1608  REF 143 LAST  698       24,2474   0 4636 0         TC      BANKCALL
1609  REF   4 LAST  629       24,2475   21067 0          CADR    GOPERF1
1610  REF   1                 24,2476   1 3403 1         TCF     POST41       V34
1611  REF   1                 24,2477   1 2560 1         TCF     TST,TRIM     V33
1612  REF  32 LAST  564       24,2500   4 4770 1 TRIMONLY CS     BIT1         SET MRKRTEMP FOR GIMBAL TRIM  (-1)
1613  REF   1                 24,2501   55'444 0   +1    TS      MRKRTMP      ENTRY FROM TST,TRIM
1614  REF 124 LAST  645       24,2502   3 4772 1         CAF     ZERO         SET CNTR  +0 FOR RESTART LOGIC IN S40.6
1615  REF   2 LAST  200       24,2503   55'446 1         TS      CNTR               +0 SAYS NORMAL ENTRY.
A1616                                                                           +1 (PRE40.6) SAYS RESTART ENTRY
1617  REF  69 LAST  698       24,2504   3 4770 0         CAF     ONE
1618  REF  18 LAST  645       24,2505   0 5233 0         TC      WAITLIST
1619  REF  17 LAST  693       E6,1465                    EBANK=  DAPDATR1
1620  REF   1                 24,2506   02366 0          2CADR   S40.6
1620  REF   1                 24,2507   40066 0
1621  REF   2 LAST  698       24,2510   11'444 0         CCS     MRKRTMP      TEST TO FIND TIME TO WAIT FOR GIMBALTEST
1622  REF   1                 24,2511   3 3523 0         CAF     18SEC         PLUS, DELAY FOR 18 SECONDS
1623                          24,2512   1 2514 1         TCF     +2           HOLE
1624  REF   1                 24,2513   3 3525 0         CAF     5SEC         DELAY FOR TRIM ONLY TASK
1625  REF 144 LAST  698       24,2514   0 4636 0         TC      BANKCALL
1626  REF   8 LAST  589       24,2515   01731 0          CADR    DELAYJOB
16262 REF   1                 24,2516   3 3514 1         CAF     V06N4
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16264  REF   4  LAST  645   24,2517  54 777 1          TS      NVWORD1         FORCE CLOCKJOB
1627   REF  18  LAST  645   24,2520  0 5362 0          TC      2PHSCHNG
1628                        24,2521   00026 0          OCT     00026           6.2 = PRE40.6(-0CS), CLOKTASK(100CS)
1629                        24,2522   00234 1          OCT     00234           4.23 = P40S/SV (PRIO12)
1630   REF   1              01,2154                4P23SPT1 =       4.23SPOT
1631   REF   2  LAST  230   01,2317                6P2SPT1  =       6.2SPOT
1635   REF   7  LAST  652   24,2523  0 4606 0    P40S/SV  TCR     E7SETTER        JOB, 4.23 PROTECTS, PRIO12
1636   REF  52  LAST  693   E7,1412                        EBANK=   TIG
1637   REF 146  LAST  698   24,2524  0 6006 1             TC      INTPRET
1638                        24,2525   45345 1          DLOAD   DSU
1639   REF  53  LAST  699   24,2526   03413 1                  TIG
1640   REF   6  LAST  693   24,2527   03460 0                  AVEGDT          29.96 SEC (P40) 100.00 SEC (P15)
1641   REF  27  LAST  683   24,2530   00041 1          STORE   TDEC1
1642                        24,2531   77624 1          CALRB                   RETURN IN BASIC
1643   REF   1              24,2532   27576 0                  MIDTOAV1
1644   REF   1              24,2533  0 2542 0          TC      P40SET          P15 INTEGRATION ALWAYS RETURNS HERE
1645                        24,2534  0 0006 1    P40SNEWM EXTEND                 INTEGRATION TIME GREATER THAN ALLOWED
1646   REF   5  LAST  317   24,2535  3 1105 1          DCA     PIPTIME1
1647   REF  54  LAST  699   24,2536  53'413 1          DXCH    TIG
1648                        24,2537  0 0006 1          EXTEND
1649   REF   2  LAST  693   24,2540  3 3530 1          DCA     SEC29.96
1650   REF  55  LAST  699   24,2541  21'413 1          DAS     TIG             SET NEW TIG FOR V06N40
1651                        24,2542  0 0006 1    P40SET  EXTEND
1652   REF 262  LAST  678   24,2543  3 0155 0          DCA     MPAC            DELTA TIME TO PREREAD
1653   REF  12  LAST  527   24,2544  53'673 0          DXCH    P40TMP
1654                        24,2545  0 0006 1          EXTEND
1655   REF   1              24,2546  4 3525 1          DCS     5SECDP          FOR TIGBLNK
16555  REF  13  LAST  699   24,2547  21'673 0          DAS     P40TMP
1656                        24,2550  0 0006 1          EXTEND
1657   REF  14  LAST  699   24,2551  3 1673 1          DCA     P40TMP
1658   REF   3  LAST  527   24,2552  0 5332 0          TC      LONGCALL
1659   REF  56  LAST  699   E7,1412                        EBANK=   TIG
1660   REF   3  LAST  233   24,2553   02565 0                 2CADR   TIGBLNK
1660                        24,2554   50067 0
1661   REF  48  LAST  698   24,2555  0 5402 1          TC      PHASCHNG
1662                        24,2556   20214 1          OCT     20214           4.21 = TIGBLNK (P40TMP CS)
16625  REF   1              01,2151                4P21SPT1 =       4.21SPOT
1663   REF  68  LAST  632   24,2557  1 5205 1          TCF     ENDOFJOB

1664   REF  33  LAST  698   24,2560  3 4770 0    TST,TRIM CAF     BIT1            SET UP FOR GIMB DRIVE TEST AND TRIM (+1)
1665   REF   1              24,2561  1 2501 0          TCF     TRIMONLY +1

1666   REF 145  LAST  698   24,2562  0 4636 0    P40BLNKR TC      BANKCALL
1667   REF   3  LAST  537   24,2563   20715 0          CADR    CLEANDSP        REMOVE RESIDUE
1668   REF  69  LAST  699   24,2564  1 5205 1          TCF     ENDOFJOB
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P1669
1670   REF   2  LAST  698   24,2565  3 3525 0  TIGBLNK  CAF     5SEC      CALL TIGAVEG IN 5 SEC AT TIG - AVEGDT
1671   REF   9  LAST  531   24,2566  0 5223 1           TC      TWIDDLE
1672   REF   2  LAST  234   24,2567   02602 1           ADRES   TIGAVEG
1673   REF 125  LAST  698   24,2570  3 4772 1           CAF     ZERO      DISABLE HERE, NOT IN P40BLNKR
1674   REF   5  LAST  699   24,2571  54 777 1           TS      NVWORD1
1675   REF   4  LAST  555   24,2572  3 5053 1           CAF     PRIO14
1676   REF  11  LAST  585   24,2573  0 5121 0           TC      NOVAC
1677   REF  57  LAST  699   E7,1412                     EBANK=  TIG
1678   REF   1         24,2574   02562 1           2CADR   P40BLNKR  DONT PROTECT-RESTARTS BLANK DSKY
1678   REF   1         24,2575   50067 0
1679   REF   3  LAST  243   24,2576  4 4342 1           CS      OCT37     4.37 = TIGAVEG (500CS)
1680   REF   2  LAST  438   24,2577  0 4126 0  P40TSK   TC      NEWPHASE
1681                 24,2600   00004 0           OCT     4
16815  REF   1         01,2176           4P37SPT1 =      4.37SPOT
1682   REF  27  LAST  557   24,2601  0 5314 1           TC      TASKOVER

1683   REF  58  LAST  700   E7,1412                     EBANK=  TIG
16841  REF  13  LAST  521   24,2602  31'214 1  TIGAVEG  CAE     MODREG    TASK (4.37 PROTECTS)
16842  REF  27  LAST  579   24,2603  7 4763 0           MASK    BIT6
16843                24,2604  0 0006 1           EXTEND                P15 OR P40/P41 ?
16844  REF   1         24,2605  1 2631 0           BZF     P15AVEG   P15
16845  REF   1         24,2606  4 4765 0           CS      PFRATBIT  P40/P41
16846  REF  12  LAST  589   24,2607  7 0076 1           MASK    FLAGWRD2
16847  REF  13  LAST  700   24,2610  54 076 1           TS      FLAGWRD1
1685   REF  28  LAST  597   24,2611  30 075 0           CAE     ENG2BIT
1686   REF   1         24,2612  7 4756 0           MASK    P40 OR P41 ?
1687   REF 161  LAST  599   24,2613  10 000 0           CCS     A
1688   REF   1         24,2614  1 3642 0           TCF     P41REDSP
1689   REF   2  LAST  698   24,2615  3 3514 1           CAF     V06N40    UNBLANK DISPLAY
1690   REF   6  LAST  700   24,2616  54 777 1           TS      NVWORD1
1691   REF   1         24,2617  3 3522 1           CAF     SEC24.96
1692   REF  10  LAST  700   24,2620  0 5223 1           TC      TWIDDLE
1693   REF   2  LAST  232   24,2621   02634 1           ADRES   TIG-5
1694   REF  19  LAST  630   24,2622  4 6211 1           CS      SIX       4.6 = TIG-5 (2496CS), PRECHECK (-0CS)
1695   REF   3  LAST  700   24,2623  0 4126 0  TTGPHS   TC      NEWPHASE  ENTRY FROM P41REDSP (P41) WITH A=-4, OR
1696                24,2624   00004 0           OCT     4                 FROM TIGON    (P47) WITH A=-2
16962  REF   2  LAST  230   01,2102           4P2SPT1 =       4.2SPOT
16964  REF   1         01,2110           4P4SPT1 =       4.4SPOT
16966  REF   1         01,2116           4P6SPT1 =       4.6SPOT
1697   REF   2  LAST  540   24,2625  11'166 0  PRECHECK CCS     PHASE5    HAS SERVICER BEEN RESTARTED
1698   REF  28  LAST  700   24,2626  1 5314 0           TCF     TASKOVER  YES, DONT START ANOTHER ONE
1699   REF  42  LAST  693   24,2627  0 4655 0           TC      POSTJUMP
1700   REF   2  LAST  235   24,2630   76607 1           CADR    PREREAD

17001  REF   1         24,2631  3 3513 0  P15AVEG  CAF     V06N95B
17002  REF   7  LAST  700   24,2632  54 777 1           TS      NVWORD1   UNBLANK DISPLAY
17006  REF   4  LAST  232   24,2633  1 2625 0           TCF     PRECHECK
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P1701
 1702   REF  59  LAST  700   E7,1412                          EBANK=  TIG
 1703   REF   3  LAST  700   24,2634   3 3525 0   TIG-5      CAF     5SEC
 1704   REF  19  LAST  698   24,2635   0 5233 0              TC      WAITLIST
 1705   REF  18  LAST  698   E6,1465                          EBANK=  DAPDATR1
 1706   REF   3  LAST  233   24,2636    02651 1              2CADR   TIG-0
 1706                        24,2637    50066 1
 1707   REF  19  LAST  550   24,2640   4 4760 0              CS      BIT9          WILL CAUSE V99 FLASH
 1708   REF   8  LAST  700   24,2641   54 777 1              TS      NVWORD1
 1709   REF  19  LAST  699   24,2642   0 5362 0              TC      2PHSCHNG
 1710                        24,2643    40074 0              OCT     40074         A, 4.7 = TIG-0 (500CS)
 1711                        24,2644    00033 1              OCT     00033         A, 3.3 = S40.13 (PRIO20)
 1711R  REF   2  LAST  230   01,2060                 3P3SPT1  =       3.3SPOT
 1712   REF   1              01,2132                 4P7SPT1  =       4.7SPOT
 1713   REF   1              24,2645   0 5134 1              TC      FINVAC2C
 1714   REF   7  LAST  234   E7,1427                          EBANK=  TGO
 1715   REF   2  LAST  231   24,2646    02534 1              2CADR   S40.13
 1715                        24,2647    34067 1
 1716   REF  29  LAST  700   24,2650   1 5314 0              TCF     TASKOVER
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P1717
 1718   REF  19  LAST  701   E6,1465                          EBANK=  DAPDATR1      TASK, 4.7 PHASE OR 4.11 (-0 CS IN R40)
 1719   REF   4  LAST  531   24,2651   4 0103 1  TIG-0       CS      FLAGWRD7      SET IGN FLAG
 1720   REF   1               24,2652   7 4754 1             MASK    IGNFLBIT
 1721   REF   5  LAST  702   24,2653   26 103 1             ADS     FLAGWRD7
 1722   REF   6  LAST  702   24,2654   30 103 0             CAE     FLAGWRD7      CHECK ASTN FLAG FOR V99 RESPONSE
 1723   REF  24  LAST  558   24,2655   7 4755 0             MASK    BIT12
 1724                        24,2656   0 0006 1             EXTEND
 1725   REF  30  LAST  701   24,2657   1 5314 0             BZF     TASKOVER      WAIT FOR V99P
 1726   REF   3  LAST  700   24,2660   3 3514 1             CAF     V06N40        CLEAR THE V99 (IN CASE OF A RESTART
 1727   REF   9  LAST  701   24,2661   54 777 1             TS      NVWORD1             DURING THE V99 SEQUENCE)
 1728   REF  49  LAST  699   24,2662   0 5402 1             TC      PHASCHNG      V99P HAS COME ALREADY, DO IGNITION NOW
 1729                        24,2663    00274 0             OCT     00274         A, 4.27 = IGNITION (-OCS) TBASE OLD
17295   REF   1               01,2162             4P27SPT1 =       4.27SPOT
 1730   REF  13  LAST  596   24,2664   30 032 0  IGNITION   CAE     CDUX          SAVE FOR ROLL DAP REFERENCE OGAD
 1731   REF   1               24,2665   55'447 0           TS      OGAD                V99PJOB (CLOCKJOB) SETS UP IGNITION
 1732                        24,2666   0 0006 1           EXTEND                      TASK (4.61 PROTECTION)
 1733   REF  24  LAST  579   24,2667   3 0025 0           DCA     TIME2               FOR RESTARTS
 1734   REF   7  LAST  531   24,2670   53'022 1           DXCH    TEVENT
 1735   REF  10  LAST  448   24,2671   4 0101 0           CS      FLAGWRD5      SET ENGONFLG
 1736   REF   4  LAST  209   24,2672   7 4762 1           MASK    ENGONBIT
 1737   REF  11  LAST  702   24,2673   26 101 0           ADS     FLAGWRD5
 1738   REF  25  LAST  652   24,2674   3 4754 0  SPSON      CAF     BIT13         TURN ON SPS ENGINE
 1739                        24,2675   0 0006 1           EXTEND
 1740   REF  20  LAST  597   24,2676   05 011 1           WOR     DSALMOUT
17401   REF  14  LAST  555   24,2677   4 0106 1           CS      FLGWRD10      SET BURNFLAG TO INDICATE
17402   REF   1               24,2700   7 4757 1           MASK    BURNBIT       THAT THEN CSM DID THE BURN
17403   REF  15  LAST  702   24,2701   26 106 1           ADS     FLGWRD10

 1741   REF   1               24,2702   3 4760 1  IMPULCHK   CAF     IMPULBIT      CHECK FOR IMPULSIVE BURN
 1742   REF  14  LAST  700   24,2703   7 0076 1           MASK    FLAGWRD2
 1743   REF 162  LAST  700   24,2704   10 000 0           CCS     A
 1744   REF   1               24,2705   1 2773 1           TCF     IMPLBURN      IMPULSIVE
 1745   REF  12  LAST  543   24,2706   4 0102 0           CS      FLAGWRD6      NON-IMPULSIVE, SET STRULLSW FOR STEERULL
 1746   REF   1               24,2707   7 4754 1           MASK    STRULBIT
 1747   REF  13  LAST  702   24,2710   26 102 0           ADS     FLAGWRD6
 1748   REF  10  LAST  543   24,2711   4 4076 0  PREPTVC    CS      DPCONFIG      RESET T5 BITS
 1749   REF  14  LAST  702   24,2712   7 0102 0           MASK    FLAGWRD6
 1750   REF  15  LAST  702   24,2713   54 102 0           TS      FLAGWRD6
 1751                        24,2714   0 0006 1           EXTEND                      KILL RCS
 1752   REF   1               24,2715   3 3550 1           DCA     T5IDL24
 1753   REF   8  LAST  550   24,2716   52 113 0           DXCH    T5LOC
 1754   REF  24  LAST  572   24,2717   4 6214 1           CS      THREE         4.3 = DOTVCON (40CS)
 1755   REF   4  LAST  700   24,2720   0 4126 0           TC      NEWPHASE
 1756                        24,2721    00004 0           OCT     4
17565   REF   2  LAST  230   01,2124             4P3SPT1  =       4.3SPOT
 1757   REF   2  LAST  531   24,2722   0 5255 0           TC      FIXDELAY
 1758                        24,2723    00050 1           DEC     40            0.4 SECOND DELAY FOR THRUST BUILDUP
 1759   REF  34  LAST  699   24,2724   4 4770 1  DOTVCON    CS      BIT1          SET TVCPHASE = TVCDAPON CALL (FRESHDAP)
 1760   REF   2  LAST  109   24,2725   55'635 1           TS      TVCPHASE
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1761  REF 126 LAST 700  24,2726  3 4772 1          CAF   ZERO        SET TVCEXECUTIVE PHASE
1762  REF   2 LAST 110  24,2727  55'644 1          TS    TVCEXPHS
1763  REF  11 LAST 702  24,2730  4 4076 0          CS    DPCONFIG    SET T5 BITS TO INDICATE TVC TAKEOVER....
1764  REF  16 LAST 702  24,2731  7 0102 0          MASK  FLAGWRD6        BITS 15,14  =  10
1765  REF   1           24,2732  6 4752 0          AD    DAP1BIT
1766  REF  17 LAST 703  24,2733  54 102 0          TS    FLAGWRD6
1767  REF  25 LAST 702  24,2734  3 6214 0          CAF   THREE       6.3 = CLOKTASK (100CS), DROPPING PRE40.6
1768  REF  73 LAST 631  24,2735  54 001 1          TS    L                 WHICH IS HANDLED NOW BY REDOTVC
1769                    24,2736  4 0000 0          COM
1770  REF   2 LAST 197  24,2737  53'170 1          DXCH  -PHASE6
17705 REF   4 LAST 645  01,2325           6P3SPT2  =     6.3SPOT
1771                    24,2740  0 0006 1          EXTEND            STORE RCS ATTITUDE ERRORS FOR USE IN
1772  REF   7 LAST 188  24,2741  4 1571 1          DCS   ERRORY      INITIALIZING TVC ATTITUDE ERRORS
1773  REF   2 LAST 110  24,2742  53'665 1          DXCH  ERRBTMP
1774  REF  14 LAST 568  24,2743  4 4773 1          CS    FIVE        4.5 = DOSTRULL  ( 160 CS )
1775  REF   5 LAST 702  24,2744  0 4126 0          TC    NEWPHASE
1776                    24,2745  00004 0           OCT   4
17765 REF   1           01,2127           4P5SPT1  =     4.5SPOT
1777  REF  14 LAST 589  24,2746  3 4750 1          CAF   POSMAX      SET TIME5 FOR STARTING RIGHT AWAY
1778  REF   6 LAST 550  24,2747  54 030 0          TS    TIME5
1779                    24,2750  0 0006 1          EXTEND
1780  REF   1           24,2751  3 3562 0          DCA   TVCDN2C     (TVCDAPON)
1781  REF   9 LAST 702  24,2752  52 113 0          DXCH  T5LOC       (KILLS RCS DAP)
1782  REF   3 LAST 702  24,2753  0 5255 0          TC    FIXDELAY    0.4 + 1.6 = 2.0 SEC FOR ULLAGE-OFF AND
1783                    24,2754  00240 1           DEC   160               STEERING (IF NON-IMPULSIVE)
1784  REF  18 LAST 703  24,2755  4 0102 0 DOSTRULL CS    FLAGWRD6    CHECK STRULLSW FOR IMPULSIVE BURN
1785  REF   2 LAST 702  24,2756  7 4754 1          MASK  STRULBIT
1786  REF 163 LAST 702  24,2757  10 000 0          CCS   A
1787  REF   1           24,2760  0 2764 0          TC    ULAGEOFF    ULLAGE OFF
1788  REF  15 LAST 702  24,2761  4 0076 1 STEEROLL CS    FLAGWRD2    SET STEERSW
1789  REF   1           24,2762  7 4756 0          MASK  STEERBIT
1790  REF  16 LAST 703  24,2763  26 076 1          ADS   FLAGWRD2
1791  REF 127 LAST 703  24,2764  3 4772 1 ULAGEOFF CAF   ZERO
1792                    24,2765  0 0006 1          EXTEND
1793  REF   2 LAST 194  24,2766  01 005 0          WRITE CHAN5       ZERO CHANNEL 5
1794                    24,2767  0 0006 1          EXTEND
1795  REF  14 LAST 214  24,2770  3 4772 1          DCA   NEG         KILL GROUP 4 (DP NEG0 = -0, +0)
1796  REF   3 LAST 214  24,2771  53'164 1          DXCH  -PHASE4
1797  REF  31 LAST 702  24,2772  1 5314 0 ENDIGN   TCF   TASKOVER

1798  REF   3 LAST 703  24,2773  4 4754 1 IMPLBURN CS    STRULBIT    RESET STRULLSW (COULD BE AN IMPULSIVE
1799  REF  19 LAST 703  24,2774  7 0102 0          MASK  FLAGWRD6        ENGINE FAIL)
1800  REF  20 LAST 703  24,2775  54 102 0          TS    FLAGWRD6
1801  REF   8 LAST 699  24,2776  0 4606 0          TCR   E7SETTER
1802  REF  60 LAST 701  E7,1412                    EBANK= TIG
1803                    24,2777  0 0006 1          EXTEND            PREPARE FOR R1 OF V06N40 (CLOCKTASK)
1804  REF   8 LAST 701  24,3000  3 1430 1          DCA   TGO
1805  REF  61 LAST 703  24,3001  53'413 1          DXCH  TIG
1806                    24,3002  0 0006 1          EXTEND
1807  REF  25 LAST 702  24,3003  3 0025 0          DCA   TIME2
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1808   REF  62  LAST  703   24,3004  21'413 1          DAS     TIG
1809   REF  20  LAST  701   24,3005  0 5362 0          TC      2PHSCHNG
1810                        24,3006   40053 0          OCT     40053          A,3.5 = ENGINOFF (TGO+1)....NOTE GROUP
1811                        24,3007   07014 0          OCT     07014          C, DELTAT AND 2CADR FOLLOW FOR TASK BELO
18115  REF   1              01,2063                3P5SPT1  =       3.5SPOT
1812                        24,3010   77777 0          DEC     -0             -0 CS
1813   REF  20  LAST  702   E6,1465                    EBANK=  DAPDATR1
1814   REF   1              24,3011   03016 0          2CADR   IMPLCONT
1814   REF   1              24,3012   50066 1
1815   REF   9  LAST  703   24,3013  31'430 1          CAE     TGO +1         (TPAGREE IN S40.13, LESS THAN 600CS)
1816   REF  11  LAST  700   24,3014  0 5223 1          TC      TWIDDLE
1817   REF   2  LAST  231   24,3015   03023 0          ADRES   ENGINOFF
1818   REF   2  LAST  702   24,3016  4 4760 0  IMPLCONT CS      IMPULBIT       RESET IMPULSW, ENGINOFF IS NOW SET UP
1819   REF  17  LAST  703   24,3017  7 0076 1          MASK    FLAGWRD2
1820   REF  18  LAST  704   24,3020  54 076 1          TS      FLAGWRD2
1821   REF   9  LAST  632   24,3021  0 4611 0          TCR     E6SETTER
1822   REF  21  LAST  704   E6,1465                    EBANK=  DAPDATR1
1823   REF   1              24,3022  1 2711 0          TCF     PREPTVC

1824   REF  10  LAST  704   E7,1427                    EBANK=  TGO            E7 FORCED BY 3.15SPOT VARIABLE DELTA-T
1825   REF  10  LAST  704   24,3023  0 4611 0  ENGINOFF TCR     E6SETTER       TASK, 3.15 PHASE (TGO+1 CS)      GET E6
1826   REF  22  LAST  704   E6,1465                    EBANK=  DAPDATR1
1827   REF   2  LAST  209   24,3024  0 3045 0  DOSPSOFF TCR     SPSOFF         SHUT DOWN SPS
1828   REF   4  LAST  703   24,3025  0 5255 0          TC      FIXDELAY       2.5 SECOND DELAY FOR SPS TAILOFF
1829                        24,3026   00372 1          DEC     250            RESTART MAY DOUBLE THE DELAY, HIT TEVENT
1830   REF   3  LAST  559   24,3027  0 3217 0  DOTVCRCS TCR     SETMAXDB       WIDE DEADBAND FOR CUTOFF TRANSIENT
1831   REF  24  LAST  551   24,3030  0 4714 1          TC      IBNKCALL       SET UP RCS DAP (KILLS TVCDAPS, SETS T5
1832   REF   3  LAST  262   24,3031   42042 1          CADR    RCSDAPON             BITS, WAITS 0.6SEC FOR TVCEXEC DIE)
1833   REF  25  LAST  704   24,3032  0 4714 1          TC      IBNKCALL       UPDATE WEIGHT/G AND MASS-PROPERTIES FOR
1834   REF   3  LAST  266   24,3033   13313 1          CADR    MASSPROP             RCS DAP STARTUP IN 0.6 SECONDS
1835   REF   2  LAST  209   24,3034  0 3161 1          TCR     TVCZAP         WIPE OUT TVC, TURN OFF CLOKTASK
1836   REF  21  LAST  704   24,3035  0 5362 0          TC      2PHSCHNG
1837                        24,3036   00003 1          OCT     00003          KILL GROUP 3 PROTECTION OF ENGINOFF
1838                        24,3037   00354 0          OCT     00354          A, 4.35 = POSTBURN (NOVAC, PRIO12)
18385  REF   1              01,2173                4P35SPT1 =       4.35SPOT
1839   REF   4  LAST  531   24,3040  3 4664 1          CAF     PRIO12         SET UP POSTBURN V16N40 JOB
1840   REF  12  LAST  700   24,3041  0 5121 0          TC      NOVAC
1841   REF  23  LAST  704   E6,1465                    EBANK=  DAPDATR1       (SETMAXDB IN POST41)
1842   REF   2  LAST  233   24,3042   03174 0          2CADR   POSTBURN
1842                        24,3043   50066 1
1843   REF  32  LAST  703   24,3044  1 5314 0          TCF     TASKOVER

1844   REF  24  LAST  704   E6,1465                    EBANK=  DAPDATR1
18445                       24,3045  0 0004 0  SPSOFF   INHINT
1845                        24,3046  0 0006 1          EXTEND                 ESTABLISH SPSOFF TEVENT
1846   REF  26  LAST  703   24,3047  3 0025 0          DCA     TIME2
1847   REF   8  LAST  702   24,3050  53'022 1          DXCH    TEVENT
1848   REF   5  LAST  702   24,3051  4 4762 1          CS      ENGONBIT       RESET ENGONFLG
1849   REF  12  LAST  702   24,3052  7 0101 0          MASK    FLAGWRD5
1850   REF  13  LAST  704   24,3053  54 101 0          TS      FLAGWRD5       (RESTARTS WILL SHUT DOWN SPS NOW)
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1851  REF  26  LAST  702  24,3054  4 4754 1          CS      BIT13      SHUT DOWN SPS ENGINE
1852                      24,3055  0 0006 1          EXTEND
1853  REF  21  LAST  702  24,3056  03 011 1          WAND    DSALMOUT
1854  REF  31  LAST  563  24,3057  3 4753 1          CAF     BIT14      ISSUE SIV CUTOFF COMMAND
1855                      24,3060  0 0006 1          EXTEND             FOR POSSIBLE BACK-UP USE
1856  REF  34  LAST  550  24,3061  05 012 1          WOR     CHAN12
1857  REF   3  LAST  702  24,3062  3 1635 0          CA      TVCPHASE   CHECK IF OK FOR TRIM UPDATE
1858  REF  70  LAST  698  24,3063  6 4770 0          AD      ONE                   THESE CHECKS ARE ONLY NEEDED
1859                      24,3064  0 0006 1          EXTEND                FOR A LESS THAN 0.4 SEC BURN
1860  REF   1             24,3065  1 3101 0          BZF     BTRIMR     NO, INITIALIZATION NOT COMPLETE
1861  REF  21  LAST  703  24,3066  4 0102 0          CS      FLAGWRD6   YES, CHECK IF TVC
1862  REF  12  LAST  703  24,3067  7 4076 0          MASK    DPCONFIG
1863                      24,3070  0 0006 1          EXTEND
1864  REF   2  LAST  705  24,3071  6 3101 1          BZMF    BTRIMR     NO, NOT TVC YET
1865  REF   2  LAST  109  24,3072  31'633 0          CAE     REPFRAC    NO TRIM UPDATES IF R40 (ENGFAIL) ACTIVE
1866                      24,3073  0 0006 1          EXTEND                (LOTHRUST SETS REPFRAC = 77777)
1867  REF   3  LAST  705  24,3074  1 3101 0          BZF     BTRIMR
1868  REF   2  LAST  109  24,3075  31'601 1 BESTTRIM CAE     DELPBAR    UPDATE TRIMS WITH DELFILTER VALUES
1869  REF  12  LAST  696  24,3076  55'423 1          TS      PACTOFF
1870  REF   2  LAST  109  24,3077  31'603 0          CAE     DELYBAR
1871  REF   5  LAST  696  24,3100  55'424 0          TS      YACTOFF
1872  REF 130  LAST  592  24,3101  0 0002 0 BTRIMR   TC      Q
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P1873
 18735  REF   1                                          COUNT* $$/S40.8
 1874   REF   3  LAST  698   E6,1446                     EBANK= CNTR
 1875                        24,3102   77775 1  S40.81  VLOAD                TGO LESS THAN 4 SECONDS
 1877   REF  16  LAST  698   24,3103   15336 0          HI6ZEROS
 1878   REF  11  LAST  182   24,3104   03126 1  RATEZRO STORE  OMEGAC        TVC TO ATTITUDE HOLD
 1879                        24,3105   77776 1          EXIT
 1880   REF  15  LAST  703   24,3106  3 4750 1          CAF    POSMAX        INHIBIT SWITCHOVER/TVC EG TRACKING
 1881   REF   4  LAST  706   24,3107  55'446 1          TS     CNTR
 1887   REF   9  LAST  703   24,3110  0 4606 0          TCR    E7SETTER
 1888   REF  63  LAST  704   E7,1412                     EBANK= TIG
 1889                        24,3111  0 0004 0          INHINT
 1890                        24,3112  0 0006 1          EXTEND
 1891   REF  64  LAST  706   24,3113  3 1413 0          DCA    TIG
 1892   REF 263  LAST  699   24,3114  52 155 1          DXCH   MPAC
 1893                        24,3115  0 0006 1          EXTEND
 1894   REF  27  LAST  704   24,3116  4 0025 1          DCS    TIME2
 1895   REF 264  LAST  706   24,3117  20 155 1          DAS    MPAC
 1896   REF   6  LAST  557   24,3120  0 7224 1          TCR    DPAGREE
 1897   REF 265  LAST  706   24,3121  30 155 0          CAE    MPAC +1       (LESS THAN 6 (OR 4) SECONDS TO GO)
 1898                        24,3122  0 0006 1          EXTEND
 1899                        24,3123  6 3125 1          BZMF   +2
 1900                        24,3124  1 3126 0          TCF    +2
 1901   REF  71  LAST  705   24,3125  3 4770 0          CAF    ONE
 1902   REF  11  LAST  704   24,3126  55'430 0          TS     TGO +1
 1907   REF  12  LAST  704   24,3127  0 5223 1          TC     TWIDDLE
 1908   REF   3  LAST  704   24,3130   03023 0          ADRES  ENGINOFF
 1909   REF  22  LAST  704   24,3131  0 5362 0          TC     2PHSCHNG
 1910                        24,3132   40053 0          OCT    40053         A,3.5 = ENGINOFF (TGO+1).....NOTE GROUP
 1911                        24,3133   10035 0          OCT    10035         B, 5.3 = REREADAC, AND START BELOW
 19112  REF   2  LAST  704   01,2063           3P5SPT2  =      3.5SPOT
 19114  REF   4  LAST  541   01,2250           5P3SPT2  =      5.3SPOT
 1912   REF  48  LAST  698   24,3134  0 5561 0  CLEARSTR TC     DOWNFLAG      CLEAR IMPULSW, ENGINOFF IS NOW SET UP
 1913   REF   3  LAST  530   24,3135   00042 1          ADRES  STEERSW       RESTARTS OK
 1914   REF   1              24,3136  1 3614 0          TCF    SERVXT

 1915                        24,3137   77776 1  INCRSVG EXIT                 ALARM INDICATING THAT THRUST IS POINTING
 1916   REF  24  LAST  667   24,3140  0 5671 1          TC     ALARM         IN WRONG DIRECTION.
 1917                        24,3141   01407 0          OCT    01407
 1918   REF   2  LAST  706   24,3142  1 3614 0          TCF    SERVXT

 19185  REF   1                                          COUNT* $$/R40
 1919                        24,3143   77614 1  LOTHRUST BOFF
 1920   REF   4  LAST  706   24,3144   01344 0                 STEERSW
 1921   REF   2  LAST  531   24,3145   51603 0                 SERVXTI       NO STEERING. EXIT
 1922                        24,3146   77214 0  R40CHECK BON   VLOAD         THRUST FAILURE (LO-OR-NO) INDICATED
 1923   REF   1              24,3147   00711 0                 IDLEFAIL      SET BY V97P. ALLOWS 1 BYPASS IN CASE OF
 1924   REF   3  LAST  706   24,3150   51603 0                 SERVXTI       UNFAVORABLE STEERING SYNCH
 1925   REF  17  LAST  706   24,3151   15336 0  R40START       HI6ZEROS      START OF ENGINE-FAIL (R40) OPERATIONS
 1926   REF  12  LAST  706   24,3152   03126 1          STORE  OMEGAC        PUT TVC IN ATTITUDE HOLD
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1927                              24,3153   77776 1        EXIT
1928   REF  25  LAST  704        E6,1465                  EBANK= DAPDATR1
1929   REF 128  LAST  703        24,3154   4 4772 0       CS     ZERO
1930   REF   3  LAST  705        24,3155   55'633 1       TS     REPFRAC     KILL TVCDAP CG TRIM TRACKING
1931   REF  10  LAST  702        24,3156   54 777 1       TS     NVWORD1     SET UP ENGINE-FAIL V97FLASH (CLOCKJOB)
1932   REF   2  LAST  531        24,3157   1 3134 0       TCF    CLEARSTR
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P1933
 19335 REF   3 LAST  698 TO  706:    286   307*          COUNT* $$/P40
 1934                       24,3160  0 0004 0    -1      INHINT
 1935  REF   1              24,3161  4 3520 1  TVCZAP    CS     OCT02202     DISABLE TVC AND OPT ERR CNTRS, REENGAGE
 1936                       24,3162  0 0006 1             EXTEND                   OPTICS DAC
 1937  REF  35 LAST  705    24,3163  03 012 1             WAND   CHAN12
 1938  REF  35 LAST  702    24,3164  4 4770 1             CS     BIT1         ENABLE T4RUPT OPTICS MONITOR....PERMIT
 1939  REF  21 LAST  452    24,3165  55'323 0             TS     OPTIND           OPTICS-ZERO BUT NOT OPTICS-DRIVE
 1940  REF 129 LAST  707    24,3166  3 4772 1             CAF    ZERO         CLEAR NVWORD1 IN CASE CLOCKJOB WAITING
 1941  REF  11 LAST  707    24,3167  54 777 1             TS     NVWORD1
 1942  REF   2 LAST  531    24,3170  4 4756 0             CS     TIMRBIT      CLEAR TIMRFLAG TO STOP CLOKTASK
 1943  REF   7 LAST  702    24,3171  7 0103 1             MASK   FLAGWRD7
 1944  REF   8 LAST  708    24,3172  54 103 1             TS     FLAGWRD7
 1945  REF 131 LAST  705    24,3173  0 0002 0             TC     Q

 1946  REF  26 LAST  707    E6,1465                       EBANK= CAPDATR1
 1947  REF   1              24,3174  3 3515 0  POSTBURN   CAF    V16N40       NOVAC, PRIO 12
 1948  REF 146 LAST  699    24,3175  0 4636 0             TC     BANKCALL
 1949  REF   1              24,3176   20716 0             CADR   REFLASH
 1950  REF   2 LAST  698    24,3177  1 3403 1             TCF    POST41       V34 GO FINISH
 1951  REF   1              24,3200  1 3441 1             TCF    P40RCS       PROCEED
 1952  REF   3 LAST  704    24,3201  1 3174 1             TCF    POSTBURN     RECYCLE

 1953  REF  27 LAST  708    E6,1465                       EBANK= DAPDATR1
 1954                       24,3202  0 0004 0    -1      INHINT
 1955  REF  14 LAST  702    24,3203  3 0032 0  SETMINDB   CA     CDUX         ROUTINE FOR SETTING
 1956  REF  11 LAST  599    24,3204  55'572 1             TS     THETADX      THE MINIMUM DEADBAND
 1957                       24,3205  0 0006 1             EXTEND              IN AUTOPILOT
 1958  REF   6 LAST  570    24,3206  3 0034 0             DCA    CDUY
 1959  REF   9 LAST  599    24,3207  53'574 1             DXCH   THETADY
 1960  REF   3 LAST  571    24,3210  3 5007 0             CA     MINDB        SHOULD BE CALLED UNDER
 1961  REF   7 LAST  571    24,3211  55'655 1             TS     ADB          INTERRUPT INHIBITED
 1962  REF  25 LAST  592    24,3212  4 4765 0             CS     BIT4         EBANK = E6
 1963  REF  28 LAST  708    24,3213  7 1465 0             MASK   DAPDATR1
 1964  REF  29 LAST  708    24,3214  55'465 0             TS     DAPDATR1
 1965  REF 132 LAST  708    24,3215  0 0002 0             TC     Q

 1966  REF  30 LAST  708    E6,1465                       EBANK= DAPDATR1
 1967                       24,3216  0 0004 0    -1      INHINT
 1968  REF   1              24,3217  3 3521 1  SETMAXDB   CA     MAXDB        ROUTINE FOR SETTING
 1969  REF   8 LAST  708    24,3220  55'655 1             TS     ADB          THE MAXIMUM DEADBAND IN AUTOPILOT
 1970  REF  31 LAST  708    24,3221  4 1465 0             CS     DAPDATR1
 1971  REF  26 LAST  708    24,3222  7 4765 0             MASK   BIT4         SHOULD BE CALLED UNDER
 1972  REF  32 LAST  708    24,3223  27'465 0             ADS    DAPDATR1     INTERRUPT INHIBITED
 1973  REF 133 LAST  708    24,3224  0 0002 0             TC     Q            EBANK = E6
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P1974
1975    REF  65  LAST  706   E7,1412                          EBANK=  TIG
1976    REF   3  LAST  708   24,3225   3 4756 1  CLOKTASK    CAF     TIMRBIT      IS TIMRFLAG SET
1977    REF   9  LAST  708   24,3226   7 0103 1              MASK    FLAGWRD7
1978    REF 164  LAST  703   24,3227  10 000 0               CCS     A
1979    REF   1              24,3230   1 3234 0              TCF     CLOCKON
1980    REF  50  LAST  702   24,3231   0 5402 1              TC      PHASCHNG
1981                         24,3232    00006 1              OCT     00006        KILL RESTART
1982    REF  33  LAST  704   24,3233   0 5314 1              TC      TASKOVER
1983                         24,3234   0 0006 1  CLOCKON     EXTEND
1984    REF  28  LAST  706   24,3235   3 0025 0              DCA     TIME2
1985    REF   9  LAST  530   24,3236  53'661 0               DXCH    TTOGO
1986                         24,3237   0 0006 1              EXTEND
1987    REF  66  LAST  709   24,3240   4 1413 1              DCS     TIG
1988    REF  10  LAST  709   24,3241  21'661 0               DAS     TTOGO
1989    REF  11  LAST  520   24,3242   3 5016 0  SETCLOCK    CAF     1SEC
1990    REF  13  LAST  706   24,3243   0 5223 1              TC      TWIDDLE
1991    REF   5  LAST  645   24,3244    03225 1              ADRES   CLOKTASK
1992    REF  12  LAST  708   24,3245  10 777 1               CCS     NVWORD1
1993                         24,3246   1 3251 0              TCF     +3
1994    REF   1              24,3247   1 3261 0              TCF     SETTB6
1995                         24,3250   1 3251 0              TCF     +1
1996    REF   1              24,3251   4 3511 0              CS      V06N85B      CHECK FOR V06N85B (P41)
1997    REF  13  LAST  709   24,3252   6 0777 0              AD      NVWORD1
1998                         24,3253   0 0006 1              EXTEND
1999    REF   1              24,3254   1 3264 0              BZF     SETUPDYN     V06N85, SO UPDATE N85 FOR DYNAMIC DISP
2000    REF   3  LAST  585   24,3255   3 7651 1              CAF     PRIO27
2001    REF  13  LAST  704   24,3256   0 5121 0              TC      NOVAC
2002    REF  33  LAST  708   E6,1465                          EBANK=  DAPDATR1
2003    REF   1              24,3257    03276 1              2CADR   CLOCKJOB
2003    REF   1              24,3260    50066 1
2004    REF  16  LAST  543   24,3261   4 0025 1  SETTB6      CS      TIME1        SET GROUP6 TIMEBASE
2005    REF   1              24,3262  55'271 0               TS      TBASE6
2006    REF  34  LAST  709   24,3263   1 5314 0              TCF     TASKOVER

2007    REF   4  LAST  709   24,3264   3 7651 1  SETUPDYN    CAF     PRIO27       SET UP A JOB TO UPDATE N85 (FOR P41=V06)
2008    REF  30  LAST  590   24,3265   0 5135 0              TC      FINDVAC
2009    REF  34  LAST  709   E6,1465                          EBANK=  DAPDATR1
2010    REF   1              24,3266    03271 0              2CADR   DYNDISP
2010    REF   1              24,3267    50066 1
2011    REF   2  LAST  709   24,3270   1 3261 0              TCF     SETTB6       CLOSE OUT CLOCKTASK

2012    REF 147  LAST  699   24,3271   0 6006 1  DYNDISP     TC      INTPRET      UPDATE N85 FOR A DYNAMIC V06N85 IN P41,
2013                         24,3272    77624 1              CALL                      PRIOR TO BLANKING AND AVEG (V16N85)
2014    REF   1              24,3273    51651 1                      P40CNV85
2015                         24,3274    77776 1              EXIT
2016    REF   1              24,3275   1 3306 0              TCF     CKNVWRD1
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P2017
 2018   REF  35  LAST  709   E6,1465                          EBANK=  DAPDATR1
 2019   REF  15  LAST  708   24,3276   30 032 0  CLOCKJOB     CAE     CDUX          NOVAC, PRIO 27
 2020   REF   1               24,3277   55'175 1              TS      CDUSPOTX
 2021   REF   7  LAST  708   24,3300    3 0033 1              CA      CDUY
 2022   REF   1               24,3301   55'171 0              TS      CDUSPOTY
 2023   REF  10  LAST  570   24,3302    3 0034 0              CA      CDUZ
 2024   REF   1               24,3303   55'173 1              TS      CDUSPOTZ
 2025   REF 147  LAST  708   24,3304    0 4636 0              TC      BANKCALL
 2026   REF   1               24,3305     47602 0             CADR    QUICTRIG
 2027                         24,3306    0 0004 0  CKNVWRD1    INHINT
 2028   REF  14  LAST  709   24,3307   10 777 1              CCS     NVWORD1       DETERMINE FUNCTION, INDICATED BY NVWORD1
 2029   REF   1               24,3310    1 3466 1              TCF     NOFLASH
 2030   REF  70  LAST  699   24,3311    1 5205 1              TCF     ENDOFJOB
 2031   REF   1               24,3312    1 3427 1              TCF     ENGREQST
20315   REF   2 LAST  706 TO  708:      13     13*             COUNT*  $$/R40
 2032   REF   4  LAST  702   24,3313    3 3514 1  FAILDSP     CAF     V06N40        SPS ENGINE FAILED - FLASH V97
 2033   REF 148  LAST  710   24,3314    0 4636 0              TC      BANKCALL
 2034   REF   1               24,3315     20727 1             CADR    CLOCPLAY
 2035   REF   1               24,3316    1 3363 0              TCF     V97T          TERMINATE
 2036   REF   1               24,3317    1 3407 0              TCF     V97P          PROCEED
 2037   REF  51  LAST  709   24,3320    0 5402 1  V97E        TC      PHASCHNG      ENTER
 2038                         24,3321     00534 0              OCT     00534         A, 4.53 = V97EJOB (PRIO 30 NOVAC)
20385   REF   1               01,2220               4P53SPT1  =       4.53SPOT
A2039                                                                               IF RESTART,FORCE V97EJOB BEFORE CLOCKJOB
 2040   REF   5  LAST  710   24,3322    3 3514 1  V97EJOB     CAF     V06N40        REDISPLAY V06N40
 2041   REF  15  LAST  710   24,3323    54 777 1              TS      NVWORD1
 2042   REF  10  LAST  706   24,3324    0 4606 0              TCR     E7SETTER
 2043   REF  67  LAST  709   E7,1412                          EBANK=  TIG
 2044   REF   7  LAST  553   24,3325    4 4124 0              CS      OCT24         FORCE R1 OF V06N40 TO READ  59X59
 2045   REF  68  LAST  710   24,3326   55'412 0              TS      TIG
 2046   REF  11  LAST  704   24,3327    0 4611 0              TCR     E6SETTER
 2047   REF   7  LAST  292   E6,1473                          EBANK=  CSMMASS
 2048   REF   3  LAST  704   24,3330    0 3045 0  SPSOFF97    TCR     SPSOFF
 2049   REF   1               24,3331    3 3526 0              CAF     SEC2.5        DELAY 2.5 SECS FOR POSSIBLE TAILOFF
 2050   REF 149  LAST  710   24,3332    0 4636 0              TC      BANKCALL
 2051   REF   9  LAST  698   24,3333     01731 0              CADR    DELAYJOB      **** RESTART CAN DOUBLE DELAY ****
A2052                                                                               **** RESTART WILL ALTER TEVENT ****
 2053   REF  36  LAST  708   24,3334    3 4770 0  V97E40.6    CAF     BIT1
 2054   REF  20  LAST  701   24,3335    0 5233 0              TC      WAITLIST
 2055   REF   5  LAST  706   E6,1446                          EBANK=  CNTR
 2056   REF   2  LAST  236   24,3336     02355 0              2CADR   PRE40.6       USE S40.6 RESTART ENTRY TO TRIM ENGINE
 2056                         24,3337     40066 0
 2057   REF  26  LAST  704   24,3340    0 4714 1              TC      IBNKCALL      RCS DAP IN 0.6SEC, SETTING T5 BITS TO
 2058   REF   4  LAST  704   24,3341     42042 1              CADR    RCSDAPON           KILL TVCEXEC/TVCROLLDAP STARTS.
A2059                                                                                    LEAVE NARROW DEADBAND FOR REIGNITE
 2060   REF  23  LAST  706   24,3342    0 5362 0              TC      2PHSCHNG
 2061                         24,3343     00026 0              OCT     00026         A, 6.2 = PRE40.6 (-0CS), CLOKTASK (1SEC)
 2062                         24,3344     05024 1              OCT     05024         NOVAC BELOW, PRIO NEXT
 2063                         24,3345     50777 0              OCT     50777         PRIO 27 NOVAC
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20635  REF   3  LAST  699   01,2317            6P2SPT2  =       6.2SPOT
2064   REF  49  LAST  706   24,3346  0 5561 0  QUICKIGN TC      DOWNFLAG      CLEAR ASTNFLAG
2065   REF   1               24,3347   00154 1           ADRES   ASTNFLAG
2066   REF  57  LAST  655   24,3350  0 5547 1           TC      UPFLAG        AND SET IGNFLAG
2067   REF   1               24,3351   00153 0           ADRES   IGNFLAG      FOR IMMEDIATE V99 RESPONSE
2068   REF  20  LAST  701   24,3352  4 4760 0  V99FLASH CS      BIT9          CAUSE V99 TO FLASH
2069   REF  16  LAST  710   24,3353  54 777 1           TS      NVWORD1
2070   REF  24  LAST  710   24,3354  0 5362 0           TC      2PHSCHNG
2071                        24,3355   40114 1           OCT     40114         A, 4.11 = TIG-0 (-0CS) TBASE FOR PREPTVC
2072                        24,3356   00033 1           OCT     00033         A, 3.3 = S40.13 (PRIO 20)
20725  REF   3  LAST  701   01,2060            3P3SPT2  =       3.3SPOT
2073   REF   1               01,2135            4P11SPT1 =      4.11SPOT
2074   REF   2  LAST  701   24,3357  0 5134 1           TC      FINVAC2       SET UP TIMEBURN
2075   REF  12  LAST  706   E7,1427                     EBANK=  TGO
2076   REF   3  LAST  701   24,3360   02534 1           2CADR   S40.13
2076                        24,3361   34067 1
2077   REF  71  LAST  710   24,3362  1 5205 1  ENDV97E  TCF     ENDOFJOB      WAIT FOR CLOCKJOB (IMMEDIATE) REACTION

2078   REF   8  LAST  710   E6,1473                     EBANK=  CSMMASS
2079   REF  52  LAST  710   24,3363  0 5402 1  V97T     TC      PHASCHNG      KILL CLOKTASK
2080                        24,3364   00076 0           OCT     00076         A, 6.7  = V97TJOB (PRIO 27 NOVAC)
20805  REF   1               01,2333            6P7SPT1  =       6.7SPOT
2081   REF 130  LAST  708   24,3365  3 4772 1  V97TJOB  CAF     ZERO          DISABLE CLOCKJOB
2082   REF  17  LAST  711   24,3366  54 777 1           TS      NVWORD1
2083   REF   4  LAST  710   24,3367  0 3045 0           TCR     SPSOFF        SHUTDOWN SPS ENGINE
2084   REF   2  LAST  710   24,3370  3 3526 0           CAF     SEC2.5        DELAY 2.5 SECS FOR POSSIBLE TAILOFF :
2085   REF 150  LAST  710   24,3371  0 4636 0           TC      BANKCALL      FALSE THRUST LOSS
2086   REF  10  LAST  710   24,3372   01731 0           CADR    DELAYJOB      **** RESTART CAN DOUBLE DELAY ****
A2087                                                                        **** RESTART WILL ALTER TEVENT ****
2088                        24,3373  0 0004 0           INHINT
2089   REF  27  LAST  710   24,3374  0 4714 1  V97TRCS  TC      IBNKCALL      RCS DAP IN 0.6SEC, SETTING T5 BITS TO
2090   REF   5  LAST  710   24,3375   42042 1           CADR    RCSDAPON            KILL TVCEXEC/TVCROLLDAP STARTS
2091   REF  25  LAST  711   24,3376  0 5362 0  V99T     TC      2PHSCHNG      (ENTRY FROM V97T FLOW TOO)
2092                        24,3377   00006 1           OCT     00006         KILL PRE40.6/CLOKTASK PROTECTION
2093                        24,3400   05024 1           OCT     05024         C, PRIORITY NEXT, JOB BELOW
2094                        24,3401   50777 0           OCT     50777         PRIO 27 NOVAC
2095   REF   3  LAST  704   24,3402  0 3160 0  V99TJOB  TCR     TVCZAP -1     WIPE OUT TVC, CLOKTASK
2096                        24,3403  0 0006 1  POST41   EXTEND
2097   REF   1               24,3404  3 3554 0           DCA     SERVCADR
2098   REF   5  LAST  698   24,3405  53'062 0           DXCH    AVEGEXIT
2099   REF  30  LAST  668   24,3406  1 4103 0           TCF     GOTOPOOH

2100   REF   9  LAST  711   E6,1473                     EBANK=  CSMMASS
2101   REF  53  LAST  711   24,3407  0 5402 1  V97P     TC      PHASCHNG
2102                        24,3410   00134 1           OCT     00134         A, 4.13 = V97PJOB (PRIO 30 NOVAC)
21025  REF   1               01,2140            4P13SPT1 =      4.13SPOT
A2103                                                                       IF RESTART,FORCE V97PJOB BEFORE CLOCKJOB
2104   REF   6  LAST  710   24,3411  3 3514 1  V97PJOB  CAF     V06N40        REDISPLAY V06N40
2105   REF  18  LAST  711   24,3412  54 777 1           TS      NVWORD1
2106   REF  58  LAST  711   24,3413  0 5547 1           TC      UPFLAG        SET IDLEFAIL TO ALLOW R40-BYPASS, IN
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 2107   REF   2  LAST  706   24,3414   00030 1            ADRES  IDLEFAIL      CASE OF UNFAVORABLE STEERING SYNCH
 2108   REF  59  LAST  711   24,3415   0 5547 1           TC     UPFLAG        SET STEERSW TO RE-ENABLE STEERING
 2109   REF   5  LAST  706   24,3416   00042 1            ADRES  STEERSW
 2110   REF   2  LAST  540   24,3417   3 5017 1           CAF    2SECS
 2111   REF 151  LAST  711   24,3420   0 4636 0           TC     BANKCALL
 2112   REF  11  LAST  711   24,3421   01731 0            CADR   DELAYJOB       WAIT 2 SECONDS
A2113                                                                           **** RESTART CAN DOUBLE DELAY ****
A2114                                                                           **** RESTART WILL ALTER TEVENT ****
 2115   REF  50  LAST  711   24,3422   0 5561 0  R40ENABL TC     DOWNFLAG      THEN RE-ENABLE R40 BY CLEARING IDLEFLAIL
 2116   REF   3  LAST  712   24,3423   00030 1            ADRES  IDLEFAIL
 2117   REF  54  LAST  711   24,3424   0 5402 1           TC     PHASCHNG
 2118                        24,3425   00004 0            OCT    00004         KILL GROUP 4
 2119   REF  72  LAST  711   24,3426   1 5205 1  ENDV97P  TCF    ENDOFJOB


 2120   REF   7  LAST  711   24,3427   3 3514 1  ENGREQST CAF    V06N40
 2121   REF 152  LAST  712   24,3430   0 4636 0           TC     BANKCALL
 2122   REF   2  LAST  710   24,3431   20727 1            CADR   CLOCPLAY
 2123   REF   1              24,3432   1 3376 1           TCF    V99T          TERMINATE
 2124   REF   1              24,3433   1 3471 1           TCF    V99P          PROCEED
 2125   REF  26  LAST  711   24,3434   0 5362 0  V99E     TC     2PHSCHNG      ENTER
 2126                        24,3435   00006 1            OCT    00006         KILL PRE40.6/CLOKTASK PROTECTION
 2127                        24,3436   05024 1            OCT    05024         C, PRIORITY NEXT, JOB BELOW
 2128                        24,3437   50777 0            OCT    50777         PRIO 27 NOVAC
 2129   REF   4  LAST  711   24,3440   0 3160 0  V99EJOB  TCR    TVCZAP -1     WIPE OUT TVC, CLOKTASK
 2130                        24,3441   0 0006 1  P40RCS   EXTEND               V16N40 ENTERS HERE
 2131   REF   1              24,3442   3 3556 1           DCA    ACADN85
 2132   REF   6  LAST  711   24,3443   53'062 0           DXCH   AVEGEXIT
 2133   REF   3  LAST  712   24,3444   3 5017 1           CAF    2SECS
 2134   REF 153  LAST  712   24,3445   0 4636 0           TC     BANKCALL
 2135   REF  12  LAST  712   24,3446   01731 0            CADR   DELAYJOB
 2136   REF   4  LAST  698   24,3447   0 3202 1  P40MINDB TCR    SETMINDB -1
 2137                        24,3450   0 0003 1           RELINT
 2138   REF  55  LAST  712   24,3451   0 5402 1  TIGNOW   TC     PHASCHNG
 2139                        24,3452   05024 1            OCT    05024         TYPE C GROUP 4 BELOW FOR NOUN 85
 2140                        24,3453   57777 1            OCT    57777         PRIO 20 NOVAC
 2141   REF   1              24,3454   3 3512 1           CAF    V16N85B
 2142   REF 154  LAST  712   24,3455   0 4636 0           TC     BANKCALL
 2143   REF   2  LAST  708   24,3456   20716 0            CADR   REFLASH
 2144   REF   3  LAST  708   24,3457   1 3403 1           TCF    POST41        FINISH P40/41
 2145   REF   1              24,3460   1 3462 0           TCF    MNKPST41
 2146   REF   1              24,3461   1 3451 0           TCF    TIGNOW        V32 NOT GSOP RESPONSE BUT REDISPLAY N85

21463                        24,3462   0 0006 1  MNKPST41 EXTEND
21465   REF   2  LAST  711   24,3463   3 3554 0           DCA    SERVCADR
21467   REF   7  LAST  712   24,3464   53'062 0           DXCH   AVEGEXIT
21469   REF   3  LAST  515   24,3465   1 4105 0           TCF    MNKGOPOO

 2147   REF  19  LAST  711   24,3466   30 777 0  NOFLASH  CAE    NVWORD1       DISPLAY NVWORD1 NORMALLY
 2148   REF 155  LAST  712   24,3467   0 4636 0           TC     BANKCALL
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2149   REF   2  LAST  541   24,3470   20721 1                CADR    REGODSP

21495  REF   4  LAST  669      4000                          SETLOC  FFTAG12
21496                           4606                          BANK

21498  REF   1                                               COUNT*  $$/R40
2150   REF   3  LAST  537      4606   3 5046 0  E7SETTER     CAF     EBANK7
2151   REF  19  LAST  652      4607   56 003 1                XCH     EBANK
2152   REF  69  LAST  710    E7,1412                         EBANK=  TIG
2153   REF 134  LAST  708      4610   0 0002 0                TC      Q

2154   REF   2  LAST  155      4611   3 5045 0  E6SETTER     CAF     EBANK6          SET UP EBANK6
2155   REF  20  LAST  713      4612   56 003 1                XCH     EBANK
2156   REF  36  LAST  710    E6,1465                         EBANK=  DAPDATR1
2157   REF 135  LAST  713      4613   0 0002 0                TC      Q

21575  REF   2  LAST  693   24,2000                          SETLOC  P40S
21576                       24,3471                          BANK

21578  REF   3 LAST  710 TO  713:    110    123*             COUNT*  $$/R40
2158   REF  37  LAST  713    E6,1465                         EBANK=  DAPDATR1
2159                       24,3471   0 0004 0  V99P         INHINT
2160   REF  10  LAST  709   24,3472   30 103 0                CAE     FLAGWRD7        CHECK ASTN FLAG FOR PRIOR V99P
2161   REF   1              24,3473   7 4755 0                MASK    ASTNBIT
2162   REF 165  LAST  709   24,3474   10 000 0                CCS     A
2163   REF   1              24,3475   1 3506 0                TCF     V99P/TIG        YES, THIS MUST BE A RESTART ENTRY

2164   REF   2  LAST  713   24,3476   3 4755 1  ASTNV99P     CAF     ASTNBIT         SET ASTNFLAG
2165   REF  11  LAST  713   24,3477   26 103 1                ADS     FLAGWRD7
2166   REF  12  LAST  713   24,3500   30 103 0                CAE     FLAGWRD7        CHECK IGN FLAG FOR TIG-0 ARRIVAL
2167   REF   2  LAST  702   24,3501   7 4754 1                MASK    IGNFLBIT
2168                       24,3502   0 0006 1                EXTEND
2169   REF   2  LAST  713   24,3503   1 3506 0                BZF     V99P/TIG        NO, CLEAR THE V99 AND WAIT FOR TIG-0

2170   REF   2  LAST  365   24,3504   0 5222 0  ENDV99P1     TC      TWIDBIT1        TIG-0 HAS COME ALREADY SET UP IGNTN HERE
2171   REF   2  LAST  233   24,3505    02664 1                ADRES   IGNITION
2173   REF   8  LAST  712   24,3506   3 3514 1  V99P/TIG     CAF     V06N40          CLEAR THE V99 FLASH AND WAIT FOR TIG-0
2174   REF  20  LAST  712   24,3507   54 777 1                TS      NVWORD1
2175   REF  73  LAST  712   24,3510   1 5205 1  ENDV99P      TCF     ENDOFJOB

21755  REF   4 LAST  708 TO  710:    91    398*             COUNT*  $$/P40
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P2176
 2177                          24,3511  01525 1  V06N85B  VN     0685
 2178                          24,3512  04125 0  V16N85B  VN     1685
 21785                         24,3513  01537 1  V06N95B  VN     0695
 2179                          24,3514  01450 1  V06N40   VN     0640
 2180                          24,3515  04050 0  V16N40   VN     1640
 2181                          24,3516  04123 0  V1683    VN     1683
 2182  REF  4  LAST  390         4355           OCT12    =      TEN
 2184                          24,3517  00204 1  P40CKLS2 OCT    204
 2186  REF  2  LAST  353         4615           OCT27/24 =      VBSP3LD
 2189                          24,3520  02202 0  OCT02202 OCT    02202        BITS 2,8,11 FOR CHANNEL 12 TVC/OPTICS
A2192                                           MINDB    DEC    46
 2193                          24,3521  00707 1  MAXDB    DEC    455
 2194                          24,3522  04700 1  SEC24.96 DEC    2496
 2195                          24,3523  03410 1  18SEC    DEC    1800
 2196                          24,3524  00000 1  5SECDP   DEC    0            MAKE DP 5SEC
 2197                          24,3525  00764 1  5SEC     DEC    500
 2199                          24,3526  00372 1  SEC2.5   DEC    250
 2200                          24,3527  00000 1  SEC29.96 2DEC   2996
 2200                          24,3530  05664 0
 2201                          24,3531  02217 1  FENG     2DEC   9.1188544 B-7   SPS THRUST (20500LBS), SC.AT B+7 NEWT/E4
 2201                          24,3532  06650 1
 2202                          24,3533  00013 0  FRCS2    2DEC   .087437837 B-7  RCS ULLAGE (199.6COS10 LBS), SC.AT
 2202                          24,3534  06112 0
A2203                                                                        B+7 NEWTONS/E+4
 2205                          24,3535  04000 0  EP4(45)H 2DEC   .125
 2205                          24,3536  00000 1
 2206                          24,3537  00707 1  EP4(10)H 2DEC   .027777777
 2206                          24,3540  03434 1
 2207                          24,3541  21215 1  TRIMSCAL 2DEC   1.07975111 B-1
 2207                          24,3542  12215 1
 2208                          24,3543  00053 1  YBIAS    2DEC   +.00263888889  YAW   MECH BIAS (+0.95 DEG, THRUST ON)
 2208                          24,3544  07423 0
 2209                          24,3545  77636 1  PBIAS    2DEC   -.00597222222  PITCH MECH BIAS (-2.15 DEG, THRUST ON)
 2209                          24,3546  44653 1
A2210                                                                        REFERENCE, TRW 68.6520.3.3-40 27FEB,1968
 2215  REF 38  LAST  713        E6,1465                  EBANK=  DAPDATR1
 2216  REF  3  LAST  271        24,3547  03226 1  T5IDL24 2CADR  T5IDLOC
 2216                          24,3550  12066 1
 2217  REF 70  LAST  713        E7,1412                  EBANK=  TIG
 2218  REF  1                  24,3551  03706 0  ACADN83 2CADR  CALCN83
 2218  REF  1                  24,3552  50067 0
 2219  REF 71  LAST  714        E7,1412                  EBANK=  TIG
 2220  REF  1                  24,3553  03143 1  SERVCADR 2CADR SERVEXIT
 2220  REF  1                  24,3554  76067 1
 2221  REF 39  LAST  714        E6,1465                  EBANK=  DAPDATR1
 2222  REF  1                  24,3555  03576 0  ACADN85 2CADR  CALCN85
 2222  REF  1                  24,3556  50066 1
 2223  REF 40  LAST  714        E6,1465                  EBANK=  DAPDATR1
 2224  REF  1                  24,3557  02176 0  S40.8ADS 2CADR  S40.8
 2224  REF  1                  24,3560  34066 0
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2225   REF  41  LAST  714   E6,1465                          EBANK= DAPDATR1
2226   REF   1              24,3561   02163 1  TVCON2C  2CADR  TVCDAPON
2226   REF   1              24,3562   36066 1
```

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P2227
 2228   REF   1                  30,2000                    SETLOC P40S3
 2229                            30,3650                    BANK
 2230   REF   1                                             COUNT* $$/P40
 2231                            30,3650  45020 1  AGAIN    STQ    CALL
 2232   REF   1                  30,3651  03730 0           QTEMP1
 2233   REF   4  LAST  644       30,3652  27145 1           THISPREC
 2234                            30,3653  66134 1  SXA,2    SXA,1
 2235   REF  13  LAST  688       30,3654  03746 1           RTX2
 2236   REF  13  LAST  681       30,3655  03745 1           RTX1
 2237                            30,3656  40375 1  VLOAD    SETPD
 2238   REF  19  LAST  655       30,3657  00001 0           RATT
 2239                            30,3660  00001 0           0D
 2240   REF   9  LAST  697       30,3661  03632 0  STORE    RTIG
 2241   REF  11  LAST  695       30,3662  27570 0  STOVL    RINIT
 2242   REF  19  LAST  677       30,3663  00007 0           VATT
 2243   REF   9  LAST  694       30,3664  03640 0  STORE    VTIG
 2244   REF  10  LAST  694       30,3665  03576 0  STORE    VINIT
 2245                            30,3666  65335 1  SLOAD    PDDL
 2246   REF  18  LAST  706       30,3667  15336 0           HI6ZEROS
 2247   REF   1                  30,3670  11536 1           EP4(45)H
 2248                            30,3671  71214 0  BON      DLOAD
 2249   REF   3  LAST  491       30,3672  03705 0           NORMSW
 2250                            30,3673  61675 1           +2
 2251   REF   1                  30,3674  11540 0           EP4(10)H
 2252                            30,3675  45006 0  PUSH     CALL
 2253   REF   2  LAST  480       30,3676  22000 1           INITVEL
 2254                            30,3677  52001 1  SETPD    GOTO
 2255                            30,3700  00001 0
 2256   REF   2  LAST  716       30,3701  03730 0           QTEMP1

 2257                            30,3702  46145 0  TSTRXUT  DLOAD   BHIZ
 2258                            30,3703  00045 0           36D
 2259   REF   1                  30,3704  61707 0           BADVCTOR
 2260                            30,3705  43575 1  VLOAD    RVQ
 2261                            30,3706  00007 0           6D
 2262                            30,3707  53575 0  BADVCTOR VLOAD   UNIT
 2263   REF  10  LAST  716       30,3710  03632 0           RTIG
 2264                            30,3711  53515 0  PDVL     UNIT
 2265   REF  10  LAST  716       30,3712  03640 0           VTIG
 2266                            30,3713  53322 1  VSR3     VAD
 2267                            30,3714  53435 0  VXV      UNIT
 2268   REF   9  LAST  697       30,3715  03713 1           UT
 2269                            30,3716  77676 0  VCOMP
 2270                            30,3717  00007 0  STORE    6D
 2271                            30,3720  77616 0  RVQ
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P2272
 2273                          30,3721   67214 1  SETUP.9  BON      SLOAD
 2274  REF   2  LAST  694     30,3722   01310 1           FIRSTFLG
 2275  REF   1                30,3723   61736 1           SURELY.9
 2276  REF   2  LAST  110     30,3724   03326 0           NBRCYCLP
 2277                          30,3725   74301 0           NORM     VXSC          (NORM  HANDLES ZERO PROPERLY)
 2278  REF  25  LAST  689     30,3726   00047 1           X1
 2279  REF   3  LAST  694     30,3727   03705 0           BDT
 2280                          30,3730   53257 1           VSR*     VAD
 2281                          30,3731   20563 0                    0 -140,1
 2282  REF   1                30,3732   03646 0           VGTEMP
 2283                          30,3733   77651 0           VSU
 2284  REF   2  LAST  110     30,3734   03327 1           DELVSUM
 2285  REF   1                30,3735   03721 0           STORE    VGPREV
 2286                          30,3736   77776 1  SURELY.9 EXIT
 2287  REF   7  LAST  592     30,3737  3 4754 0           CAF      PRIO10
 2288  REF  31  LAST  709     30,3740  0 5135 0           TC       FINDVAC
 2289  REF  42  LAST  715     E6,1465                     EBANK=   DAPDATR1
 2290  REF   1                30,3741   02400 1           2CADR    S40.9
 2290  REF   1                30,3742   34066 0
 2291  REF  27  LAST  712     30,3743  0 5362 0           TC       2PHSCHNG
 2292                          30,3744   00051 0           OCT      00051         A, 1.5 = RED040.9, PRIO 10
 2293                          30,3745   10035 0           OCT      10035
22932  REF   1                01,2017             1P5SPT1  =        1.5SPOT
22934  REF   5  LAST  706     01,2250             5P3SPT3  =        5.3SPOT
 2294  REF 148  LAST  709     30,3746  0 6006 1           TC       INTPRET
 2295                          30,3747   77775 1           VLOAD
 2296  REF   8  LAST  547     30,3750   01030 0                    RN            ACTIVE VEHICLE RADIUS VECTOR AT T1
 2297  REF  12  LAST  716     30,3751   27570 0           STOVL    RINIT
 2298  REF   9  LAST  547     30,3752   01036 0                    VN            ACTIVE VEHICLE VELOCITY VECTOR AT T1
 2299  REF  11  LAST  716     30,3753   17576 0           STODL    VINIT
 2300  REF   7  LAST  647     30,3754   01044 0                    PIPTIME
 2301  REF   2  LAST  126     30,3755   03474 0           STORE    INIT
 2302                          30,3756   77621 1           BOSU
 2303  REF   8  LAST  481     30,3757   03656 1                    TPASS4
 2304  REF   7  LAST  493     30,3760   27423 1           STOVL    DELLT4
 2305  REF  19  LAST  716     30,3761   15336 0                    HI6ZEROS
 2306  REF   3  LAST  717     30,3762   17327 1           STODL    DELVSUM
 2307  REF  20  LAST  717     30,3763   15336 0                    HI6ZEROS
 2308  REF   3  LAST  698     30,3764   03325 0           STORE    NBRCYCLS
 2309                          30,3765   77650 1           GOTO
23095  REF   1                30,3766   34360 0                    VGCOMP
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R2310   NAME     S40.6  GIMBAL DRIVE TEST AND/OR GIMBAL TRIM
R2311   FUNCTIONAL DESCRIPTION
R2312        GIMBAL DRIVE TEST....0,+2,-2,0  DEGREE ENGINE COMMANDS, AT 2 SECOND
R2313           INTERVALS, FIRST IN PITCH, THEN IN YAW. ASTRONAUT VERIFICATION
R2314           OF GIMBAL MOTION ON GPI
R2315        GIMBAL TRIM.....AFTER A 4 SECOND DELAY,ENGINE COMMANDED TO
R2316           PRE-COMPUTED TRIM POSITION. ASTRONAUT VERIFICATION ON GPI.
R2317        PRE40.6....RESTART ENTRY TO RE-DO S40.6, ONLY IF RCS IS ON - IF TVC
R2318            IS NOT ON - PRIMARILY TO GET ACTUATORS TRIMMED FOR IGNITION.
R2319            BYPASS 4 SEC DELAY.  SPEED IS CRITICAL NEAR IGNITION.
R2320            IF TVC IS ON (TVCDAPON OR LATER)  THEN REDOTVC WILL TAKE CARE
R2321            OF RESTARTING ACTUATORS.
R2322   CALLING SEQUENCE.....
R2323        WAITLIST,  WITH 2CADR FOR S40.6 (OR PRE40.6),  WITH EBANK= CNTR
R2324   NORMAL EXIT MODE - FIXDELAY, TASKOVER
R2325   SUBROUTINES CALLED.....
R2326        FIXDELAY
R2327   ERASEABLE INITIALIZATION REQUIRED
R2328        CNTR = +0,  NORMALLY SET BY THE P40 CALL AT TST,TRIM
R2329        MRKRTMP...POSITIVE FOR GIMBAL DRIVE TEST AND GIMBAL TRIM (BOTH)
R2330                  NEGATIVE FOR GIMBAL TRIM ONLY
R2331        PACTOFF, YACTOFF SC.AT 85.41 ARCSEC/BIT  (V48N48 P,YTRIM)
R2332        ..SC CONT.. SWITCH AT ..CMC.. (A/P CONTROL SWITCH AT ..GNC..)
R2333        ACTIVE SPS GIMBAL MOTOR POWER(S),  PITCH, YAW
R2334   OUTPUT
R2335        TVCYAW, TVCPITCH (BITS RELEASED)
R2336        TVC ENABLE  AND  OPTICS ERROR COUNTER ENABLE

  2337  REF   1                 20,2000                       SETLOC  DAPS6
  2338                          20,2355                       BANK
  2339  REF   6  LAST  710     E6,1446                       EBANK=  CNTR
  2340  REF   1                                               COUNT*  $$/S40.6
  2341  REF  22  LAST  705     20,2355   4 0102 0  PRE40.6    CS      FLAGWRD6      RESTART ENTRY TO S40.6 (DO NOT PERMIT
  2342  REF  13  LAST  705     20,2356   7 4076 0              MASK    DPCONFIG      IF TVC, BITS 15,14 = 1,0)
  2343                          20,2357   0 0006 1            EXTEND
  2344                          20,2360   6 2362 1            BZMF    +2
  2345  REF  35  LAST  709     20,2361   1 5314 0            TCF     TASKOVER      TVC, REDOTVC WILL REESTABLISH INTERFACE
  2346  REF  37  LAST  710     20,2362   4 4770 1            CS      BIT1          RCS, SO DO S40.6,  GIMTRIM ONLY
  2347  REF   3  LAST  698     20,2363   55'444 0            TS      MRKRTMP
  2348  REF  38  LAST  718     20,2364   3 4770 0            CAF     BIT1          FOR REVISED S40.6 TIMING FOR RESTARTS...
  2349  REF   7  LAST  718     20,2365   55'446 1            TS      CNTR          TO INDICATE A RESTART ENTRY (CNTR IS
A 2350                                                                            NORMALLY +0, BY S40.6)
  2351  REF   8  LAST  718     E6,1446                       EBANK=  CNTR
  2352  REF 131  LAST  711     20,2366   4 4772 0  S40.6     CS      ZERO          INHIBIT OPTICS ACTIVITY
  2353  REF  22  LAST  708     20,2367   55'323 0            TS      OPTIND
  2354  REF  24  LAST  590     20,2370   4 4767 1            CS      BIT2          DISABLE OPTICS ERROR COUNTERS
  2355                          20,2371   0 0006 1            EXTEND
  2356  REF  36  LAST  708     20,2372   03 012 1            WAND    CHAN12

  2357  REF   1                 20,2373   3 2460 1            CAF     CCT02200      TVC ENABLE (SPS SERVO AMPS SEE DAC
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2358                          20,2374  0 0006 1           EXTEND                      VOLTAGES) AND DISENGAGE OPTICS/DAC
2359  REF  37 LAST  718       20,2375  05 012 1           WOR     CHAN12
2360  REF   5 LAST  704       20,2376  0 5255 0           TC      FIXDELAY           60MS PROCEDURAL DELAY (40MS MINIMUM) FOR
2361                          20,2377   00006 1           DEC     6                       RELAY LATCHING
2362  REF  25 LAST  718       20,2400  3 4767 0           CAF     BIT2               ENABLE OPTICS ERROR COUNTERS
2363                          20,2401  0 0006 1           EXTEND
2364  REF  38 LAST  719       20,2402  05 012 1           WOR     CHAN12
2365  REF   6 LAST  719       20,2403  0 5255 0           TC      FIXDELAY           20MS PROCEDURAL DELAY (4MS MINIMUM) FOR
2366                          20,2404   00002 0           DEC     2                       RELAY LATCHING
2367  REF   9 LAST  718       20,2405  11'446 1  RSTRTST  CCS     CNTR               CHECK FOR RESTART ENTRY (PRE40.6)
2368  REF   1                 20,2406  1 2446 1           TCF     GIMTRIM +2         RESTART ENTRY....BYPASS 4 SECOND DELAY
A2369                                                                                     TST,TRIM SETS +0 ON NORMAL ENTRY
2370  REF   4 LAST  718       20,2407  31'444 1           CAE     MRKRTMP            CHECK FOR TEST/TRIM OR TRIM ONLY
2371  REF  10 LAST  719       20,2410  55'446 1           TS      CNTR                    MRKRTMP SAVES CNTR FOR RESTARTS
2372                          20,2411  0 0006 1           EXTEND
2373  REF   2 LAST  719       20,2412  6 2444 1           BZMF    GIMTRIM            (TRIM ONLY)
2374  REF 132 LAST  718       20,2413  4 4772 0  GDTSETUP CS      ZERO               GIMBAL DRIVE TEST SETUP, FOR PITCH
2375  REF  11 LAST  719       20,2414  55'446 1           TS      CNTR
2376  REF   1                 20,2415  3 2462 0  GIMDTEST CAF     +2ACTDEG           GIMBAL DRIVE TEST, 1ST INCREMENT
2377  REF   1                 20,2416  0 2431 0           TC      OUTPUT                  (LEAVES GIMBAL AT +2 DEG)
2378  REF   1                 20,2417  3 2461 0           CAF     -4ACTDEG           2ND INCREMENT (LEAVES GIMBAL AT -2)
2379  REF   2 LAST  719       20,2420  0 2431 0           TC      OUTPUT
2380  REF   2 LAST  719       20,2421  3 2462 0           CAF     +2ACTDEG           3RD INCREMENT (LEAVES GIMBAL AT -0)
2381  REF   3 LAST  719       20,2422  0 2431 0           TC      OUTPUT
2382  REF  12 LAST  719       20,2423  4 1446 1           CS      CNTR               CHECK FOR COMPLETION OF YAW TEST
2383  REF 166 LAST  713       20,2424  10 000 0           CCS     A
2384  REF   3 LAST  719       20,2425  1 2444 0           TCF     GIMTRIM            COMPLETED, GO TO GIMBAL TRIM ROUTINE
2385  REF  39 LAST  718       20,2426  4 4770 1           CS      BIT1               SET UP YAW TEST
2386  REF  13 LAST  719       20,2427  55'446 1           TS      CNTR
2387  REF   1                 20,2430  1 2415 1           TCF     GIMDTEST           FOR YAW TEST
2388                          20,2431  0 0006 1  OUTPUT   EXTEND                     OUTPUT THE INCREMENT....SAVE Q
2389  REF   4 LAST  395       20,2432  23'004 1           QXCH    TEMPR60
2390  REF  14 LAST  719       20,2433  51'446 0           INDEX   CNTR
2391  REF   1                 20,2434  54 054 1           TS      TVCPITCH
2392  REF  15 LAST  719       20,2435  51'446 0           INDEX   CNTR
2393  REF  19 LAST  426       20,2436  3 4756 1           CAF     BIT11
2394                          20,2437  0 0006 1           EXTEND
2395  REF   5 LAST  195       20,2440  05 014 1           WOR     CHAN14
2396  REF   7 LAST  719       20,2441  0 5255 0           TC      FIXDELAY           WAIT 2SEC, WHILE ASTRONAUT VERIFIES
2397                          20,2442   00310 0           DEC     200                     GIMBAL MOTION ON GPI
2398  REF   5 LAST  719       20,2443  0 1004 1           TC      TEMPR60
2399  REF   8 LAST  719       20,2444  0 5255 0  GIMTRIM  TC      FIXDELAY           WAIT 4 SECONDS BEFORE GIMBAL TRIM
2400                          20,2445   00620 0           DEC     400
2401  REF 133 LAST  719       20,2446  4 4772 0    +2     CS      ZERO               PICK UP TRIM VALUES AND OUTPUT THEM
2402  REF  13 LAST  705       20,2447  6 1423 0           AD      PACTOFF                 (AVOID +0) ENTRY POINT FROM RSTRTST
2403  REF   2 LAST  719       20,2450  54 054 1           TS      TVCPITCH                ON A RESTART, TO AVOID 4SEC DELAY
2404  REF 134 LAST  719       20,2451  4 4772 0           CS      ZERO
2405  REF   6 LAST  705       20,2452  6 1424 1           AD      YACTOFF
2406  REF   1                 20,2453  54 053 0           TS      TVCYAW
2407  REF   2 LAST  178       20,2454  3 5050 1           CAF     PRIO6              RELEASE THE COUNTERS, BITS 11,12
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2408                          20,2455  0 0006 1                EXTEND
2409  REF   6  LAST  719      20,2456  05 014 1                WOR     CHAN14
2410  REF  36  LAST  718      20,2457  1 5314 0  ENDS40.6      TCF     TASKOVER

2411                          20,2460  02200 1   OCT02200      OCT     02200          BITS 8,11 FOR CHANNEL 12 TVC/OPTICS
2412                          20,2461  77527 1   -4ACTDEG      DEC     -168           -2(+2ACTDEG), WHOLE BITS, NO ROUNDUP
2413                          20,2462  00124 0   +2ACTDEG      DEC     +84            +2 DEG, SC.AT 85.41 ARCSEC/BIT (+84D)


2414  REF   1                 27,2000                         SETLOC  P40S5
2415                          27,3032                         BANK
2416  REF   1                                                 COUNT*  $$/S41.1
2417                          27,3032  45020 1   S41.1        STQ     CALL
2418  REF   4  LAST  646      27,3033  03657 0                 QTEMP
2419  REF   5  LAST  598      27,3034  47530 1                 CDUTRIG
2420                          27,3035  77775 1                 VLOAD
2421                          27,3036  45121 1                 MXV     CALL
2422  REF  26  LAST  696      27,3037  01734 0                 REFSMMAT
2423  REF   3  LAST  599      27,3040  47633 1                 *SMNB*
2424                          27,3041  74321 1                 MXV     VXSC
2425  REF   4  LAST  558      27,3042  05014 1                 QUADROT
2426  REF   1                 27,3043  17047 1                 TENBNK14       VG IN CONTROL COORD IN MPAC SCALED AT
2427                          27,3044  52072 0                 VSL5    GOTO   VG IN CONTROL COORDS. IN MPAC AT 2(+7)
2428  REF   5  LAST  720      27,3045  03657 0                 QTEMP
2429                          27,3046  24000 1   TENBNK14      2DEC    10. B-4
2429                          27,3047  00000 1
24291                         27,3050  00024 1   THETACON      2DEC    .31830989 B-8
24291                         27,3051  13714 1

R2430  CALLED BY ..DONOUN46.. (VERB 48), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP)

2431  REF   2  LAST  718      20,2000                         SETLOC  DAPS6
2432                          20,2463                         BANK                   VIA IBNKCALL
2434  REF   1                                                 COUNT*  $$/S41.2
2435  REF  43  LAST  717      20,2463  3 1465 1  S41.2        CA      DAPDATR1
2436  REF  26  LAST  703      20,2464  7 6214 1                MASK    THREE
2437  REF 167  LAST  719      20,2465  6 0000 1                AD      A
2438  REF   3  LAST  420      20,2466  54 774 1                TS      RATEINDX
2439                          20,2467  0 0004 0                INHINT
2440  REF  44  LAST  720      20,2470  31'465 1                CAE     DAPDATR1       IS LEM ATTACHED (BITS 14,13 OF DAPDATR1
2441  REF   7  LAST  266      20,2471  7 4346 0                MASK    PR1030                        =10)
2442  REF   1                 20,2472  6 4751 0                AD      -BIT14         (OCT57777)
2443                          20,2473  0 0006 1                EXTEND
2444  REF   1                 20,2474  1 2501 0                BZF     TOGETHER       YES
2445  REF   1                 20,2475  4 4767 1                CS      ATTCHBIT       NO, UNSET FLAG
2446  REF  13  LAST  713      20,2476  7 0103 1                MASK    FLAGWRD7
2447  REF  14  LAST  720      20,2477  54 103 1                TS      FLAGWRD7
2448                          20,2500  1 2504 0                TCF     +4
2449  REF  15  LAST  720      20,2501  4 0103 1   TOGETHER     CS      FLAGWRD7       ATTACHED, SET FLAG FOR INTEGRATION
2450  REF   2  LAST  720      20,2502  7 4767 1                MASK    ATTCHBIT
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2451   REF  16  LAST  720   20,2503  26 103 1     ADS     FLAGWRD7
2452                       20,2504  0 0003 1     RELINT
2453   REF  45  LAST  720   20,2505  3 1465 1     CA      DAPDATR1
2454   REF  27  LAST  708   20,2506  7 4765 0     MASK    BIT4
2455                       20,2507  0 0006 1     EXTEND
2456                       20,2510  6 2512 0     BZMF    +2          DEC 46 MEANS NARROW DB
2457   REF   1             20,2511  3 2612 0     CA      DEC409
2458   REF   1             20,2512  6 2613 1     AD      DEC46       DEC 455 MEANS WIDE DB
2459   REF   9  LAST  708   20,2513  55'655 1     TS      ADB
2460   REF  46  LAST  721   20,2514  3 1465 1     CA      DAPDATR1
2461   REF  23  LAST  447   20,2515  7 4762 1     MASK    BIT7        QUAD BD
2462                       20,2516  0 0006 1     EXTEND
2463                       20,2517  6 2521 0     BZMF    +2
2464   REF  72  LAST  706   20,2520  3 4770 0     CA      ONE
2465   REF   2  LAST  113   20,2521  55'631 0     TS      XTRANS
2466   REF  47  LAST  721   20,2522  3 1465 1     CA      DAPDATR1
2467   REF  22  LAST  543   20,2523  7 4757 1     MASK    BIT10       QUAD AC
2468                       20,2524  0 0006 1     EXTEND
2469                       20,2525  6 2527 0     BZMF    +2
2470   REF  73  LAST  721   20,2526  4 4770 1     CS      ONE
2471   REF   3  LAST  721   20,2527  27'631 0     ADS     XTRANS
2472                       20,2530  0 0004 0     INHINT
2473                       20,2531  0 0006 1     EXTEND
2474                       20,2532  1 2537 0     BZF     +5          CLEAR NJETSFLG (4 JETS, OR NO JETS)
2475   REF  29  LAST  700   20,2533  4 0075 1     CS      FLAGWRD1    SET NJETSFLG   (2 JETS, AC OR BD QUADS)
2476   REF   1             20,2534  7 4752 1     MASK    NJETSBIT    NJETSFLG=1 FOR 2 JET ULLAGE (AC OR BD)
2477   REF  30  LAST  721   20,2535  26 075 1     ADS     FLAGWRD1
2478                       20,2536  1 2542 1     TCF     +4
2479   REF   2  LAST  721   20,2537  4 4752 1     CS      NJETSBIT    NJETSFLG=0 FOR 4 JET (OR 0 JET) ULLAGE
2480   REF  31  LAST  721   20,2540  7 0075 1     MASK    FLAGWRD1
2481   REF  32  LAST  721   20,2541  54 075 1     TS      FLAGWRD1
2482                       20,2542  0 0003 1     RELINT
2483   REF   4  LAST  292   20,2543  3 1466 1     CA      DAPDATR2
2484   REF  27  LAST  705   20,2544  7 4754 1     MASK    BIT13
2485                       20,2545  0 0006 1     EXTEND
2486                       20,2546  6 2550 0     BZMF    +2
2487                       20,2547  1 2551 0     TCF     +2
2488   REF  74  LAST  721   20,2550  4 4770 1     CS      ONE
2489                       20,2551  4 0000 0     COM
2490   REF   2  LAST  113   20,2552  55'630 1     TS      ACORBD      MINUS FOR A-C,PLUS FOR B-D
2491   REF   5  LAST  721   20,2553  3 1466 1     CA      DAPDATR2
2492   REF  23  LAST  721   20,2554  7 4757 1     MASK    BIT10
2493   REF 168  LAST  720   20,2555  10 000 0     CCS     A
2494                       20,2556  1 2562 0     TCF     +4
2495   REF  75  LAST  721   20,2557  3 4770 0     CA      ONE
2496   REF   2  LAST  113   20,2560  55'626 0     TS      RACFAIL
2497   REF   1             20,2561  1 2572 1     TCF     BDFAIL
2498   REF 135  LAST  719   20,2562  3 4772 1     CA      ZERO
2499   REF   3  LAST  721   20,2563  55'626 0     TS      RACFAIL
2500   REF   6  LAST  721   20,2564  3 1466 1     CA      DAPDATR2
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2501	REF 28	LAST 721	20,2565	7 4765 0		MASK	BIT4
2502	REF 169	LAST 721	20,2566	10 000 0		CCS	A
2503	REF 2	LAST 721	20,2567	1 2572 1		TCF	BDFAIL
2504	REF 76	LAST 721	20,2570	4 4770 1		CS	ONE
2505	REF 4	LAST 721	20,2571	55'626 0		TS	RACFAIL
2506	REF 7	LAST 721	20,2572	3 1466 1	BDFAIL	CA	DAPDATR2
2507	REF 24	LAST 721	20,2573	7 4762 1		MASK	BIT7
2508	REF 170	LAST 722	20,2574	10 000 0		CCS	A
2509			20,2575	1 2601 0		TCF	+4
2510	REF 77	LAST 722	20,2576	3 4770 0		CA	ONE
2511	REF 2	LAST 113	20,2577	55'627 1		TS	RBDFAIL
2512	REF 136	LAST 713	20,2600	0 0002 0		TC	Q
2513	REF 136	LAST 721	20,2601	3 4772 1		CA	ZERO
2514	REF 3	LAST 722	20,2602	55'627 1		TS	RBDFAIL
2515	REF 8	LAST 722	20,2603	3 1466 1		CA	DAPDATR2
2516	REF 40	LAST 719	20,2604	7 4770 1		MASK	BIT1
2517	REF 171	LAST 722	20,2605	10 000 0		CCS	A
2518	REF 137	LAST 722	20,2606	0 0002 0		TC	Q
2519	REF 78	LAST 722	20,2607	4 4770 1		CS	ONE
2520	REF 4	LAST 722	20,2610	55'627 1		TS	RBDFAIL
2521	REF 138	LAST 722	20,2611	0 0002 0		TC	Q

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P2522
  2523   REF   1                  16,2000                        SETLOC  P40S1
  2524                            16,2065                        BANK
  2525   REF   4   LAST   717     E6,1724                        EBANK=  NBRCYCLS
  25255  REF   1                                                  COUNT*  $$/S40.1
  2526                            16,2065   45345 1  S40.1B      DLOAD   DSU             LAMBERT
  2527   REF  72   LAST   714     16,2066   03413 1                TIG
  2528   REF   1                  16,2067   34531 1                TWODT
  2529   REF  28   LAST   699     16,2070   14041 1  STODL   TDEC1
  2530   REF   9   LAST   717     16,2071   03656 1                TPASS4
  2531                            16,2072   77625 0  DSU
  2532   REF  29   LAST   723     16,2073   00041 1                TDEC1
  2533   REF   8   LAST   717     16,2074   37423 0  STCALL  DELLT4
  2534   REF   1                  16,2075   61650 0                AGAIN
  2535                            16,2076   77775 1  VLOAD
  2536   REF   9   LAST   494     16,2077   03612 1                VIPRIME
  2537   REF  10   LAST   716     16,2100   17713 1  STODL   UT
  2538   REF  73   LAST   723     16,2101   03413 1                TIG
  2539   REF  30   LAST   723     16,2102   00041 1  STORE   TDEC1
  2540                            16,2103   77621 1  BDSU
  2541   REF  10   LAST   723     16,2104   03656 1                TPASS4
  2542   REF   9   LAST   723     16,2105   37423 0  STCALL  DELLT4
  2543   REF   2   LAST   723     16,2106   61650 0                AGAIN
  2544                            16,2107   41575 0  VLOAD   PUSH
  2545   REF  12   LAST   494     16,2110   03646 0                DELVEET3
  2546   REF  12   LAST   698     16,2111   37721 1  STCALL  VGTIG
  2549   REF   2   LAST   695     16,2112   11200 0                GET.LVC
  2550                            16,2113   77601 0  SETPD
  2551                            16,2114   00001 0                0D
  2552                            16,2115   45175 0  CALCOT  VLOAD   CALL
  2553   REF  11   LAST   716     16,2116   03632 0                RTIG
  2554   REF   1                  16,2117   77270 1                CALCGRAV        GDELTAT IN MPAC AT 2(+7)M/CS
  2555                            16,2120   70372 0  VSL1    V/SC
  2556   REF   1                  16,2121   34523 1                2DCS            G AT 2(-5) M/CS.CS
  2557                            16,2122   52315 1  PDVL    VSU
  2558   REF  10   LAST   723     16,2123   03612 1                VIPRIME
  2559   REF  11   LAST   723     16,2124   03713 1                UT
  2560                            16,2125   52341 0  V/SC    VSU
  2561   REF   2   LAST   723     16,2126   34523 1                2DCS
  2562                            16,2127   72561 0  VXSC    VSL2
  2563   REF   4   LAST   693     16,2130   03703 0                CSTEER
  2564                            16,2131   24015 0  STOVL   12D             B.C SCALED AT 2(-5) PDL 12D
  2565   REF  13   LAST   723     16,2132   03721 0                VGTIG
  2566                            16,2133   41456 0  UNIT    PUSH            UG PDL 0 SCALED AT 2(+1)
  2567                            16,2134   74241 0  DOT     VXSC
  2568                            16,2135   00015 0                12D
  2569                            16,2136   00001 0                0
  2570                            16,2137   51352 1  VSL2    BVSU
  2571                            16,2140   00015 0                12D
  2572                            16,2141   14015 0  STODL   12D             Q PDL 12D SCALED AT 2(-5)
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2573   REF   4  LAST  695   16,2142   03727 0                 F
2574                       16,2143   56261 1          SRR    DDV
2575                       16,2144   21605 1                 4
2576   REF   2  LAST  695   16,2145   03076 0                 WEIGHT/G
2577                       16,2146   63316 0          DSQ    PDVL        F/MASS SQUARED PDL 6 AT 2(-10)M/(CS.CS)
2578                       16,2147   00015 0                 12D
2579                       16,2150   77636 1          VSQ
2580                       16,2151   75421 1          BDSU   SQRT
2581                       16,2152   76561 1          VXSC   VSL1
2582                       16,2153   53455 0          VAD    UNIT
2583                       16,2154   00015 0                 12D
2584   REF  12  LAST  723   16,2155   37713 0          STCALL UT
2585   REF   1              16,2156   50331 0                 S40.2,3     **** NO RETURN **** SAME AS GOTO S40.2,3

25855  REF   1                                         COUNT* $$/S40.2
2586                       16,2157   77775 1  S40.2,3B VLOAD
2587   REF   4  LAST  216   16,2160   11760 0                 XUNIT
2588   REF  21  LAST  697   16,2161   27351 0          STOVL  SCAXIS
2589   REF  13  LAST  724   16,2162   03713 1                 UT
2590   REF   5  LAST  697   16,2163   00307 0          STORE  XSCREF
2591                       16,2164   53435 0          VXV    UNIT
2592   REF  12  LAST  723   16,2165   03632 0                 RTIG
2593                       16,2166   34007 1          STCALL 6D
2594   REF   2  LAST  697   16,2167   61702 0                 TSTRXOT
2595   REF   5  LAST  697   16,2170   00315 0          STORE  YSCREF
2596                       16,2171   57435 1          VXV    VCOMP
2597   REF   6  LAST  724   16,2172   00307 0                 XSCREF
2598                       16,2173   77772 0          VSL1
2599   REF   8  LAST  698   16,2174   34323 1          STCALL ZSCREF      ZNB AXIS IN REF COOR
2600   REF   1              16,2175   50444 0                 P40SXTY     **** NO RETURN **** SAME AS GOTO P40SXTY
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L P40-P47 USER'S PAGE NO. 35 E6 S3

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P2601   NAME      S40.8 - CROSS PRODUCT STEERING
R2602   FUNCTION      (1) UPDATES THE VELOCITY-TO-BE-GAINED VECTOR.
R2603                 (2) GENERATES ANGULAR RATE STEERING COMMANDS FOR AUTOPILOT.
R2604                 (3) ESTABLISHES ENGINE CUT-OFF SIGNALS AT APPROPRIATE TIMES.
R2605                 (4) INITIATES THRUST-FAIL ROUTINE, R40
R26055                (5) UPDATES CSMMASS
R2606   INPUT         VGPREV  - LAST VALUE OF THE VELOCITY-TO-BE-GAINED VECTOR
R2607                           PRIOR TO UPDATING IN METERS/CS AT +7.
R2608                 DELVREF - CHANGE IN VEHICLE VELOCITY SINCE LAST MEASUMEMENT
R2609                           IN METERS/CS AT +7.
R2610                 BDT     - EFFECT OF RATE OF CHANGE OF REQUIRED VELOCITY AND
R2611                           GRAVITY DURING DT UPON VELOCITY-TO-BE-GAINED IN
R2612                           METERS/CS AT +7.
R2613                 CSTEER  - A SCALAR OF THE STEERING LAW, SC.AT B+1, USED FOR
R2614                           SPS AIMPOINT STEERING MANEUVERS
R2615                 IDLEFAIL- A FLAG TO INHIBIT (IDLE) THE THRUST-FAIL ROUTINE
R2616                 STEERSW - A SWITCH TO PRECLUDE NEEDLESS CONDUCT OF STEERING
R2617                 REFSMMAT, DAPDATR1, PIPTIME
R2618                 EREPFRAC, ETDECAY, KPRIMEDT FOR TVC
R2619   OUTPUT        TTOGO   - TIME REMAINING FOR ENGINE BURN IN CS AT +28
R2620                 OMEGAC  - DP VECTOR RATE COMMAND, SC.AT  1/(2TVCDT) REVS/SEC
R2621                 VG, VGPREV, VGDISP, TGO, TIG, SCALED AS NOTED IN CODING
R2622                 STEERSW, IMPULSW, NVWORD1
R2623                 REPFRAC, CNTR, VCNTR, VCNTRIMP FOR TVC (R40 INTERFACING)
R2624   SUBROUTINES USED    - *SMNB* , ALARM

 2625   REF  48  LAST  721   E6,1465                          EBANK=  DAPDATR1
26255   REF   1                                              COUNT*  $$/S40.8
 2626   REF 149  LAST  717   16,2176  0 6006 1  S40.8       TC      INTPRET
 2627                        16,2177   45001 1               SETPD   CALL
 2628                        16,2200   00001 0                       00D
 2629   REF   1              16,2201   34331 1                       UPDATEVG
 2630                        16,2202   77745 1               DLOAD
 2631   REF  10  LAST  711   16,2203   03074 1                       CSMMASS          KG    B-16
 2632   REF   1              16,2204   03335 1               STORE   MASSTMP
 2633                        16,2205   77776 1               EXIT
 2634   REF  56  LAST  712   16,2206  0 5402 1               TC      PHASCHNG
 2635                        16,2207   10035 0               OCT     10035            TYPE B RESTART BELOW AND 5.3 REREADAC
26355   REF   6  LAST  717   01,2250                5P3SPT4  =       5.3SPOT
 2636   REF 150  LAST  725   16,2210  0 6006 1               TC      INTPRET
 2637                        16,2211   51575 1               VLOAD   ABVAL
 2638   REF   1              16,2212   03432 1                       DELVREF          DELTA V          M/CS  B-7
 2639                        16,2213   67206 1               PUSH    SLOAD            00D = DELTA V MAG M/CS  B-7
 2640   REF   1              16,2214   01345 1                       DVTHRESH                          M/CS  B+2
 2641                        16,2215   44205 0               DMP     BDSU
 2642   REF   1              16,2216   34533 0                       DPB-9            DVTHRESH         M/CS  B-7
 2643                        16,2217   67240 0  LOCHECK      BMN     SLOAD
 2644   REF   1              16,2220   51143 0                       LOTHRUST         ** MAYBE THRUST BAD **
A2645                                                                                 THRUST GOOD : UPDATE CSMMASS
 2646   REF   1              16,2221   01351 1                       EMDOT            FLOW RATE        KG/CS B-3
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2647                          16,2222  44205 0          DMP     BDSU
2648  REF    1                16,2223  34530 0                  FOURSEC +1      200 B-13 : MPAC = 2 SECS MASS LOSS
2649  REF    2  LAST  725      16,2224  03335 1                  MASSTMP
2650  REF   11  LAST  725      16,2225  03074 1  UPD8MASS STORE  CSMMASS         CSMMASS UPDATED FOR LAST 2 SECS
2651                          16,2226  77614 1          BOFF
2652  REF    6  LAST  712      16,2227  01344 0                  STEERSW         NO STEERING :
2653  REF    4  LAST  706      16,2230  51603 0                  SERVXT1         BYPASS TGOCALC AND X-PRODUT
2654                          16,2231  77414 0  CGTRACK BON     EXIT            ENABLE TVCDAP CG TRACKING
2655  REF    1                16,2232  04700 1                  SWTOVER
2656  REF    1                16,2233  34325 1                  FREPSET         V46 SWITCHOVER HAS OCCURRED (CSM/LM)
2657  REF   49  LAST  725      16,2234  31'465 1         CAE     DAPDATR1        ENABLE TVCDAP CG TRACKING
2658  REF   32  LAST  705      16,2235  7 4753 0         MASK    BIT14
2659  REF  172  LAST  722      16,2236  10 000 0         CCS     A
2660  REF   41  LAST  722      16,2237  3 4770 0         CAF     BIT1
2661  REF  173  LAST  726      16,2240  50 000 1         INDEX   A               LM-OFF, LM-ON VALUE
2662  REF    1                16,2241  31'421 1         CAE     EREPFRAC
2663  REF    4  LAST  707      16,2242  55'633 1  REPFRACS TS     REPFRAC

2664  REF  151  LAST  725      16,2243  0 6006 1         TC      INTPRET
2665                          16,2244   51375 1 TGOCALC VLOAD   BVSU            GET DELVG
2666  REF    2  LAST  725      16,2245  03432 1                  DELVREF
2667  REF    4  LAST  717      16,2246  03705 0                  BDT
2668                          16,2247  77656 1          UNIT
2669                          16,2250  41441 0          DOT     PUSH            (DOD)
2670  REF    4  LAST  133      16,2251  03460 0                  VG
2671                          16,2252  56244 0          BPL     DDV             ANGLE SHOULD BE GREATER THAN PI/2
2672  REF    1                16,2253  51137 0                  INCRSVG              DISPLAY ALARM IF NOT
2673  REF    1                16,2254  34632 1                  2VEXHUST
2674                          16,2255  41215 1          DAD     DMP             (DOT PRODUCT UP FROM DOD)
2675  REF    1                16,2256  11760 0                  LODPHALF
2676                          16,2257  70501 1          NORM    SR1
2677  REF   26  LAST  717      16,2260  00047 1                  X1
2678                          16,2261  60325 0          PDDL    NORM
2679                          16,2262  00045 0                  36D             (MAG DELVG)
2680  REF   17  LAST  689      16,2263  00050 1                  X2
2681                          16,2264  77665 1          BDDV
2682                          16,2265  53664 0          XSU,2   SL*
2683  REF   27  LAST  726      16,2266  00046 0                  X1
2684                          16,2267  57607 1                  0 -9D,2
2685                          16,2270  41405 0          DMP     PUSH            (DOD)
2686  REF    1                16,2271  34525 1                  -FOURDT
2687                          16,2272  54335 0          SLOAD   SR
2688  REF    1                16,2273  03014 1                  ETDECAY         ETDECAY SC.AT B+14 CS
2689                          16,2274  20617 0                  14D
2690                          16,2275  45421 1          BDSU    STADR
2691  REF   13  LAST  711      16,2276  74347 1          STORE   TGO             TIME TO GO IN CS. AT +28
2692                          16,2277  77615 0          DAD
2693  REF    8  LAST  717      16,2300  01044 0                  PIPTIME
2694  REF   74  LAST  723      16,2301  17413 1          STODL   TIG
2695  REF   14  LAST  726      16,2302  03430 0                  TGO
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2696                                16,2303   50025 0                 DSU     BMN
2697   REF   2  LAST  726           16,2304   34527 0                         FOURSEC
2698   REF   1                      16,2305   51102 0                         S40.81

2699                                16,2306   74375 0  XPRODUCT       VLOAD   VXSC
2700   REF   5  LAST  726           16,2307   03705 0  STEERING               BDT
2701   REF   5  LAST  723           16,2310   03703 0                         CSTEER
2702                                16,2311   52352 1                 VSL2    VSU
2703   REF   3  LAST  726           16,2312   03432 1                         DELVREF
2704                                16,2313   63256 0                 UNIT    PDVL
2705   REF   5  LAST  726           16,2314   03460 0                         VG
2706                                16,2315   47256 0                 UNIT    VXV
2707                                16,2316   45121 1                 MXV     CALL
2708   REF  27  LAST  720           16,2317   01734 0                         REFSMMAT        (REFSMMAT/2)
2709   REF   4  LAST  720           16,2320   47633 1                         *SMNB*
2710                                16,2321   77761 1                 VXSC
2711   REF   2  LAST  109           16,2322   03227 0                         KPRIMEDT        (KPRIMEDT SCIAT PI/8 RAD)
2712   REF  13  LAST  706           16,2323   37126 0  OMEGACLC       STCALL  OMEGAC
2713   REF   5  LAST  726           16,2324   51603 0                         SERVXT1
2714                                16,2325   77545 0  FREPSET        DLOAD   EXIT            POST-SQITCHOVER CSM/LM. LOAD FROM LOW-
2715   REF   1                      16,2326   36534 0                         FREPFRAC            BANDWIDTH PARAMETER IN FIXED MEMORY
2716   REF 266  LAST  706           16,2327   30 154 1                CAE     MPAC
2717   REF   1                      16,2330   1 2242 0                TCF     REPFRACS
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P2718
 2719                          16,2331   43020 1  UPDATEVG STQ     BON
 27195 REF  19 LAST  588       16,2332   03374 1                   R61CNTR
 2720  REF   7 LAST  694       16,2333   01307 1                   XDELVFLG
 2721  REF   2 LAST  717       16,2334   34360 0                   VGCOMP
 2722                          16,2335   50135 0            SLOAD  BMN
 2723  REF   5 LAST  723       16,2336   03325 0                   NBRCYCLS
 2724  REF   1                 16,2337   61721 1                   SETUP.9
 2725                          16,2340   53375 0            VLOAD  VAD
 2726  REF   4 LAST  717       16,2341   03327 1                   DELVSUM
 2727  REF   4 LAST  727       16,2342   03432 1                   DELVREF
 2728  REF   2 LAST  111       16,2343   03335 1            STORE  DELVSUMP
 2729                          16,2344   77776 1            EXIT
 2730  REF  79 LAST  722       16,2345  3 4770 0            CA     ONE
 2731  REF   6 LAST  728       16,2346  6 1724 1            AD     NBRCYCLS
 2732  REF   3 LAST  717       16,2347  55'725 1            TS     NBRCYCLP
 2733  REF  57 LAST  725       16,2350  0 5402 1            TC     PHASCHNG      TYPE B RESTART BELOW AND 5.3 REREADACCS
 2734                          16,2351   10035 0            OCT    10035
 27345 REF   7 LAST  725       01,2250              5P3SPT5  =      5.3SPOT
 2735  REF   4 LAST  728       16,2352  3 1725 0            CA     NBRCYCLP
 2736  REF   7 LAST  728       16,2353  55'724 0            TS     NBRCYCLS
 2737  REF 152 LAST  726       16,2354  0 6006 1            TC     INTPRET
 2738                          16,2355   77775 1            VLOAD
 2739  REF   3 LAST  728       16,2356   03335 1                   DELVSUMP
 2740  REF   5 LAST  728       16,2357   03327 1            STORE  DELVSUM
 2741                          16,2360   77775 1  VGCOMP    VLOAD
 2742  REF   5 LAST  728       16,2361   03432 1                   DELVREF             CONSTRUCT DELVG, SC.AT B-7  M/CS
 2743                          16,2362   53245 1            BVSU   VAD
 2744  REF   6 LAST  727       16,2363   03705 0                   BDT
 2745  REF   2 LAST  717       16,2364   03721 0                   VGPREV
 2746  REF   6 LAST  727       16,2365   03460 0            STORE  VG            VELOCITY-TO-BE-GAINED, SC.AT B-7  M/CS
 2747                          16,2366   77646 0            ABVAL
 2748  REF   6 LAST  698       16,2367   03763 0            STORE  VGDISP        FOR DISPLAY PURPOSES
 2749                          16,2370   77776 1            EXIT
 2750  REF  58 LAST  728       16,2371  0 5402 1            TC     PHASCHNG
 2751                          16,2372   10035 0            OCT    10035          TYPE B  RESTART BELOW AND 5.3 REREADAC
 27515 REF   8 LAST  728       01,2250              5P3SPT6  =      5.3SPOT
 2752  REF 153 LAST  728       16,2373  0 6006 1            TC     INTPRET
 2753                          16,2374   77775 1            VLOAD
 2754  REF   7 LAST  728       16,2375   03460 0                   VG
 2755  REF   3 LAST  728       16,2376   37721 1            STCALL VGPREV
 2756  REF  20 LAST  728       16,2377   03374 1                   R61CNTR
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P2757   NAME          S40.9 - VTOGAIN (AIMPOINT MANEUVERS ONLY)
R2758   FUNCTION      (1) GENERATES REQUIRED VELOCITY AND VELOCITY-TO-BE-GAINED
R2759                 VECTORS FOR USE DURING AIMPOINT MANEUVERS
R2760                 (2) UPDATES THE B VECTOR WHICH IS USED IN THE FINAL
R2761                 CALCULATION OF EXTRAPOLATING THE VELOCITY-TO-BE-GAINED
R2762   CALLING SEQ   VIA FINDVAC AS NEW JOB.
R2763   INPUT         RNIT      - ACTIVE VEHICLE RADIUS VECTOR IN METERS AT +29.
R2764                 VNIT      - ACTIVE VEHICLE VELOCITY VECTOR IN METERS/CS AT +7
R2765                 VRPREV    - LAST COMPUTED VELOCITY REQUIRED VECTOR IN
R2766                             METERS/CS AT +7.
R2767                 NOMTIG      - TIME OF IGN. USED IN TARGETTING ROUTINES@+28"
R2768                 DELLT4      - TRANSFER TIME FROM PIPTIME TO TARGET@+28"
R2769                 TNIT        - TIME OF RNIT AND VNIT IN CS AT +28
R2770                 GDT/2     - HALF OF VELOCITY GAINED IN DELTA T TIME DUE TO
R2771                             ACCERERATION OF GRAVITY IN METERS/CS AT +7.
R2772                 DELVREF   - CHANGE IN VELOCITY DURING LAST 2 SEC IN
R2773                             METERS/CS AT +7.
R2774               NORMSW    SET=CENTRAL ANGLE BETWEEN RTARG AND RTIG IS BETWEEN
R2775                         165 TO 195 DEGREES
R2776                         RESET=CENTRAL ANGLE OUTSIDE CONE DESCRIBED ABOVE
R2777   OUTPUT        VGTEMP    - VELOCITY TO BE GAINED VECTOR IN METERS/CS AT +7.
R2778                 COGA        - INPUT OF INITIAL GUESS FOR LAMBERT FROM S40.1
R2779                             OR PREVIOUS PASS THRU S40.9
R2780                 GOBL/2      -OBLATENESS TERM IN AVG GRAV CALC-GOBL*RSQ/MU
R2781                 VRPREV    - VELOCITY REQUIRED VECTOR IN METERS/CS AT +7.
R2782                 BDT       - B VECTOR IN METERS/CS AT +7.
R2783   SUBROUTINES USED  -  INITVEL

 27835  REF   1                                          COUNT*  $$/S40.9
 2784   REF 154  LAST  728   16,2400  0 6006 1  S40.9    TC      INTPRET
 2785                        16,2401   71201 1           SETPD   DLOAD
 2786                        16,2402   00001 0                   0D
 2787   REF   1              16,2403   11762 1                   L06ZEROS
 2788                        16,2404   43125 0           PDDL    BON
 2789   REF   1              16,2405   34517 0                   EP4(45)L
 2790   REF   4  LAST  716   16,2406   03705 0                   NORMSW
 2791                        16,2407   34412 1                   +3
 2792                        16,2410   77745 1           DLOAD
 2793   REF   1              16,2411   34521 0                   EP4(10)L
 27935                       16,2412   77606 1           PUSH
 2794                        16,2413   45014 0           CLEAR   CALL
 2795   REF   3  LAST  492   16,2414   00675 0                   GUESSW
 2796   REF   1              16,2415   22002 0                   HAVEGUES
 2797                        16,2416   77776 1           EXIT
 2798   REF  59  LAST  728   16,2417  0 5402 1           TC      PHASCHNG        SAVE TIME BY NOT REDOING LAMBERT CALCS
 2799                        16,2420   05021 1           OCT     05021           C, PRIORITY NEXT, JOB BELOW
 2800                        16,2421   10000 0           OCT     10000
 2801   REF 155  LAST  729   16,2422  0 6006 1           TC      INTPRET
 2802                        16,2423   77214 0  ENDLAMB  BON     VLOAD
 2803   REF   3  LAST  717   16,2424   01310 1                   FIRSTFLG
```

```
2804   REF   1                 16,2425   34442 1                FIRSTTME
2805   REF  11  LAST  723      16,2426   03612 1                VIPRIME
2806                           16,2427   65251 1          VSU   PDDL
2807   REF   2  LAST  126      16,2430   03466 0                VRPREV
2808   REF   3  LAST  717      16,2431   03474 0                TNIT
2809                           16,2432   54225 0          DSU   SL
2810   REF   2  LAST  126      16,2433   03476 1                TNITPREV
2811                           16,2434   20222 1                17D
2812                           16,2435   74265 0          BDDV  VXSC
2813   REF   3  LAST  723      16,2436   34523 1                200CS
2814                           16,2437   76451 0          VSU   VSL1
2815   REF   2  LAST   79      16,2440   01046 1                GDT/2
2816   REF   7  LAST  728      16,2441   03705 0          STORE BDT
2817                           16,2442   57535 0  FIRSTTME SLOAD DCOMP
2818   REF  14  LAST  716      16,2443   03747 0                RTX2
2819                           16,2444   77640 0          BMN
2820   REF   1                 16,2445   34462 0                MOONCASE
2821                           16,2446   53575 0          VLOAD UNIT
2822   REF   9  LAST  717      16,2447   01030 0                RN
2823                           16,2450   45345 1          DLOAD DSU
2824   REF   9  LAST  726      16,2451   01044 0                PIPTIME
2825   REF   6  LAST  693      16,2452   03450 0                NOMTIG
2826                           16,2453   56205 0          DMP   DDV
2827   REF   1                 16,2454   34515 1                EARTHMU
2828                           16,2455   00043 0                34D
2829                           16,2456   53361 0          VXSC  VAD
2830   REF   2  LAST   79      16,2457   01054 1                GOBL/2
2831   REF   2  LAST  717      16,2460   03646 0                VGTEMP    NOTE  NO TEST IS MADE TO SUBTRACT GOBL
2832   REF   3  LAST  730      16,2461   03646 0          STORE VGTEMP    INSIDE 165-195 DEGREE CONE AREA.
2833                           16,2462   77776 1  MOONCASE EXIT
2834   REF  60  LAST  729      16,2463   0 5402 1         TC    PHASCHNG
2835                           16,2464   04021 0          OCT   04021     C, JOB BELOW
2836   REF 156  LAST  729      16,2465   0 6006 1 COPY40.9 TC   INTPRET
2837                           16,2466   77745 1          DLOAD
2838   REF   4  LAST  730      16,2467   03474 0                TNIT
2839   REF   3  LAST  730      16,2470   27476 1          STODL TNITPREV
2840   REF  12  LAST  730      16,2471   03612 1                VIPRIME
2841   REF   3  LAST  730      16,2472   03466 0          STORE VRPREV
2842                           16,2473   77414 0          CLEAR EXIT
2843   REF   4  LAST  729      16,2474   01270 0                FIRSTFLG
2844   REF  80  LAST  728      16,2475   4 4770 1   -2    CS    ONE       REDO40.9 (RESTART)  ENTRY TO END  S40.9
2845   REF   8  LAST  728      16,2476   55'724 0         TS    NBRCYCLS
2846   REF  61  LAST  730      16,2477   0 5402 1 ENDS40.9 TC   PHASCHNG
2847                           16,2500   00001 0          OCT   00001
2848   REF  74  LAST  713      16,2501   1 5205 1         TCF   ENDOFJOB

2849   REF 157  LAST  730      16,2502   0 6006 1 REDO40.9 TC   INTPRET   S40.9 RESTARTS COME HERE TO GRACEFULLY
2850                           16,2503   77775 1          VLOAD             TERMINATE S40.9 SO THAT IT CAN BE
2851   REF   2  LAST  729      16,2504   11762 1                LOADZEROS   SET UP WITH LATEST R,V,T NEXT PASS
2852   REF   6  LAST  728      16,2505   17327 1          STODL DELVSUM     (TYPE C PHASE POINTS '04021' WILL
```

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```
2853   REF  3 LAST 730   16,2506   11762 1                LOGZEROS          FORCE NORMAL S40.9 TERMINATIONS,
2854   REF  9 LAST 730   16,2507   27325 0          STOVL NBRCYCLS          RATHER THAN LOSE TIME OF BRAND NEW
2855   REF  4 LAST 728   16,2510   03721 0                VGPREV            PASS -- QUICK OLD DATA BETTER THAN
2856   REF  4 LAST 730   16,2511   03646 0          STORE VGTEMP            NONE) NOW CAN GO THRU SETUP.9
2857                     16,2512   77776 1          EXIT                    WITHOUT DISTURBING VGPREV
2858   REF  1           16,2513 1 2475 1          TCF   ENDS40.9 -2   STORE 0,0 COVERED NBRCYCLS,P -- FIX UP S

2859                     16,2514   55340 0 EARTHMU  2DEC* -3.986032 E10 B-36*
2859                     16,2515   61710 0
2860                     16,2516   04000 0 EP4(45)L 2DEC  .125
2860                     16,2517   00000 1
2861                     16,2520   00707 1 EP4(10)L 2DEC  .027777777
2861                     16,2521   03434 1
2863                     16,2522   01440 0 200CS    2DEC  200 B-12
2863                     16,2523   00000 1
2864                     16,2524   77715 1 -FOURDT  2DEC  -800 B-18      -4(200CS), AT B+18CS (-4 FOR SCALING)
2864                     16,2525   77777 0
2865                     16,2526   00000 1 FOURSEC  2DEC  400.0 B-28     4 SEC
2865                     16,2527   00620 0
28651                    16,2530   00000 1 TWODT    2DEC  200 B-28      **** MUST FOLLOW 2DEC FOURSEC TO   ****
28651                    16,2531   00310 0
A286515                                                                 **** MAKE FOURSEC +1 2DEC 200 B-13 ****
28652                    16,2532   00040 0 DPB-9    2DEC  1 B-9
28652                    16,2533   00000 1
```

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P2866   NAME        S40.13 - TIMEBURN
R2867   FUNCTION    TO DETERMINE
R2868               (1) WHETHER A GIVEN COMBINATION OF VELOCITY-TO-
R2869               BE-GAINED AND ENGINE CHOICE RESULT IN A BURN TIME SUFFICIENT
R2870               TO ALLOW STEERING AT THE VEHICLE DURING THE BURN
R2871               (2) THE MAGNITUDE OF THE RESULTING BURN TIME, AND
R2872               (3) IF THE BURN TIME IS < 6 SECONDS,
R2873               THE ASSOCIATED TIME OF THE ENGINE-OFF SIGNAL
R2874   CALLING SEQ VIA FINDVAC AS NEW JOB.
R2875   INPUT       VGDISP   - MAGNITUDE OF VGTIG IN M/CS AT +7
R2876               WEIGHT/G - MASS OF VEHICLE IN KG AT TIG (+16)
R2877               F        - ENGINE THRUST IN M.NEWTONS AT +7
R2878               MDOT     - RATE OF DECREASE OF VEHICLE MASS DURING
R2879                          BURN IN KG/CS AT +3
R2880   OUTPUT      IMPULSW  - ZERO FOR STEERING
R2881                        - ONE FOR ATTITUDE HOLD
R2882               TGO      - BURN TIME IN CS AT +28
R2883     THE QUANTITY M.NEWTON SHALL BE USED TO EXPRESS WEIGHT IN TERMS OF
R2884     (KILOGRAM*METER)/(CENTISECOND*CENTISECOND)
R2885     (1) M.NEWTON = (10000) NEWTONS
 2886   REF   1                                        COUNT* $$/40.13
 2887   REF  25  LAST  722   16,2534  3 4762 0  S40.13  CAF    BIT7          TEST +X TRANSLATION
 2888                        16,2535  0 0006 1          EXTEND
 2889   REF   2  LAST  550   16,2536  06 031 0          RXOR   CHAN31
 28895  REF  26  LAST  732   16,2537  7 4762 1          MASK   BIT7
 2890   REF 267  LAST  727   16,2540  54 157 0          TS     MPAC +3
 2891   REF 158  LAST  730   16,2541  0 6006 1          TC     INTPRET
 2892                        16,2542   41545 0          DLOAD  PUSH          COD = |VGTIG| AT +7
 2893   REF   7  LAST  728   16,2543   03763 0                 VGDISP
 2894                        16,2544   53135 0          SLOAD  BZE
 2895   REF 268  LAST  732   16,2545   00160 0                 MPAC +3       BIT7 CHAN31
 2896   REF   1              16,2546   34556 0                 S40.130 +1    DO NOT COMPENSATE FOR 7 SECS OF ULLAGE
 2897                        16,2547   56345 0          DLOAD  DDV
 2898   REF   1              16,2550   34630 0                 S40.135       COMPENSATION FOR 2 JET ULLAGE AT +24
 2899   REF   3  LAST  724   16,2551   03076 0                 WEIGHT/G      MASS IN KGMS AT +16
 2900                        16,2552   72414 0          BDN    SL1           DOUBLE CORRECTION IF FOUR JETS
 2901   REF   1              16,2553   00700 0                 NJETSFLG
 2902   REF   2  LAST  732   16,2554   34555 0                 S40.130
 2903                        16,2555   41421 0  S40.130 BDSU   PUSH          COD = MAG(VGTIG) @ B+7 M/CS, ADJUSTED
A2904                                                                          FOR ULLAGE,
 2905                        16,2556   56345 0    +1    DLOAD  DDV           ENTRY POINT IF ULLAGE OFF
 2906                        16,2557   00001 0                 COD           MAKE SURE MPAC CONTAINS MAG(VGTIG)
 2907   REF   2  LAST  726   16,2560   34632 1                 2VEXHUST      2 VEXHAUST (=2G ISP) @ B+7 M/CS
 2908                        16,2561   44342 1          SR1    BDSU
 2909   REF   2  LAST  726   16,2562   11760 0                 LODPHALF      0.5
 2910                        16,2563   41205 0          DMP    DMP
 2911   REF   4  LAST  732   16,2564   03076 0                 WEIGHT/G      TOTAL MASS @ B+16 KG
 2912                        16,2565   00001 0                 COD           MAG(VGTIG) @ B+7 M/CS
 2913                        16,2566   40061 1          SL     BDV
 2914                        16,2567   20213 0                 10D           SCALING
```

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2915   REF   1                16,2570   34617 0                    S40.133      LARGE VG : STEERING BURN INDICATED
2916                          16,2571   41225 1          DSU       DMP
2917   REF   1                16,2572   01764 0                    EIMP1SEC     IMP BURN LOGIC B.P. @ E+2B+14 NEWT-SEC
2918   REF   1                16,2573   34624 0                    100B-14      1SEC @ B+14CS
2919                          16,2574   41471 0          DDV       PUSH         02D=(DELTET-1SEC) @ B+14CS, FIMP16 SLOPE
2920   REF   2  LAST   91      16,2575   01766 1                    EFIMP16      IMP B.LOGIC 1-6SEC SLOPE @ E+2B+14 NEWT
2921                          16,2576   51025 1          DSU       BPL
2922   REF   1                16,2577   34626 1                    500B-14      5SEC @ B+14CS
2923   REF   2  LAST  733      16,2600   34617 0                    S40.133      STEERING BURN INDICATED, DELTAT > 6 SEC
2924                          16,2601   51145 0          DLOAD     BPL
2925                          16,2602   00003 1                    02D          (DELTAT-1SEC) @ B+14CS, FIMP16 SLOPE
2926   REF   1                16,2603   34607 1                    S40.132      1<DELTAT<6SEC, SO FIMP16 SLOPE USE IS OK
2927                          16,2604   56205 0          DMP       DDV          0<DELTAT<1SEC, SO USE FIMP01 NOT FIMP16
2928   REF   3  LAST  733      16,2605   01766 1                    EFIMP16      IMP B.LOGIC 1-6SEC SLOPE @ E+2B+14 NEWT
2929   REF   1                16,2606   01765 1                    EFIMP01      IMP B.LOGIC 0-1SEC SLOPE @ E+2B+14 NEWT
2930                          16,2607   77414 0  S40.132 SET       EXIT
2931   REF   1                16,2610   01066 0                    IMPULSW      IMPULSIVE BURN
2932   REF   7  LAST  706      16,2611   0 7224 1          TC        DPAGREE
2933   REF 159  LAST  732      16,2612   0 6006 1          TC        INTPRET
2934                          16,2613   54215 0          DAD       SR           MPAC CONTAINS (DELTA-1SEC), GET DELTAT
2935   REF   2  LAST  733      16,2614   34624 0                    100B-14      1SEC @ B+14CS
2936                          16,2615   20617 0                    I4D          DELTAT @ B+28CS
2937   REF  15  LAST  726      16,2616   03430 0          STORE     TGO
2938                          16,2617   77776 1  S40.133 EXIT
2939   REF  62  LAST  730      16,2620   0 5402 1          TC        PHASCHNG
2940                          16,2621   00003 1          OCT       3
2941   REF  75  LAST  730      16,2622   1 5205 1          TCF       ENDOFJOB

2942   REF   1                                           COUNT     17/40.13

2943                          16,2623   00144 0  100B-14 2DEC      100.00 B-14      1SEC @ B+14CS
2943                          16,2624   00000 1
2944   REF   3  LAST  733      16,2623            1SEC2D =          100B-14
2945                          16,2625   00764 1  500B-14 2DEC      500.00 B-14      5SEC @ B+14CS
2945                          16,2626   00000 1
2946   REF   2  LAST  733      16,2625            5SECOND =         500B-14
2947                          16,2627   00000 1  S40.135 2DEC      69.6005183 B-23 IMPULSE FROM 7.96 SECS OF 2-JET FIRING
2947                          16,2630   04263 1
A2948                                                                          7.96(199.6)COS(10)  LB-SEC,  SC.AT
A2949                                                                          B+23 NEWTON-SEC/E+2  (7 SEC ULLAGE
A2950                                                                          TO GO, PLUS 0.96 SEC FROM PIPTIME)
2951                          16,2631   17602 0  2VEXHUST 2DEC     63.020792 B-7    2(10338.0564 FPS), AT B+7 M/CS
2951                          16,2632   25124 1
2992   REF  10  LAST  642      30,2000                            SBANK= LOWSUPER
2993   REF   3  LAST  720      20,2000                            SETLOC DAPS6
2994                          20,2612                            BANK

29945  REF   1                                           COUNT*    $$/40.14
2995                          20,2612   00631 0  DEC409  DEC       409
2996                          20,2613   00056 1  DEC46   DEC       46
```

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R2997 CALLED BY ..DONOUN47.. (VERB 48), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP)

```
 2998   REF  50  LAST  726   E6,1465                          EBANK= DAPDATR1
 2999   REF   1               20,2614  31'467 0  S40.14     CAE    IXX          RCS ENTRY
 3000                         20,2615  0 0006 1             EXTEND
 3001   REF   1               20,2616  7 2641 1             MP     CONTONE
 3002   REF   2  LAST  113   20,2617  55'623 0             TS     J/M
 3003   REF   1               20,2620  3 1470 0             CA     IAVG
 3004                         20,2621  0 0006 1             EXTEND
 3005   REF   2  LAST  734   20,2622  7 2641 1             MP     CONTONE
 3006   REF   2  LAST  113   20,2623  55'624 1             TS     J/M1
 3007   REF   2  LAST  113   20,2624  55'625 0             TS     J/M2
 3008                         20,2625  0 0006 1             EXTEND
 3009   REF   1               20,2626  3 2643 1             DCA    CONTTWO
 3010                         20,2627  0 0006 1             EXTEND
 3011   REF   2  LAST  734   20,2630  11'467 1             DV     IXX
 3012   REF   2  LAST  113   20,2631  55'620 0             TS     KMJ
 3013                         20,2632  0 0006 1             EXTEND
 3014   REF   2  LAST  734   20,2633  3 2643 1             DCA    CONTTWO
 3015                         20,2634  0 0006 1             EXTEND
 3016   REF   2  LAST  734   20,2635  11'470 1             DV     IAVG
 3017   REF   2  LAST  113   20,2636  55'621 1             TS     KMJ1

 3018   REF   2  LAST  113   20,2637  55'622 1             TS     KMJ2
 3019   REF 139  LAST  722   20,2640  0 0002 0             TC     Q

 3020                         20,2641  25137 0  CONTONE     DEC    .662034      2PI/M
 3021                         20,2642  00023 0  CONTTWO     2DEC   .00118
 3021                         20,2643  12522 1

 3023   REF   1               21,2000                      SETLOC DAPS3
 3024                         21,2032                      BANK

 30245  REF   1                                            COUNT* $$/RCSUP
 3025   REF   6  LAST  589   21,2032  22 016 0  RCSUP      LXCH   BANKRUPT
 3026                         21,2033  0 0006 1             EXTEND
 3027   REF   6  LAST  589   21,2034  22 012 1             QXCH   QRUPT
 3028   REF   6  LAST  711   21,2035  0 2042 0             TCR    RCSDAPON     ACTIVATE RCS DAP
 3029   REF  25  LAST  590   21,2036  1 5323 1             TCF    RESUME

 3030   REF  51  LAST  734   E6,1465                      EBANK= DAPDATR1
 3031   REF   1               21,2037  02140 0  RCSADDR   2CADR  RCSATT
 3031   REF   1               21,2040  42066 1

 3032                         21,2041  37704 0  C.6SECT5    OCT    37704

 3033   REF  52  LAST  734   E6,1465                      EBANK= DAPDATR1
A3034                                                                 RCSDAPON ENTRY MUST BE UNDER INT-INHIBIT
 3035   REF   1               21,2042  3 2041 0  RCSDAPON  CAF    C.6SECT5     0.6 SEC ALLOWS TVCEXEC/ROLLDAP TO DIE
```

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```
3036   REF   7  LAST  703   21,2043  54 030 0    +1      TS      TIME5          ENTRY FROM ROOTOPOO
3037   REF   1                21,2044  55'464 1            TS      T5PHASE        WILL CAUSE FRESHDAP (+1)
3038   REF  13  LAST  550   21,2045  4 1501 0            CS      RCSFLAGS       SET BIT3 TO REINITIALIZE FDAI ERROR
3039   REF  32  LAST  632   21,2046  7 4766 0            MASK    BIT3                DISPLAY, IN CASE SC CONT SWITCH
3040   REF  14  LAST  735   21,2047  27'501 0            ADS     RCSFLAGS            IN SCS NOT GNC (GUIDEMODE PRIMARY)
3041                         21,2050  0 0006 1            EXTEND
3042   REF   1                21,2051  3 2040 1            DCA     RCSADDR        (RCSATT)
3043   REF  10  LAST  703   21,2052  52 113 0            DXCH    T5LOC
3044   REF  14  LAST  718   21,2053  4 4076 0            CS      DPCONFIG       SET BITS 15,14 TO 01 TO INDICATE
3045   REF  23  LAST  718   21,2054  7 0102 0            MASK    FLAGWRD6            T5 TAKEOVER BY RCSDAP
3046   REF   1                21,2055  6 4753 1            AD      DAP2BIT
3047   REF  24  LAST  735   21,2056  54 102 0            TS      FLAGWRD6       KILLS TVCEXEC AND ROLLDAP STARTS
3048   REF 140  LAST  734   21,2057  0 0002 0            TC      Q              RETURN TO CALLER (TVCDAPOFF OR RCSDAPUP)
30481  REF   2  LAST  643   35,2000                      SETLOC  P30S1
30482                        35,3566                      BANK
304825 REF   1                                           COUNT*  $$/P40
30483  REF   3  LAST  645   35,3566  0 3525 0  STARTTGO  TC      COMPTGO        COMPTGO CAN NOT BE CALLED DIRECTLY
30484  REF  43  LAST  700   35,3567  0 4655 0            TC      POSTJUMP       VIA BANKCALL DUE TO RESTART PROBLEMS
30485  REF   1                35,3570   50237 1           CADR    TFIGINIT +2
```

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```
P3049   NAME        P41 - RCS BURN
R3050   FUNCTION    TO CONTROL THE SEQUENCE OF THE CMC DURING THE COUNTDOWN
R3051               AND THRUSTING MANEUVER OF AN RCS BURN

R3052               R02BOTH   CHECK STATUS OF IMU

R3053               S40.1     COMPUTE: INTIAL THRUST DIRECTION AND
R3054                                  INTIAL VALUE OF VELOCITY-TO-BE-
R3055                                  GAINED VECTOR (VGTIG)

R3056               S40.2,3   COMPUTE: GIMBAL ANGLES IF THRUSTING WILL
R3057                                  OCCUR WITH PRESENT IMU ORIENTATION,
R3058                                  PREFERRED IMU ORIENTATION, AND
R3059                                  DESIRED THRUST DIRECTION IN SM COORDS

R3060               R60CSM    PERFORM ATTITUDE MANEUVER

R3061               MIDTOAVI  EXTRAPOLATE CSM STATE VECTOR TO TIG-29.96 SECS

R3062               CLOKTASK  COMPUTE TIME-TO-GO TO IGNITION,
R3063                         RECALL CLOKTASK,
R3064                         UPDATE N 85, AND
R3065                         CALL CLOCKJOB TO DISPLAY V06N85

R3066               TIGBLNK   BLANK DSKY AT TIG-35 SECS AND
R3067                         WAITLIST TIGAVEG IN 5 SECS

R3068               TIGAVEG   UNBLANK DSKY,
R3069                         CAUSE CLOCKJOB TO DISPLAY NON FLASH V16N85,
R3070                         WAITLIST TTG/0 IN 29.96 SECS, AND
R3071                         START SERVICER

R3072               CLOCKJOB  (CALLED EVERY SEC)
R3073                         DISPLAY NON FLASH V06N85 UNTIL TIG - 29.96:
R3074                         THEN DISPLAY NON FLASH V16N85

R3075               TTG/0     NOVAC TIGNOW

R3076               TIGNOW    DISPLAY FLASHING V16N85

R3077               POST41    CLEAN UP AFTER BURN

R3078               ************************************************
R3079               PROVIDE RESTART PROTECTION AT ALL CRITICAL POINTS
R3080               ************************************************

R3081   INPUT       SAME AS P40

R3082   ALARMS      1703      INSUFFICIENT TIME FOR INTEGRATION
R3083                         TIG WAS SLIPPED
```

```
P3084
 3085   REF  53  LAST  734   E6,1465                          EBANK=  DAPDATR1
 3086   REF   3  LAST  713   24,2000                          SETLOC  P40S
 3087                        24,3563                          BANK
 3088   REF   1                                              COUNT*  $$/P41
 3091   REF 160  LAST  733   24,3563   0 6006 1  P41CSM     TC      INTPRET
 3092                        24,3564    71214 0               SET     DLOAD
 3093   REF   4  LAST  698   24,3565    00464 1               DLOAD   ENG2FLAG      SET FOR RCS
 3094   REF  21  LAST  717   24,3566    15336 0               BHIZ    HI6ZEROS      CSTEER = 0 FOR P41
 3095   REF   6  LAST  727   24,3567    03703 0               STORE   CSTEER
 3096                        24,3570    43145 0               DLOAD   BON
 3097   REF   1                24,3571    11534 0               RTB     FRCS2         2JET THRUST FOR S40.1
 3098   REF   2  LAST  732   24,3572    00700 0               STORE   NJETSFLG
 3099   REF   1                24,3573    50226 1               RTB     P40S/F        NJETS = 1 2-JET
 3100                        24,3574    52152 0               SL1     GOTO          NJETS = 0 4-JET
 3101   REF   2  LAST  737   24,3575    50226 1               RTB     P40S/F
 3102   REF  54  LAST  737   E6,1465                          EBANK=  DAPDATR1
 3103   REF 161  LAST  737   24,3576   0 6006 1  CALCN85    TC      INTPRET
 3104                        24,3577    77624 1               CALL
 3105   REF   2  LAST  725   24,3600    34331 1               RTB     UPDATEVG      NEW VG FROM VGCOMP (+ MAYBE S40.9)
 3106                        24,3601    77624 1               CALL
 3107   REF   2  LAST  709   24,3602    51651 1               RTB     P40CNV85      COMPUTE VGBODY
 3108                        24,3603    77776 1  SERVXT1    EXIT
31081   REF   1                24,3604   3 3616 0               CAF     NEJETBTS
31082                        24,3605   0 0006 1               EXTEND
31083   REF   3  LAST  732   24,3606    06 031 0               RXOR    CHAN31        ARE ANY RCS JETS FIRING
31084   REF   2  LAST  737   24,3607    7 3616 1               MASK    NEJETBTS      NULLING OUT RESIDUAL VG'S FROM P40?
31085                        24,3610   0 0006 1               EXTEND                OR PERFORMING P41?
31086   REF   3  LAST  706   24,3611   1 3614 0               BZF     SERVXT        NO

31087   REF  60  LAST  712   24,3612   0 5547 1               TC      UPFLAG        YES - SET BURNFLAG TO INDICATE
31088   REF   4  LAST  693   24,3613    00233 0               ADRES   BURNFLAG      THAT THE CSM DID THE BURN

 3109   REF  44  LAST  735   24,3614   0 4655 0  SERVXT     TC      POSTJUMP
 3110   REF   2  LAST  714   24,3615    77143 1               CADR    SERVEXIT

31101                        24,3616    07700 1  NEJETBTS   OCT     07700

 3111   REF   2  LAST  444   24,3617   3 4753 1  TTG/0      CAF     PRIO20        TASK (4.4 PROTECTS IN P41)
 3112   REF  14  LAST  709   24,3620   0 5121 0               TC      NOVAC
 3113   REF  55  LAST  737   E6,1465                          EBANK=  DAPDATR1
 3114   REF   2  LAST  712   24,3621    03451 1               2CADR   TIGNOW
 3114                        24,3622    50066 1
 3115   REF  51  LAST  712   24,3623   0 5561 0  P40CLK     TC      DOWNFLAG
 3116   REF   5  LAST  645   24,3624    00155 0               ADRES   TIMRFLAG
 3117   REF  37  LAST  720   24,3625   1 5314 0               TCF     TASKOVER

 3119                        24,3626    77624 1  P41/DSP    CALL                  COMPUTE
 3120   REF   3  LAST  737   24,3627    51651 1               RTB     P40CNV85              VGTIG IN CTRL COORDS
 3121                        24,3630    77776 1               EXIT
```

L P40-P47 USER'S PAGE NO. 48 E6 S3

```
3122                                  24,3631  0 0006 1                EXTEND                  DO CONTROL COORD CALCULATION AFTER AVEG
3123  REF   2  LAST  712               24,3632  3 3556 1                DCA     ACADN85
3124  REF   8  LAST  712               24,3633  53'062 0                DXCH    AVEGEXIT
31242 REF   2  LAST  709               24,3634  3 3511 1                CAF     V06N85B
31244 REF  21  LAST  713               24,3635  54 777 1                TS      NVWORD1         FORCE CLOCKJOB
3125  REF  28  LAST  717               24,3636  0 5362 0                TC      2PHSCHNG
3126                                  24,3637   40036 0                OCT     40036           6.3=CLOKTASK(100CS)
3127                                  24,3640   00234 1                OCT     234             4.23=P40S/SV(PRIO12)
31272 REF   2  LAST  699               01,2154                4P23SPT2 =       4.23SPOT
31274 REF   5  LAST  703               01,2325                6P3SPT3  =       6.3SPOT
3128  REF   3  LAST  529               24,3641  1 2523 0                TCF     P40S/SV
3129  REF   2  LAST  712               24,3642  3 3512 1       P41REDSP CAF     V16N85B         ENTER FROM P41 SIDE OF TIGAVEG
3130  REF  22  LAST  738               24,3643  54 777 1                TS      NVWORD1          REDISPLAY NONFLASHING
3131  REF   3  LAST  699               24,3644  3 3530 1                CAF     SEC29.96 +1
3132  REF  14  LAST  709               24,3645  0 5223 1                TC      TWIDDLE
3133  REF   2  LAST  232               24,3646   03617 1                ADRES   TTG/0
3134  REF  33  LAST  735               24,3647  4 4766 0                CS      BIT3            4.4 = TTG/0(2996CS), PRECHECK(-0CS)
3135  REF   1                         24,3650  1 2623 0                TCF     TTGPHS

3136                                  24,3651   40220 0       P40CNV85 STQ     SETPD
3137  REF   3  LAST  716               24,3652   03730 0                SETPD   QTEMP1
3138                                  24,3653   00001 0                        0
3139                                  24,3654   41575 0                VLOAD   PUSH
3140  REF   5  LAST  731               24,3655   03721 0                        VGPREV          EQUALS VGTIG (TARGETTING INPUT)
3141                                  24,3656   77624 1                CALL
3142  REF   1                         24,3657   57032 1                        S41.1
3143  REF   6  LAST  294               24,3660   37665 0                STCALL  VGBODY
3144  REF   4  LAST  738               24,3661   03730 0                        QTEMP1
```

```
P3145   NAME        P47 - DELTA V MONITOR
R3146   FUNCTION    TO MONITOR VEHICLE ACCELERATION AND
R3147               DISPLAY ACCUMULATED VG IN CONTROL COORDINATES


R3148               R02BOTH   CHECK STATUS OF IMU

R3149               MIDTOAV2  EXTRAPOLATE STATE VECTOR TO CURRENT TIME
R3150                         + INCREMENT OF TIMEDELT

R3151               SETUPTIG  WAITLIST TIGON IN NO. OF CS FOUND
R3152                         IN MPAC +1 AFTER MIDTOAV2 RETURN

R3153               TIGON     SET CALCN83 INTO AVEGEXIT,
R3154                         NOVAC P47BODY, AND
R3155                         START SERVICER

R3156               CALCN83   ADD PIPA CONTENTS TO ACCUMULATED DELTA V AND
R3157                         CONVERT TO CONTROL COORDINATES AND
R31572                        CALCULATE INERTIAL VELOCITY, H, AND
R31574                        HDOT FOR NOUN 62

R3158               P47BODY   ZERO DELVIMU INITIALLY AND
R3159                         GENERATE MONITORING DISPLAY OF ACCUMULATED
R3160                         DELTA V IN CONTROL COORDINATES

R3161               ************************************************
R3162               PROVIDE RESTART PROTECTION AT ALL CRITICAL POINTS
R3163               ************************************************
```

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P3164
  3165   REF    1                                          COUNT*  $$/P47
  3166   REF   75  LAST  726   E7,1412                     EBANK=  TIG
  3167   REF  156  LAST  712   24,3662   0 4636 0  P47CSM  TC      BANKCALL        IMU STATUS CHECK
  3168   REF    6  LAST  693   24,3663    03731 1          CADR    R02BOTH
  3169   REF  162  LAST  737   24,3664   0 6006 1          TC      INTPRET
  3170                        24,3665    77624 1          CALRB
  3171   REF    1             24,3666    27566 1                  MIDTOAV2
  3172   REF  269  LAST  732   24,3667   30 155 0  SETUPTIG CAE     MPAC +1         DELTA TIME TO PREREAD (LESS THAN 100
  3173   REF   15  LAST  699   24,3670   55'672 1          TS      P40TMP               CS, WITH A TPAGREE, INT.INIT.)
  3174   REF   15  LAST  738   24,3671   0 5223 1          TC      TWIDDLE
  3175   REF    2  LAST  234   24,3672    03676 0          ADRES   TIGON
  3176   REF   63  LAST  733   24,3673   0 5402 1          TC      PHASCHNG
  3177                        24,3674    40574 0          OCT     40574           A, 4.57 = TIGON (P40TMP CS)
 31775   REF    1             01,2226                4P57SPT1 =      4.57SPOT
  3178   REF   76  LAST  733   24,3675   1 5205 1          TCF     ENDOFJOB

  3179   REF   16  LAST  740   E7,1672                     EBANK=  P40TMP
  3180                        24,3676   0 0006 1  TIGON   EXTEND
  3181   REF    1             24,3677   3 3552 0          DCA     ACADN83
  3182   REF    9  LAST  738   24,3700   53'062 0          DXCH    AVEGEXIT
  3184   REF    3  LAST  391   24,3701   0 5120 1          TC      NOVAC30         FORCE ZEROING OF N83 BEFORE SERVICER
  3185   REF   76  LAST  740   E7,1412                     EBANK=  TIG
  3186   REF    2  LAST  232   24,3702    03730 0          2CADR   P47BODY
  3186                        24,3703    50067 0
  3187   REF   26  LAST  719   24,3704   4 4767 1          CS      BIT2            4.2 = PRECHECK (-0CS), P47BODY (PRIO30)
  3188   REF    2  LAST  738   24,3705   1 2623 0          TCF     TTGPHS

  3189   REF   77  LAST  740   E7,1412                     EBANK=  TIG
  3190   REF  163  LAST  740   24,3706   0 6006 1  CALCN83  TC      INTPRET
  3191                        24,3707    77201 1          SETPD   VLOAD
  3192                        24,3710    00001 0                  0
  3193   REF    1             24,3711    03665 1                  DELVCTL
  3194                        24,3712    41455 0          VAD     PUSH
  3195   REF    6  LAST  728   24,3713    03432 1                  DELVREF
  3196   REF    3  LAST  128   24,3714    37460 1          STCALL  DV47TEMP
  3197   REF    2  LAST  738   24,3715    57032 1                  S41.1
  3198   REF    6  LAST  294   24,3716    37675 1          STCALL  DELVIMU
  3199   REF    3  LAST  541   24,3717    70537 1                  S11.1           CALC. VI, H, HDOT FOR NOUN 62
  3200                        24,3720    77776 1          EXIT
  3201   REF   64  LAST  740   24,3721   0 5402 1          TC      PHASCHNG
  3202                        24,3722    10035 0          OCT     10035
 32025   REF    9  LAST  728   01,2250                5P3SPT7  =      5.3SPOT
  3203   REF   15  LAST  703   24,3723   3 4773 0          CAF     FIVE
  3204   REF    8  LAST  630   24,3724   0 5607 0          TC      GENTRAN
  3205   REF    4  LAST  740   24,3725    01457 0          ADRES   DV47TEMP
  3206   REF    2  LAST  740   24,3726    01664 1          ADRES   DELVCTL
  3207   REF    4  LAST  737   24,3727   0 3614 1          TC      SERVXT

  3208   REF  164  LAST  740   24,3730   0 6006 1  P47BODY  TC      INTPRET
```

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3209                                  24,3731   77775 1                 VLOAD
3210  REF  22  LAST  737              24,3732   15336 0                 HI6ZEROS
3211  REF   7  LAST  740              24,3733   03675 0                 STORE   DELV1MU         CLEAR DISPLAY AND ACCUMULATOR STORAGE
3212  REF   3  LAST  740              24,3734   03665 1                 STORE   DELVCTL         UPON INITIATION OR-ENTER-RESPONSE
3213                                  24,3735   77776 1                 EXIT
3214  REF   2  LAST  168              24,3736   3 5054 0  P47BOD        CAF     PRIO15          LOWER PRIO THAN CALCN83 (20)
3215  REF  12  LAST  588              24,3737   0 5176 1                TC      PRIOCHNG          TO PREVENT INTERRUPTION OF CALCN83
3216  REF  65  LAST  740              24,3740   0 5402 1                TC      PHASCHNG
3217                                  24,3741    05024 1                OCT     05024           TYPE C GROUP 4 BELOW FOR NOUN 83
3218                                  24,3742    62777 1                OCT     62777           PRIO 15 NOVAC
3219  REF   1                         24,3743   3 3516 0  P47/DSP       CAF     V1683
3220  REF 157  LAST  740              24,3744   0 4636 0                TC      BANKCALL
3221  REF  17  LAST  667              24,3745    20743 0                CADR    GOFLASH
3222  REF  31  LAST  711              24,3746   0 4103 1                TC      GOTOPOOH
3223  REF  32  LAST  741              24,3747   0 4103 1                TC      GOTOPOOH
3224  REF   3  LAST  740              24,3750   1 3730 1                TCF     P47BODY         RECYCLE - CLEAR ACCUMULATED VELOCITY
```

L P51-P53 USER'S PAGE NO. 1 EC 53

R0001 PROGRAM NAME - PROG52 DATE - AUGUST 1,1969
R0003 MODIFICATION BY ALBERT,BARNERT,HASLAM LOG SECTION - P51-P5

R0007 FUNCTION -

R0008 ALIGNS THE IMU TO ONE OF THREE ORIENTATIONS SELECTED BY THE ASTRONAUT. THE PRESENT IMU ORIENTATION IS KNOWN
R0010 AND IS STORED IN REFSMMAT. THE THREE POSSIBLE ORIENTATIONS MAY BE_

R0011 (A) PREFERRED ORIENTATION

R0012 AN OPTIMUM ORIENTATION FOR A PREVIOUSLY CALCULATED MANUEVER. THIS ORIENTATION MUST BE CALCULATED AND
R0014 STORED BY A PREVIOUSLY SELECTED PROGRAM.

R0015 (B) NOMINAL (LOCAL VERTICAL) ORIENTATION

R0016 X = UNIT(Y X Z)
R0017 -SM -SM -SM

R0018 Y = UNIT(V X R)
R0019 -SM - -

R0020 Z = UNIT(-R)
R0021 -SM -

R0022 WHERE_
R0023 R = THE GEOCENTRIC RADIUS VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0025 -

R0026 V = THE INERTIAL VELOCITY VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0028 -

R0029 (C) REFSMMAT ORIENTATION

R00291 THIS ORIENTATION IS SELECTED AUTOMATICALLY UNLESS THE ASTRONAUT KEYS IN A DIFFERENT OPTION CODE

R0030 THIS SELECTION CORRECTS THE PRESENT IMU ORIENTATION. THE PRESENT ORIENTATION DIFFERS FROM THAT TO WHICH IT
R0032 WAS LAST ALIGNED ONLY DUE TO GYRO DRIFT(I.E. NEITHER GIMBAL LOCK NOR IMU POWER INTERRUPTION HAS OCCURED
R0034 SINCE THE LAST ALIGNMENT).

R0035 AFTER A IMU ORIENTATION HAS BEEN SELECTED ROUTINE S52.2 IS OPERATED TO COMPUTE THE GIMBAL ANGLES USING THE
R0037 NEW ORIENTATION AND THE PRESENT VEHICLE ATTITUDE. CAL52A THEN USES THESE ANGLES, STORED IN THETAD,+1,+2, TO
R0039 COARSE ALIGN THE IMU. THE STAR SELECTION ROUTINE, R56, IS THEN OPERATED. IF 2 STARS ARE NOT AVAILABLE AN ALARM
R0041 IS FLASHED TO NOTIFY THE ASTRONAUT. AT THIS POINT THE ASTRONAUT WILL MANUEVER THE VEHICLE AND SELECT 2 STARS
R0043 EITHER MANUALLY OR AUTOMATICALLY. AFTER 2 STARS HAVE BEEN SELECTED THE IMU IS FINE ALIGNED USING ROUTINE R51. IF
R0045 THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING(INDICATED BY RNDVZFLG) P20 IS DISPLAYED. OTHERWISE P00 IS
R0047 REQUESTED.

R0048 CALLING SEQUENCE-

R0049 THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

L P51-P53 USER'S PAGE NO. 2 E 53

R0050 SUBROUTINES CALLED-

R0051 1. FLAGDOWN 6. S52.2 11. GOPERF3
R0052 2. R02BOTH 7. CAL53A 12. NEWMODEX
R0053 3. GOPERF4 8. FLAGUP 13. PRIOLARM
R0054 4. MATMOVE 9. R56
R0055 5. GOFLASH 10. R51

R0057 NORMAL EXIT MODES-

R0058 EXITS TO ENDOFJOB

R0059 ALARM OR ABORT EXIT MODES-

R0060 NONE

R0061 OUTPUT-

R0062 THE FOLLOWING MAY BE FLASHED ON THE DSKY
R0063 1. IMU ORIENTATION CODE
R0064 2. ALARM CODE 215 -PREFERRED IMU ORIENTATION NOT SPECIFIED
R0065 3. TIME OF NEXT IGNITION
R0066 4. GIMBAL ANGLES
R0067 5. ALARM CODE 405 -TWO STARS NOT AVAILABLE
R0068 6. PLEASE PERFORM P00
R0069 THE MODE DISPLAY MAY BE CHANGED TO 20

R0070 ERASABLE INITIALIZATION REQUIRED-

R0071 PFRATFLG SHOULD BE SET IF A PREFERRED ORIENTATION HAS BEEN COMPUTED.IF IT HAS BEEN COMPUTED IT IS STORED IN
R0073 XSMD,YSMD,ZSMD.
R0074 RNDVZFLG INDICATES WHETHER THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING.

R0076 DEBRIS-

R0077 WORK AREA
0078 REF 3 LAST 233 14,2002 P54 = PROG52
0080 REF 1 14,2000 SETLOC P50S
0081 14,2002 BANK

0082 REF 11 LAST 733 30,2000 SBANK= LOWSUPER
0083 REF 7 LAST 451 E5,1773 EBANK= SAC
0084 REF 1 COUNT* $$/P52
0087 REF 52 LAST 737 14,2002 0 5561 0 PROG52 TC DOWNFLAG
00875 REF 12 LAST 668 14,2003 00027 1 ADRES UPDATFLG BIT 7 FLAG 1
0088 REF 53 LAST 743 14,2004 0 5561 0 TC DOWNFLAG
00885 REF 12 LAST 652 14,2005 00031 0 ADRES TRACKFLG BIT 5 FLAG 1
0089 REF 158 LAST 741 14,2006 0 4636 0 TC BANKCALL
0090 REF 7 LAST 740 14,2007 03731 1 CADR R02BOTH IMU STATUS CHECK
00902 REF 165 LAST 740 14,2010 0 6006 1 TC INTPRET

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00904                          14,2011   77414 0          BON     EXIT          MINKEY SEQUENCE?
00906  REF  16  LAST  668      14,2012   05310 0          AUTOSEQ
00908  REF   1                 14,2013   30276 1          P52AUTO       YES

00910  REF  20  LAST  555      14,2014   3 0104 1         CA      FLAGWRD8
00912  REF  10  LAST  555      14,2015   7 4760 0         MASK    UTBIT
00914                          14,2016   0 0006 1         EXTEND
00916                          14,2017   1 2025 0         BZF     +6

00920  REF   4  LAST  556      14,2020   11'351 0         CCS     OPTNTYPE
00922                          14,2021   1 2023 0         TCF     +2
00924                          14,2022   1 2025 0         TCF     +3
00926  REF  61  LAST  737      14,2023   0 5547 1         TC      UPFLAG
00930  REF  13  LAST  743      14,2024    00031 0         ADRES   TRACKFLG

00932  REF   2  LAST  700      14,2025   3 4765 1         CAF     PFRATBIT
00934  REF  19  LAST  704      14,2026   7 0076 1         MASK    FLAGWRD2      PREFERRED ORIENTATION
00936  REF 174  LAST  726      14,2027   10 000 0         CCS     A
00940  REF   1                 14,2030   0 2033 0         TC      P52A
00942  REF  27  LAST  720      14,2031   3 6214 0         CAF     THREE         ION
00944  REF   2  LAST  744      14,2032   0 2034 1         TC      P52A +1
00946  REF  42  LAST  726      14,2033   3 4770 0  P52A   CAF     BIT1          YES - SET OPTION 2 = 1
00950  REF  10  LAST  554      14,2034   54 776 0    +1   TS      OPTION2
00952  REF  43  LAST  744      14,2035   3 4770 0  P52B   CAF     BIT1
00954  REF 159  LAST  743      14,2036   0 4636 0         TC      BANKCALL      FLASH OPTION CODE AND ORIENTATION CODE
00956  REF   3  LAST  553      14,2037    21074 1         CADR    GOPERF4
00960  REF  33  LAST  741      14,2040   0 4103 1         TC      GOTOPOOH
00962                          14,2041   0 2043 1         TC      +2
00964  REF   1                 14,2042   0 2035 0         TC      P52B          NEW CODE - NEW ORIENTATION CODE INPUT
00966  REF  11  LAST  744      14,2043   4 0776 0         CS      OPTION2
00970  REF  28  LAST  744      14,2044   7 6214 1         MASK    THREE
00972                          14,2045   0 0006 1         EXTEND
00974  REF   1                 14,2046   1 2407 1         BZF     P52C          REFERENCE
00976  REF  44  LAST  744      14,2047   7 4770 1         MASK    BIT1
01000                          14,2050   0 0006 1         EXTEND
01002  REF   1                 14,2051   1 2167 1         BZF     P52J          PREFERRED
01004                          14,2052   0 0006 1         EXTEND                NOMINAL(LOCAL VERTICAL), LANDING SIGHT
01006  REF  15  LAST  703      14,2053   3 4772 1         DCA     NEG0
01010  REF  25  LAST  556      14,2054   53'251 1         DXCH    DSPTEM1
01012  REF   3  LAST  560      14,2055   3 5027 1         CAF     V06N34        PREFERRED
01014  REF  34  LAST  685      14,2056   0 5535 1         TC      VNFLASH
01016  REF  26  LAST  744      14,2057   3 1250 1         CA      DSPTEM1
01020                          14,2060   0 0006 1         EXTEND
01022                          14,2061   1 2063 1         BZF     +2
01024                          14,2062   1 2066 1         TCF     +4

01026                          14,2063   0 0006 1         EXTEND
01030  REF  29  LAST  709      14,2064   3 0025 0         DCA     TIME2
01032  REF  27  LAST  744      14,2065   53'251 1         DXCH    DSPTEM1
01034  REF  12  LAST  744      14,2066   3 0776 1         CA      OPTION2
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 0135   REF  27  LAST  740    14,2067  7 4767 1          MASK    BIT2
 0136   REF 175  LAST  744    14,2070  10 000 0          CCS     A
 0137   REF   1                14,2071  1 2145 1          TCF     S52.3          NOM - S52.3 - NOW IN-LINE
 0138   REF 166  LAST  743    14,2072  0 6006 1          TC      INTPRET        LS - P52LS - NOW IN-LINE

RC139   NAME-P52LS
RC140   FUNCTION - TO DISPLAY THE LANDING SITE LATITUDE,
RC141   LONGTITUDE AND ALTITUDE. TO ACCEPT NEW DATA VIA
RC142   THE KEYBOARD. TO COMPUTE THE LANDING SITE
RC143   ORIENTATION FOR P52 OR P54
RC144
RC145   LET:
RC146      RLS = LANDING SITE VECTOR IN REF COORDINATES
RC147      R   = CSM POSITION VECTOR IN REF COORDINATES
RC148      V   = CSM VELOCITY VECTOR IN REF COORDINATES
RC149   THEN THE LANDING SITE ORIENTATION IS:
RC150      XSMD = UNIT(RLS)
RC151      YSMD = UNIT(ZSMD*XSMD)
RC152      ZSMD = UNIT((R*V)*RLS)
RC153   INPUTS-  DSPTEM1=TIME OF ALIGNMENT
RC154            RLS=LANDING SITE VECTOR IN MOON FIXED COORINATES
RC155   OUTPUTS- XSMD,YSMD,ZSMD
RC156   SUBROUTINES- RP-TO-R ,LAT-LONG,LLASRD,LLASRDA,CSMPREC
RC157   DEBRIS- VAC, SEE SUBROUTINES
RC158
 0159                          14,2073  43014 0          SET     SET
 0160   REF  16  LAST  638    14,2074  01463 1                  LUNAFLAG
 0161   REF   8  LAST  648    14,2075  00462 1                  ERADFLAG
 0162                          14,2076  77775 1          VLOAD
 0163   REF   8  LAST  617    14,2077  02026 1                  RLS
 0164                          14,2100  14001 0          STODL   6D
 0165   REF  28  LAST  744    14,2101  01251 0                  DSPTEM1
 0166   REF   2  LAST   97    14,2102  02607 1          STORE   TSIGHT
 0167                          14,2103  34007 1          STCALL  6D
 0168   REF   4  LAST  614    14,2104  55345 0                  RP-TO-R
 0169                          14,2105  77742 0          VSR2
 0170   REF   9  LAST  634    14,2106  16152 0          STODL   ALPHAV
 0171   REF   3  LAST  745    14,2107  02607 1                  TSIGHT
 0172                          14,2110  77624 1          CALL
 0173   REF   5  LAST  617    14,2111  26453 1                  LAT-LONG
 0174                          14,2112  77624 1          CALL
 0175   REF   2  LAST  617    14,2113  62363 0                  LLASRD
 0176                          14,2114  77776 1          EXIT
 0177   REF   1                14,2115  3 5036 1  LSDISP  CAF     V06N89*
 0178   REF  35  LAST  744    14,2116  0 5535 1          TC      VNFLASH
 0179   REF 167  LAST  745    14,2117  0 6006 1          TC      INTPRET
 0180                          14,2120  77624 1          CALL
 0181   REF   2  LAST  563    14,2121  62371 0                  LLASRDA
 0182                          14,2122  45145 0          DLOAD   CALL
 0183   REF   4  LAST  745    14,2123  02607 1                  TSIGHT
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 0184   REF   6  LAST  648   14,2124   26524 0                    LALOTORV
 0185                       14,2125   53575 0          VLOAD     UNIT
 0186   REF  10  LAST  745   14,2126   02152 0                    ALPHAV
 0187   REF   4  LAST   74   14,2127   14307 0          STODL     XSMD
 0188   REF   5  LAST  745   14,2130   02607 1                    TSIGHT
 0189   REF  31  LAST  723   14,2131   34041 0          STCALL    TDEC1
 0190   REF   4  LAST  617   14,2132   27145 1                    CSMPREC
 0191                       14,2133   47375 0          VLOAD     VXV
 0192   REF  20  LAST  716   14,2134   00001 0                    RATT
 0193   REF  20  LAST  716   14,2135   00007 0                    VATT
 0194                       14,2136   53435 0          VXV       UNIT
 0195   REF   5  LAST  746   14,2137   00307 0                    XSMD
 0196   REF   3  LAST   74   14,2140   00323 0          STORE     ZSMD
 0197                       14,2141   53435 0          VXV       UNIT
 0198   REF   6  LAST  746   14,2142   00307 0                    XSMD
 0199   REF   3  LAST   74   14,2143   34315 1          STCALL    YSMD
 0200   REF   1              14,2144   30170 1                    P52D
 0201   REF   2  LAST  623      5036              V06N89*  =       V06N89
R0202   NAME - S52.3
R0203   FUNCTION - TO COMPUTE AND DISPLAY THE
R0204   GIMBAL ANGLES, ALLOW ASTRONAUT TO CHOOSE
R0205   BETWEEN FAST AND ACCURATE IMU REALIGNMENT.
R0206   NOMINAL (LOCAL VERTICAL) ORIENTATION IS:
R0207            XSMD= UNIT(YSMD X ZSMD)
R0208            YSMD= UNIT(V X R)
R0209            ZSMD= UNIT(-R)
R0210   INPUT-   TIME OF ALIGNMENT IN MPAC
R0211   OUTPUT-  X,Y,ZSMD
R0212   SUBROUTINES- CSMCONIC
 0213   REF 168  LAST  745   14,2145   0 6006 1  S52.3   TC        INTPRET
 0214                       14,2146   77745 1            DLOAD
 0215   REF  29  LAST  745   14,2147   01251 0                    DSPTEM1
 0216   REF  32  LAST  746   14,2150   34041 0          STCALL    TDEC1
 0217   REF   5  LAST  746   14,2151   27145 1                    CSMPREC
 0218                       14,2152   77201 1          SETPD     VLOAD
 0219                       14,2153   00001 0                    0
 0220   REF  21  LAST  746   14,2154   00001 0                    RATT
 0221                       14,2155   53476 1          VCOMP     UNIT
 0222   REF   4  LAST  746   14,2156   24323 0          STOVL     ZSMD
 0223   REF  21  LAST  746   14,2157   00007 0                    VATT
 0224                       14,2160   53435 0          VXV       UNIT
 0225   REF  22  LAST  746   14,2161   00001 0                    RATT
 0226   REF   4  LAST  746   14,2162   00315 0          STORE     YSMD
 0227                       14,2163   53435 0          VXV       UNIT
 0228   REF   5  LAST  746   14,2164   00323 0                    ZSMD
 0229   REF   7  LAST  746   14,2165   00307 0          STORE     XSMD
 0230                       14,2166   77776 1          EXIT
 0231   REF 169  LAST  746   14,2167   0 6006 1  P52J   TC        INTPRET
 0232                       14,2170   77624 1  P52D    CALL                  READ VEHICLE ATTITUDE AND
 0233   REF   1              14,2171   22247 0                    S52.2       COMPUTE GIMBAL ANGLES
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0234                                14,2172   77776 1           EXIT
0235  REF   2 LAST  402             14,2173  3 5025 0           CAF     V06N22
0236  REF 160 LAST  744             14,2174  0 4636 0           TC      BANKCALL        DISPLAY GIMBAL ANGLES
0237  REF  18 LAST  741             14,2175   20743 0           CADR    GOFLASH
0238  REF  34 LAST  744             14,2176  0 4103 1           TC      GOTOPOOH
0239  REF   1                       14,2177  0 2201 0           TC      COARSTYP
0240  REF   2 LAST  744             14,2200  0 2167 0           TC      P52J            RECYCLE - VEHICLE HAS BEEN MANEUVERED
02402 REF  16 LAST  702             14,2201  4 0106 1 COARSTYP  CS      FLGWRD10
02404 REF   2 LAST  206             14,2202  7 4762 1           MASK    AUTSQBIT
02406                               14,2203  0 0006 1           EXTEND
02408 REF   1                       14,2204  1 2320 0           BZF     PERF20          IF MINKEY
0241  REF   2 LAST  170             14,2205  3 4775 0           CAF     OCT13           PLEASE PERFORM NORMAL/GYRO TORQUE
0242  REF 161 LAST  747             14,2206  0 4636 0           TC      BANKCALL
0243  REF   5 LAST  698             14,2207   21067 0           CADR    GOPERF1
0244  REF  35 LAST  747             14,2210  1 4103 0           TCF     GOTOPOOH        V34
0245  REF   1                       14,2211  1 2334 0           TCF     P52K            NORMAL COARSE
0246  REF 170 LAST  746             14,2212  0 6006 1 GYCRS     TC      INTPRET
0247                                14,2213   64375 1           VLOAD   MXV
0248  REF   8 LAST  746             14,2214   00307 0                   XSMD
0249  REF  28 LAST  727             14,2215   01734 0                   REFSMMAT
0250                                14,2216   77656 1           UNIT
0251  REF   4 LAST  545             14,2217   26714 1           STOVL   XDC
0252  REF   5 LAST  746             14,2220   00315 0                   YSMD
0253                                14,2221   53521 1           MXV     UNIT
0254  REF  29 LAST  747             14,2222   01734 0                   REFSMMAT
0255  REF   4 LAST  545             14,2223   26722 1           STOVL   YDC
0256  REF   6 LAST  746             14,2224   00323 0                   ZSMD
0257                                14,2225   53521 1           MXV     UNIT
0258  REF  30 LAST  747             14,2226   01734 0                   REFSMMAT
0259  REF   4 LAST  545             14,2227   36730 0           STCALL  ZDC
0260  REF   3 LAST  545             14,2230   47240 1                   CALCGTA
0261                                14,2231   43014 0           CLEAR   CLEAR
0262  REF   1                       14,2232   01260 1                   DRIFTFLG
0263  REF   6 LAST  645             14,2233   01662 1                   REFSMFLG
0264                                14,2234   77776 1           EXIT
0265  REF   1                       14,2235  3 2275 0           CAF     V16N20
0266  REF 162 LAST  747             14,2236  0 4636 0           TC      BANKCALL
0267  REF   2 LAST  395             14,2237   20710 0           CADR    GODSPR
0268  REF   1                       14,2240  3 3002 0           CAF     R55CDR
0269  REF 163 LAST  747             14,2241  0 4636 0           TC      BANKCALL
0270  REF   5 LAST  447             14,2242   17244 0           CADR    IMUPULSE
0271  REF 164 LAST  747             14,2243  0 4636 0           TC      BANKCALL
0272  REF   8 LAST  447             14,2244   17644 1           CADR    IMUSTALL
0273  REF   1                       14,2245  0 3766 0           TC      217ALARM        BAD END
0274  REF  66 LAST  741             14,2246  0 5402 1           TC      PHASCHNG
0275                                14,2247   04024 0           OCT     04024
0276  REF 171 LAST  747             14,2250  0 6006 1           TC      INTPRET
0277                                14,2251   75160 1           AXC,1   AXC,2
0278  REF   9 LAST  747             14,2252   00306 1                   XSMD
0279  REF  31 LAST  747             14,2253   01733 1                   REFSMMAT
```

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0280                                14,2254   77624 1                CALL
0281   REF   1                     14,2255   34730 1                       MATMOVE
0282                                14,2256   43014 0                CLEAR  SET
0283   REF   2  LAST  698          14,2257   01273 0                       PFRATFLG
0284   REF   7  LAST  747          14,2260   01462 0                       REFSMFLG
0285                                14,2261   77234 1                RTB    VLOAD
0286   REF   1                     14,2262   31566 0                       SET1/PDT
0287   REF  12  LAST  685          14,2263   11762 1                       ZEROVEC
0288   REF  18  LAST  435          14,2264   01472 1                STORE  GCOMP
0289                                14,2265   43014 0                SET    BOF
02895  REF   2  LAST  747          14,2266   01060 0                       DRIFTFLG
0290   REF  17  LAST  744          14,2267   05350 1                       AUTOSEQ
02905  REF   1                     14,2270   30757 1                       R51K          CONTINUE FINE ALIGN IF NOT MINKEY
02906                               14,2271   77614 1                CLEAR
02907  REF   8  LAST  685          14,2272   05276 1                       PCFLAG
0291                                14,2273   77776 1  P50SEXIT      EXIT
02915  REF   4  LAST  712          14,2274   1 4105 0                TCF    MNKGOPOO
0292                                14,2275   04024 0  V16N20        VN     1620
0293   REF   2  LAST  166            4776             ALRM15        EQUALS OCT15
0294                                14,2276   74575 0  P52AUTO       VLOAD  VSR1          XDES = UNIT(XREF COS45 + YREF SIN45) (1)
0295   REF  32  LAST  747          14,2277   01734 0                       REFSMMAT                 -   .          (2)
0296                                14,2300   74515 0                PDVL   VSR1
0297   REF  33  LAST  748          14,2301   01742 1                       REFSMMAT +6    (1) FOR 1ST, +45-DEGREE MANEUVER
0298                                14,2302   57414 1                BON    VCOMP         (2)     2ND   -
0299   REF   9  LAST  748          14,2303   05316 0                       PCFLAG         IN EITHER CASE, COS45 = SIN45, AND
0300   REF   1                     14,2304   30305 1                       P52AUTOX             'UNIT' OBVIATES NEED FOR THEN.

0301                                14,2305   53455 0  P52AUTOX      VAD    UNIT
0302                                14,2306   77626 0                STADR
0303   REF  10  LAST  747          14,2307   53470 1                STOVL  XSMD
0304   REF  34  LAST  748          14,2310   01750 1                       REFSMMAT +12D
0305   REF   7  LAST  747          14,2311   00323 0                STORE  ZSMD          ZDES = ZREF
0306                                14,2312   53435 0                VXV    UNIT
0307   REF  11  LAST  748          14,2313   00307 0                       XSMD
0308   REF   6  LAST  747          14,2314   00315 0                STORE  YSMD          YDES = UNIT(ZDES * XDES)
0309                                14,2315   52014 0                SET    GOTO
0310   REF   3  LAST  748          14,2316   01073 1                       PFRATFLG
0311   REF   2  LAST  746          14,2317   30170 1                       P52D

0312   REF  24  LAST  564          14,2320   3 4764 0  PERF20        CAF    BIT5          =OCT 20, PLEASE PERF MINKEY PC TORQUE
0312   REF 165  LAST  747          14,2321   0 4636 0                TC     BANKCALL
0313   REF   6  LAST  747          14,2322    21067 0                CADR   GOPERF1
0313   REF  36  LAST  747          14,2323   0 4103 1                TC     GOTOPOOH      V 34
0314   REF   1                     14,2324   0 2212 1                TC     GYCRS         PRO - DO IT
0314   REF 172  LAST  747          14,2325   0 6006 1                TC     INTPRET       ENTR
0315                                14,2326   77414 0                BON    EXIT
0315   REF  10  LAST  748          14,2327   05316 0                       PCFLAG
0316   REF   1                     14,2330   30273 1                       P50SEXIT      OK TO FLUSH IT 1ST TIME ONLY
0316   REF  25  LAST  706          14,2331   0 5671 1                TC     ALARM         BUT MAKE HIM DO 2ND
0317                                14,2332   00402 1                OCT    00402
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L P51-P53 USER'S PAGE NO. 8 E5 S3

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 0318   REF   2 LAST  747   14,2333  0 2320 1           TC      PERF20
RC319   NAME - CAL53A
RC320   FUNCTION - COARSE ALIGN THE IMU, IF NECESSARY.
RC321   INPUT -  PRESENT GIMBAL ANGLES - CDUX,CDUY,CDUZ
RC322          DESIRED GIMBAL ANGLES - THETAD,+1,+2
RC323   OUTPUT - THE IMU COORDINATES ARE STORED IN REFSMMAT
RC324   SUBROUTINES USED - 1.IMUCOARS 2.IMUSTALL 3.CURTAINS
 0325   REF   1                                        COUNT* $$/R53
 3255   REF 173 LAST  748   14,2334  0 6006 1 P52K     TC      INTPRET
 0326                       14,2335  77624 1  CAL53A   CALL
 0327   REF   2 LAST  746   14,2336  22247 0           S52.2          MAKE FINAL COMP OF GIMBAL ANGLES
 0328                       14,2337  66234 1           RTB     SSP
 0329   REF   1             14,2340  34744 1                   RDCDUS         READ CDUS
 0330   REF  24 LAST  649   14,2341  00051 0                   S1
 0331                       14,2342  00001 0                   1
 0332                       14,2343  40370 1           AXT,1   SETPD
 0333                       14,2344  00003 1                   3
 0334                       14,2345  00005 1                   4
 0335                       14,2346  70543 1  CALOOP    DLOAD*  SR1
 0336   REF  19 LAST  607   14,2347  01313 1                   THETAD +3D,1
 0337                       14,2350  70523 1           PDDL*   SR1
 0338                       14,2351  00005 1                   4,1
 0339                       14,2352  51425 0           DSU     ABS
 0340                       14,2353  45206 1           PUSH    DSU
 0341   REF   1             14,2354  34743 0                   DEGREE1
 0342                       14,2355  71240 1           BMN     DLOAD
 0343   REF   1             14,2356  30376 0                   CALOOP1
 0344                       14,2357  51025 1           DSU     BPL
 0345   REF   1             14,2360  34744 1                   DEG359
 0346   REF   2 LAST  749   14,2361  30376 0                   CALOOP1
 0347                       14,2362  77776 1  COARFINE EXIT
 0348   REF  67 LAST  747   14,2363  0 5402 1          TC      PHASCHNG
 0349                       14,2364  04024 0           OCT     04024
 0350   REF   1             14,2365  0 3742 0          TC      COARSUB        PERFORM ALIGNMENT
 0351   REF 174 LAST  749   14,2366  0 6006 1          TC      INTPRET
 0352                       14,2367  77234 1           RTB     VLOAD
 0353   REF   2 LAST  748   14,2370  31566 0                   SET1/PDT
 0354   REF  13 LAST  748   14,2371  11762 1                   ZEROVEC
 0355   REF  19 LAST  748   14,2372  01472 1           STORE   GCOMP
 0356                       14,2373  52014 0           SET     GOTO
 0357   REF   3 LAST  748   14,2374  01060 0                   DRIFTFLG
 0358   REF   1             14,2375  30400 0                   FINEONLY
 0359                       14,2376  77700 0  CALOOP1   TIX,1
 0360   REF   1             14,2377  30346 0                   CALOOP
 0361                       14,2400  75160 1  FINEONLY AXC,1   AXC,2
 0362   REF  28 LAST  629   14,2401  02671 0                   XSM
 0363   REF  35 LAST  748   14,2402  01733 1                   REFSMMAT
 0364                       14,2403  77624 1           CALL
 0365   REF   2 LAST  748   14,2404  34730 1                   MATMOVE
 0366                       14,2405  77414 0  CAL53RET SET     EXIT
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 0367   REF   8  LAST  748    14,2406   01462 0                  REFSMFLG
 03675  REF   2 LAST  743 TO  749:   218   218*          COUNT*  $$/P52
 0368   REF  68  LAST  749    14,2407   0 5402 1  P52C   TC      PHASCHNG
 0369                         14,2410   04024 0          OCT     04024
 0370   REF   2  LAST  567    14,2411   3 4776 0          CAF     ALRM15
 0371   REF 166  LAST  748    14,2412   0 4636 0          TC      BANKCALL
 0372   REF   7  LAST  748    14,2413   21067 0           CADR    GOPERF1
 0373   REF  37  LAST  748    14,2414   0 4103 1          TC      GOTOPOOH
 0374                         14,2415   0 2417 1          TC      +2              V33
 0375   REF   2  LAST  233    14,2416   0 2622 0          TC      R51             FINE ALIGN
 0376   REF 175  LAST  749    14,2417   0 6006 1          TC      INTPRET
 0377                         14,2420   43234 0           RTB     CAD
 0378   REF  21  LAST  629    14,2421   51751 0                   LOADTIME
 0379   REF   1               14,2422   34652 1                   TSIGHT1
 0380                         14,2423   77624 1           CALL
 0381   REF   1               14,2424   26345 1                   LOCSAM
 0815   REF   1                                         COUNT*  $$/PICAP
R0382   NAME - PICAPAR        NOW IN-LINE

R0383   FUNCTION -
R0384     THIS PROGRAM READ THE IMU-CDUS AND COMPUTES THE VEHICLE ORIENTATION
R0385   WITH RESPECT TO INERTIAL SPACE. IT THEN COMPUTES THE SHAFT AXIS (SAX)
R0386   WITH RESPECT TO REFERENCE INERTIAL. EACH STAR IN THE CATALOG IS TESTED
R0387   TO DETERMINE IF IT IS OCCULTED BY EITHER THE EARTH,SUN OR MOON. IF A
R0388   STAR IS NOT OCCULTED  THEN IT IS PAIRED WITH ALL STAR OF LOWER INDEX.
R0389   THE PAIRED STAR  IS TESTED FOR OCCULTATION. PAIRS OF STARS THAT PASS
R0390   THE OCCULTATION TESTS ARE TESTED FOR GOOD SEPARATION.A PAIR OF STARS
R0391   HAVE GOOD SEPARATION IF THE ANGLE BETWEEN THEM IS LESS THAN 76 DEGREES
R0392   AND MORE THAN 30 DEGREES. THOSE PAIRS OF STARS WITH GOOD SEPARATION
R0393   ARE THEN TESTED TO SEE IF THEY LIE IN CURRENT FIELD OF VIEW.(WITHIN
R0394   38 DEGREES OF SAX). THE PAIR WITH MAXIMUM SEPARATION IS CHOSEN FROM
R0395   THOSE WITH GOOD SEPARATION,AND IN FIELD OF VIEW.
R0396
R0397   OUTPUT
R0398   BESTI,BESTJ -SINGLE PREC,INTEGERS,STAR NUMBERS TIMES 6
R0399   VFLAG - FLAG BIT  SET IMPLIES NO STARS IN FIELD OF VIEW
R0400
R0401   INITIALIZATION
R0402   1)A CALL TO LOCSAM MUST BE MADE
R0403   2)VEARTH = -UNIT(R)  WHERE R HAS BEEN UPDATED TOO APPROXIMATE TIME OF
R0404        SIGHTINGS.
R0405
R0406   DEBRIS
R0407   WORK AREA
R0408   X,Y,ZNB
R0409   SINCDU,COSCDU
R0410   STARAD - STAR +5
 0411                         14,2425   77624 1           CALL
 0412   REF   6  LAST  720    14,2426   47530 1                   CDUTRIG
 0413                         14,2427   45001 1           SETPD   CALL
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0414                                14,2430  00001 0                    C
0415  REF   1                      14,2431  34756 1                    CALCSMSC
0416                                14,2432  71214 0          SET       DLOAD          VFLAG = 1
0417  REF   1                      14,2433  01465 1                    VFLAG
0418  REF   1                      14,2434  11762 1                    DPZERO
0419  REF   6  LAST  639           14,2435  24303 1          STOVL     BESTI
0420  REF   5  LAST  629           14,2436  02714 1                    XNB
0421                                14,2437  63361 0          VXSC      PDVL
0422  REF   1                      14,2440  30575 0                    SIN33
0423  REF   4  LAST  427           14,2441  02730 1                    ZNB
0424                                14,2442  74370 0          AXT,1     VXSC
0425                                14,2443  00344 1                    228D           X1 = 37 X 6 +6
0426  REF   1                      14,2444  30577 1                    COS33
0427                                14,2445  77655 1          VAD
0428                                14,2446  53505 1          VXM       UNIT
0429  REF  36  LAST  749           14,2447  01734 0                    REFSMMAT
0430  REF   1                      14,2450  02760 1          STORE     SAX            SAX = SHAFT AXIS
0431                                14,2451  66331 0          SSP       SSP            S1=S2=6
0432  REF  25  LAST  749           14,2452  00051 0                    S1
0433                                14,2453  00006 1                    6
0434  REF  10  LAST  642           14,2454  00052 0                    S2
0435                                14,2455  00006 1                    6
0436                                14,2456  52100 1  PIC1    TIX,1     GOTO           MAJOR STAR
0437  REF   1                      14,2457  30461 1                    PIC2
0438  REF   1                      14,2460  30606 1                    PICEND
0439                                14,2461  45173 0  PIC2    VLOAD*    CALL
0440  REF   3  LAST  640           14,2462  33776 1                    CATLOG,1
0441  REF   1                      14,2463  30552 0                    OCCULT
0442                                14,2464  73014 0          BON       LXA,2
0443  REF   4  LAST  300           14,2465  01710 0                    CULTFLAG
0444  REF   1                      14,2466  30456 0                    PIC1
0445  REF  28  LAST  726           14,2467  00046 0                    X1
0446                                14,2470  52104 0  PIC3    TIX,2     GOTO
0447  REF   1                      14,2471  30473 1                    PIC4
0448  REF   2  LAST  751           14,2472  30456 0                    PIC1
0449                                14,2473  45173 0  PIC4    VLOAD*    CALL
0450  REF   4  LAST  751           14,2474  44001 0                    CATLOG,2
0451  REF   2  LAST  751           14,2475  30552 0                    OCCULT
0452                                14,2476  76614 0          BON       VLOAD*
0453  REF   5  LAST  751           14,2477  01710 0                    CULTFLAG
0454  REF   1                      14,2500  30470 1                    PIC3
0455  REF   5  LAST  751           14,2501  33776 1                    CATLOG,1
0456                                14,2502  45237 0          DOT*      DSU
0457  REF   6  LAST  751           14,2503  44001 0                    CATLOG,2
0458  REF   1                      14,2504  30601 0                    CSS66          SEPARATION LESS THAN 76 DEG.
0459                                14,2505  43240 0          BMN       DAD
0460  REF   2  LAST  751           14,2506  30470 1                    PIC3
0461  REF   1                      14,2507  30603 1                    CSS6640        SEPARATION MORE THAN 30 DEG.
0462                                14,2510  77644 1          BPL
0463  REF   3  LAST  751           14,2511  30470 1                    PIC3
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0464                          14,2512  50373 0          VLOAD*  DOT
0465  REF   7  LAST  751      14,2513  33776 1                  CATLOG,1
0466  REF   2  LAST  751      14,2514  02760 1                  SAX
0467                          14,2515  50025 0          DSU     BMN          MAJOR STAR IN CONE
0468  REF   1                 14,2516  30605 1                  CSS33
0469  REF   3  LAST  751      14,2517  30456 0                  PIC1
0470                          14,2520  50373 0          VLOAD*  DOT
0471  REF   8  LAST  752      14,2521  44001 0                  CATLOG,2
0472  REF   3  LAST  752      14,2522  02760 1                  SAX
0473                          14,2523  50025 0          DSU     BMN
0474  REF   2  LAST  752      14,2524  30605 1                  CSS33
0475  REF   4  LAST  751      14,2525  30470 1                  PIC3
0476                          14,2526  77614 1  STRATGY BONCLR
0477  REF   2  LAST  751      14,2527  01605 0                  VFLAG
0478  REF   1                 14,2530  30545 0                  NEWPAR
0479                          14,2531  65120 1    -3    XCHX,1  XCHX,2
0480  REF   7  LAST  751      14,2532  00302 0                  BESTI
0481  REF   3  LAST  184      14,2533  00303 1                  BESTJ
0482                          14,2534  47773 1  STRAT   VLOAD*  DOT*
0483  REF   9  LAST  752      14,2535  33776 1                  CATLOG,1
0484  REF  10  LAST  752      14,2536  44001 0                  CATLOG,2
0485                          14,2537  43006 0          PUSH    BOFINV
0486  REF   3  LAST  752      14,2540  01545 1                  VFLAG
0487  REF   1                 14,2541  30531 0                  STRAT -3
0488                          14,2542  45345 1          DLOAD   DSU
0489                          14,2543  77644 1          BPL
0490  REF   5  LAST  752      14,2544  30470 1                  PIC3
0491                          14,2545  67130 1  NEWPAR  SXA,1   SXA,2
0492  REF   8  LAST  752      14,2546  00302 0                  BESTI
0493  REF   4  LAST  752      14,2547  00303 1                  BESTJ
0494                          14,2550  77650 1          GOTO
0495  REF   6  LAST  752      14,2551  30470 1                  PIC3
0496                          14,2552  51321 0  OCCULT  MXV     BVSU
0497  REF   1                 14,2553  02736 1                  CULTRIX
0498  REF   1                 14,2554  00017 1                  CSS
0499                          14,2555  77654 0          BZE
0500  REF   1                 14,2556  30571 1                  CULTED
0501                          14,2557  75240 0          BMN     SIGN
0502  REF   2  LAST  752      14,2560  30571 1                  CULTED
0503  REF 270  LAST  740      14,2561  00160 0                  MPAC +3
0504                          14,2562  75240 0          BMN     SIGN
0505  REF   3  LAST  752      14,2563  30571 1                  CULTED
0506  REF 271  LAST  752      14,2564  00162 1                  MPAC +5
0507                          14,2565  43040 1          BMN     CLRGO
0508  REF   4  LAST  752      14,2566  30571 1                  CULTED
0509  REF   6  LAST  751      14,2567  01630 0                  CULTFLAG
0510  REF   2  LAST  642      14,2570  00052 0                  QPRET
0511                          14,2571  77614 1  CULTED  SETGO
0512  REF   7  LAST  752      14,2572  01430 1                  CULTFLAG
0513  REF   3  LAST  752      14,2573  00052 0                  QPRET
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0514   REF   1                    0016                CSS      =       CEARTH
0515                              14,2574   21150 0   SIN33    2DEC    .5376381241
0515                              14,2575   25157 0
0516                              14,2576   32766 1   COS33    2DEC    .8431756920
0516                              14,2577   22713 1
0517                              14,2600   01736 1   CSS66    2DEC    .06048472       (COS76)/4
0517                              14,2601   35137 1
0518                              14,2602   73003 0   CSS6640  2DEC    -.15602587      (COS76 - COS30)/4
0518                              14,2603   65403 0
0519                              14,2604   06233 0   CSS33    2DEC    .197002688      COS(1/2(76))/4
0519                              14,2605   26112 1
A0520                                                 VI       =       12D
0521                              14,2606   77414 0   PICEND   BOF     EXIT
0522   REF   4   LAST  752       14,2607   01745 0                     VFLAG
0523   REF   1                    14,2610   30621 1                     P52F
0524   REF  26   LAST  748       14,2611   0 5671 1  P52I     TC      ALARM
0525                              14,2612   00405 0             OCT     405
0526   REF   4   LAST  667       14,2613   3 5023 0            CAF     V05N09
0527   REF 167   LAST  750       14,2614   0 4636 0            TC      BANKCALL
0528   REF  19   LAST  747       14,2615   20743 0             CADR    GOFLASH
0529   REF  38   LAST  750       14,2616   0 4103 1            TC      GOTOPOOH
0530   REF   3   LAST  750       14,2617   0 2622 0            TC      R51             PROCEED - DO R51 FINE ALIGN
0531   REF   2   LAST  744       14,2620   0 2407 0            TC      P52C            RECYCLE- VEHICLE HAS BEEN MANUEVERED
0532                              14,2621   77776 1   P52F     EXIT
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PC533   NAME-R51  FINE ALIGN
RC534   FUNCTION-TO ALIGN THE STABLE MEMBER TO REFSMMAT
RC535   INPUT- BESTI,BESTJ(PAIR OF STAR NO )
RC536   OUTPUT- GYRO TORQUE PULSES
RC537   SUBROUTINES- R52,R54,R55(SXTNB,NBSM,AXISGEN
 C538   REF   1                                        COUNT*  $$/R51
 C539   REF  45  LAST  744  14,2622  3 4770 0  R51     CAF     BIT1
 C540   REF   2  LAST  211  14,2623  54 304 1  R51.3   TS      STARIND
 C541   REF  54  LAST  743  14,2624  0 5561 0          TC      DOWNFLAG
 C542   REF   4  LAST  630  14,2625   00025 0          ADRES   TARG2FLG

 C548   REF  69  LAST  750  14,2626  0 5402 1          TC      PHASCHNG
 C549                       14,2627   05024 1          OCT     05024          RESTART  GR 4  FOR R52 - R53
 C550                       14,2630   13000 0          OCT     13000
 C551   REF   3  LAST  754  14,2631  50 304 0          INDEX   STARIND
 C552   REF   9  LAST  752  14,2632  3 0302 0          CA      BESTI
 C553                       14,2633  0 0006 1          EXTEND
 C554   REF   1              14,2634  7 3004 1          MP      1/6TH
 C555   REF   9  LAST  638  14,2635  55'140 1          TS      STARCODE
 C556   REF 176  LAST  750  14,2636  0 6006 1          TC      INTPRET
 C557                       14,2637   77624 1          CALL
 C558   REF   2  LAST  567  14,2640   30761 1                  R51DSPA
 C559                       14,2641   72131 1          SSP     LXA,1
 C560   REF  26  LAST  751  14,2642   00051 0                  S1
 C561                       14,2643   00000 1                  0
 C562   REF   4  LAST  754  14,2644   00304 0                  STARIND
 C563                       14,2645   77700 0          TIX,1
 C564   REF   1              14,2646   30651 0                  R51ST
 C565   REF   3  LAST  639  14,2647   36617 1          STCALL  STARSAV2       2ND STAR
 C566   REF   2  LAST  754  14,2650   30652 0                  R51ST +1
 C567   REF   2  LAST   98  14,2651   02611 0  R51ST   STORE   STARSAV1       1ST STAR
 C568                       14,2652   54335 0    +1    SLOAD   SL             IS THIS P54
 C569   REF  14  LAST  700  14,2653   01215 0                  MODREG
 C570                       14,2654   20215 0                  120
 C571                       14,2655   45030 0          BHIZ    CALL
 C572   REF   1              14,2656   30753 0                  R51A           NO
 C573   REF   1              14,2657   36105 0                  R56
 C574                       14,2660   77624 1  R51B    CALL
 C575   REF   1              14,2661   36052 0                  SXTSM
 C576   REF   4  LAST  754  14,2662   02617 0          STORE   STARSAV2
 C577                       14,2663   45145 0          DLOAD   CALL
 C578   REF   6  LAST  746  14,2664   02607 1                  TSIGHT
 C579   REF   1              14,2665   31651 1                  PLANET
 C580                       14,2666   53521 1          MXV     UNIT
 C581   REF  37  LAST  751  14,2667   01734 0                  REFSMMAT
 C582                       14,2670   77776 1          EXIT
 C583   REF   5  LAST  754  14,2671  10 304 1          CCS     STARIND
 C584   REF   1              14,2672  0 2744 1          TC      R51.4
 C585   REF 177  LAST  754  14,2673  0 6006 1          TC      INTPRET
 C586   REF   5  LAST  450  14,2674   26736 1          STOVL   STARAD
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 0587   REF   5  LAST  754   14,2675   02617 0                    STARSAV2
 0588                       14,2676   24007 0          STOVL     6D
 0589   REF   3  LAST  754   14,2677   02611 0                    STARSAV1
 0590                       14,2700   24015 0          STOVL     12D
 0591   REF   3  LAST   97   14,2701   02601 1                    PLANVEC
 0592   REF   6  LAST  754   14,2702   36744 0          STCALL    STARAD +6
 0593   REF   1              14,2703   34657 1                    R54          STAR DATA TEST
 0594                       14,2704   45014 0          BOFF      CALL
 0595   REF   1              14,2705   00354 0                    FREEFLAG
 0596   REF   2  LAST  748   14,2706   30757 1                    R51R
 0597   REF   2  LAST  451   14,2707   47432 1                    AXISGEN

R0598   NAME - R55 - GYRO TORQUE
R0599   FUNCTION-COMPUTE AND SEND GYRO PULSES
R0600   INPUT- X,Y,ZDC- REFSMMAT WRT PRESENT STABLE MEMBER
R0601   OUTPUT- GYRO PULSES
R0602   SUBROUTINES- CALCGTA,GOFLASH,GODSPR,IMUFINE,IMUPULSE,GOPERF1
 06025  REF   1                                          COUNT* $$/R55
 0603                       14,2710   77624 1  R55      CALL         COMPUTE AND SEND GYRO PULSES
 0604   REF   4  LAST  747   14,2711   47240 1                    CALCGTA
 0605                       14,2712   77776 1  PULSEM   EXIT
 0606   REF   2  LAST  451   14,2713  3 5040 0  R55.1    CAF       V06N93
 0607   REF 168  LAST  753   14,2714   0 4636 0          TC        BANKCALL
 0608   REF  20  LAST  753   14,2715   20743 0           CADR      GOFLASH
 0609   REF  39  LAST  753   14,2716   0 4103 1          TC        GOTOPOOH
 0610   REF   1              14,2717   0 2721 1          TC        R55.2
 0611   REF   1              14,2720   0 2734 0          TC        R55RET
 0612   REF  70  LAST  754   14,2721   0 5402 1  R55.2    TC        PHASCHNG
 0613                       14,2722    00314 1          OCT       00314
 06135  REF   1              01,2165              4P31SPT1 =        4.31SPOT
 0614   REF   2  LAST  747   14,2723  3 3002 0          CA        R55CDR
 0615   REF 169  LAST  755   14,2724   0 4636 0          TC        BANKCALL
 0616   REF   6  LAST  747   14,2725    17244 0          CADR      IMUPULSE
 0617   REF 170  LAST  755   14,2726   0 4636 0          TC        BANKCALL
 0618   REF   9  LAST  747   14,2727    17644 1          CADR      IMUSTALL
 0619   REF   2  LAST  747   14,2730   0 3766 0          TC        217ALARM     BAD END
 0620   REF  71  LAST  755   14,2731   0 5402 1          TC        PHASCHNG
 0621                       14,2732    05024 1          OCT       05024
 0622                       14,2733    13000 0          OCT       13000
 0623   REF  55  LAST  754   14,2734   0 5561 0  R55RET   TC        DOWNFLAG
 0624   REF   4  LAST  748   14,2735    00051 0          ADRES     PFRATFLG
 06245  REF   2 LAST  754 TO  755:     54     54*         COUNT* $$/R51
 0625   REF   2  LAST  168   14,2736  3 5775 1  R51KA    CAF       OCT14
 0626   REF 171  LAST  755   14,2737   0 4636 0          TC        BANKCALL
 0627   REF   8  LAST  750   14,2740    21067 0          CADR      GOPERF1
 0628   REF  40  LAST  755   14,2741   0 4103 1          TC        GOTOPOOH
 0629   REF   3  LAST  753   14,2742   0 2407 0          TC        P52C         V33
 0630   REF  41  LAST  755   14,2743   0 4103 1          TC        GOTOPOOH
 0631   REF 178  LAST  754   14,2744   0 6006 1  R51.4    TC        INTPRET
 0632   REF   4  LAST  755   14,2745    26601 1          STOVL     PLANVEC
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0633   REF   6  LAST  755   14,2746   02617 0                STARSAV2
0634   REF   4  LAST  755   14,2747   02611 0          STORE STARSAV1
0635                        14,2750   77776 1          EXIT
0636   REF 137  LAST  722   14,2751   3 4772 1         CAF   ZERO
0637   REF   1              14,2752   1 2623 0         TCF   R51.3        CLEAR STARIND
0638                        14,2753   77624 1  R51A    CALL
0639   REF   5  LAST  630   14,2754   31005 0                R52
0640                        14,2755   77650 1          GOTO
0641   REF   1              14,2756   30660 1                R51B
0642                        14,2757   77776 1  R51K    EXIT
0643   REF   1              14,2760   0 2736 1         TC    R51KA
0644                        14,2761   77420 1  R51DSPA STQ   EXIT
0645   REF   3  LAST  632   14,2762   02657 1                SRTEMP
0646   REF   1              14,2763   3 3003 1  R51DSP CAF   V01N70
0647   REF   5  LAST  563   14,2764   0 5540 0         TC    VNFLASHR
0648                        14,2765   0 2771 1         TC    +4
0649   REF  20  LAST  700   14,2766   3 6211 0         CAF   SIX
0650   REF  10  LAST  632   14,2767   0 5516 0         TC    BLANKET
0651   REF  77  LAST  740   14,2770   1 5205 1         TCF   ENDOFJOB
0652   REF   1              14,2771   0 3636 1         TC    CHKSCODE
0653   REF  12  LAST  638   14,2772   0 4362 1         TC    FALTON
0654   REF   1              14,2773   0 2763 1         TC    R51DSP
0655   REF 179  LAST  755   14,2774   0 6006 1         TC    INTPRET
0656                        14,2775   45034 1          RTB   CALL
0657   REF  22  LAST  750   14,2776   51751 0                LOADTIME
0658   REF   2  LAST  754   14,2777   31651 1                PLANET
0659                        14,3000   77650 1          GOTO
0660   REF   4  LAST  756   14,3001   02657 1                SRTEMP
0661   REF  18  LAST  545   14,3002   02757 0  R55CDR  ECADR OGC
0662                        14,3003   00306 1  V01N70  VN    0170
0663                        14,3004   05253 0  1/6TH   DEC   .1666667
R0664  NAME - R52 - AUTOMATIC OPTICS POSITIONING ROUTINE

R0665  FUNCTION- (1) TO POINT THE STAR LOS OF THE OPTICS AT A STAR OR LANDMARK DEFINED BY THE PROGRAM OR BY DSKY INPUT.
R0667            (2) TO POINT THE STAR LOS OF THE OPTICS AT THE LEM DURING RENDEZVOUS TRACKING OPERATIONS.

R0669  CALLING SEQUENCE- CALL R52

R0670  INPUT- 1. TARG1FLG AND TARG2FLG- PRESET BY CALLER
R0671         2. RNDVZFLG AND TRACKFLG- PRESET BY CALLER
R0672         3. STAR CODE- PRESET BY CALLER. ALSO INPUT THROUGH DSKY
R0673         4. LAT, LONG AND ALT OF LANDMARK- INPUT THROUGH DSKY
R0674         5. NO. OF MARKS(MARKINDX)- PRESET BY CALLER

R0675  OUTPUT-  DRIVE SHAFT AND TRUNNION CDUS

R0676  SUBROUTINES- 1. FIXDELAY      7. CLEANDSP
R0677               2. GOPERF1       8. GODSPR
R0678               3. GOFLASH       9. REFLASHR
R0679               4. R53          10. R52.2
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R0680                5. ALARM          11. R52.3
R0681                6. SR52.1

 0682   REF   1                                          COUNT* $$/R52
 0683                              14,3005  77614 1 R52  CLEAR
 0684   REF   2  LAST  564        14,3006  04265 1      ADVTRK
 0685                              14,3007  77420 1 R52VRB STQ   EXIT
 0686   REF   3  LAST   97        14,3010  02576 1      SAVQR52
 0687   REF   3  LAST  538        14,3011  3 5043 0     CAF   EBANK5      CALLER NOT ALWAYS IN E5.
 0688   REF  21  LAST  713        14,3012  56 003 1     XCH   EBANK
 0689   REF   1                   14,3013  55'577 1     TS    R52BNKSV
 0690                              14,3014  0 0006 1     EXTEND
 0691   REF   8  LAST  512        14,3015  3 0036 1     DCA   CDUT
 0692   REF   5  LAST  451        14,3016  53'313 0     DXCH  DESOPTT
 0693                              14,3017  0 0006 1     EXTEND
 0694   REF  30  LAST  744        14,3020  3 0025 0     DCA   TIME2
 0695   REF   1                   14,3021  52 364 1     DXCH  AOPOLD
 0696   REF 180  LAST  756        14,3022  0 6006 1     TC    INTPRET
 0697                              14,3023   43131 0     SSP   CLEAR
 0698   REF  23  LAST  718        14,3024   01324 0           OPTIND
 0699                              14,3025   00000 1           0
 0700   REF   1                   14,3026   00271 0           R53FLAG
 0701                              14,3027   43014 0     BON   CLEAR
 0702   REF   3  LAST  555        14,3030   00705 0           TARG1FLG
 0703   REF   1                   14,3031   31222 1           R52H
 0704   REF   1                   14,3032   03660 1           TERMIFLG
 0705                              14,3033   77776 1     EXIT
 0706   REF  10  LAST  255        14,3034  3 1354 1 R52C CA    SWSAMPLE    IS OPTICS MODE IN AGC
 0707                              14,3035  0 0006 1     EXTEND
 0708   REF   1                   14,3036  6 3245 1     BZMF  R52M        MANUAL
 0709   REF 181  LAST  757        14,3037  0 6006 1 R52D TC    INTPRET     THIS IS SR52.1 - NOW IN-LINE

R0710   NAME - SR52.1
R0711
R0712   FUNCTION
R0713    TARG1 AND TARG2 FLAGS ARE LOOKED AT TO DETERMINE IF THE TARGET IS THE
R0714    LEM, STAR OR LANDMARK. IN CASE OF LEM OR LMK,THE PRESENT TIME PLUS
R0715    2 SECONDS IS SAVED IN AOPTIME (ALIAS STARAD ,+1 ). IF THE LEM  IS
R0716    THE TARGET  THEN CONIC UPDATES     OF THE CSM AND LEM ARE MADE TO
R0717    THE TIME IN AOPTIME. THE UNIT OF THE DIFFERENCE OF LEM AND CSM
R0718    POSITION VECTORS BECOMES THE REFERENCE SIGHTING VECTOR  USED IN THE
R0719    COMMON PART OF THIS PROGRAM.
R0720    IN THE CASE OF LANDMARK, THE CSM IS UPDATED CONICALLY. THE RADIUS
R0721    VECTOR FOR THE LANDMARK IS OBTAINED FROM LALOTORV. BOTH OF THESE ARE
R0722    FOUND FOR THE TIME IN AOPTIME. THE UNIT OF THE DIFFERENCE BETWEEN
R0723    THE LANDMARK AND CSM RADIUS VECTORS BECOMES THE REFERENCE SIGHTING
R0724    VECTOR FOR THE COMMON PART OF THIS ROUTINE.
R0725    IF A STAR IS THE TARGET, THE PROPER STAR IS OBTAINED FROM THE CATALOG
R0726    AND THIS VECTOR BECOMES THE REFERENCE SIGHTING VECTOR.
R0727    THE COMMON PART OF THIS PROGRAM  TRANSFORMS THE REFERENCE SIGHTING
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RC728    VECTOR INTO STABLE MEMBER COORDINATES. IT READS THE IMU-CDUS AND USES
RC729    THIS DATA IN A CALL TO CALCSXA. ON RETURN FROM CALCSXA A TEST IS
RC730    MADE TO SEE IF THE TRUNNION ANGLE IS GREATER THAN 90DEG. OR 50DEG.

RC731
RC732    OUTPUT
RC733    SAC -SINGLE PREC,2S COMP,SCALED AT HALF REVS- SHAFT ANGLE DESIRED
RC734    PAC -SINGLE PREC,2S COMP SCALED AT EIGTH REVS - TRUNNION ANGLE DESIRED
RC735
RC736    INITIALIZATION
RC737    IF TARG1FLG =1 THEN TARGET IS LEM -NO OTHER INPUT REQUIRED
RC738    IF TARG1FLG =0 AND TARG2FLG =0 THE TARGET IS STAR, STARIND SHOULD
RC739    0 OR 1 DENOTING BESTI OR BESTJ RESPECTIVELY AS STAR CODE. STAR CODES
RC740    ARE 6 TIMES STAR NUMBER.
RC741    IF TARG1FLG=0 AND TARG2FLG=1 THEN TARGET IS LANDMARK. SEE ROUTINE
RC742    LALOTORV FOR INPUT REQUIREMENTS. HERE FIXERAD=1 FOR CONSTANT EARTH
RC743    RADIUS
RC744
RC745    DEBRIS
RC746     WORK AREA
RC747     STARAD - STAR+5 (STAR IS DESIRED LOS IN STABLE MEMBER COORDINATES)
 C748                          14,3040   43234 0      +1      RTB     LAD
 C749    REF  23  LAST  756    14,3041   51751 0                      LOADTIME
 C750    REF   1               14,3042   31271 1                      2.4SECDP
 C751                          14,3043   45214 1              BOFF    DSU
 C752    REF   3  LAST  565    14,3044   04741 1                      P24FLAG
 C753                          14,3045   31047 0                      +2
 C754    REF   1               14,3046   31273 0                      .5SECDP
 C755    REF   3  LAST   95    14,3047   02347 0              STORE   AOPTIME
 C756                          14,3050   43014 0              BON     BON
 C757    REF   4  LAST  757    14,3051   00705 0                      TARG1FLG
 C758    REF   1               14,3052   31066 0                      LEM52
 C759    REF   5  LAST  754    14,3053   00706 0                      TARG2FLG
 C760    REF   1               14,3054   31075 1                      LMK52
 C761                          14,3055   72131 1              SSP     LXA,1
 C762    REF  27  LAST  754    14,3056   00051 0                      S1
 C763                          14,3057   00000 1                      0
 C764    REF   6  LAST  754    14,3060   00304 0                      STARIND
 C765                          14,3061   77700 0              TIX,1
 C766    REF   1               14,3062   31116 0                      ST52ST
 C767                          14,3063   52175 0              VLOAD   GOTO
 C768    REF   7  LAST  756    14,3064   02617 0                      STARSAV2
 C769    REF   1               14,3065   31120 0                      CDM52
 C770                          14,3066   77745 1  LEM52       DLOAD
 C771    REF   4  LAST  758    14,3067   02347 0                      AOPTIME
 C772    REF  33  LAST  746    14,3070   34041 0              STCALL  TDEC1
 C773    REF   4  LAST  601    14,3071   27202 1                      LEMCONIC
 C774                          14,3072   52175 0              VLOAD   GOTO
 C775    REF  23  LAST  746    14,3073   00001 0                      RATT
 C776    REF   1               14,3074   31105 1                      LMKLMCDM
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0777                                14,3075   71214 0  LMK52    BON     DLOAD
0778  REF   3  LAST  757            14,3076   04305 0                   ADVTRK
0779  REF   1                       14,3077   54040 1                   ADVTRACK
0780  REF   5  LAST  758            14,3100   02347 0                   ADPTIME
0781                                14,3101   77624 1           CALL
0782  REF   7  LAST  746            14,3102   26524 0                   LALOTORV
0783                                14,3103   77775 1           VLOAD
0784  REF  11  LAST  746            14,3104   02152 0                   ALPHAV
0785  REF   8  LAST  451            14,3105   16766 1  LMKLMCOM STODL   STAR
0786  REF   6  LAST  759            14,3106   02347 0                   ADPTIME
0787  REF  34  LAST  758            14,3107   34041 0           STCALL  TDEC1
0788  REF   6  LAST  655            14,3110   27170 1                   CSMCONIC
0789                                14,3111   52375 1           VLOAD   VSU
0790  REF   9  LAST  759            14,3112   02766 1                   STAR
0791  REF  24  LAST  758            14,3113   00001 0                   RATT
0792                                14,3114   52056 0           UNIT    GOTO
0793  REF   2  LAST  758            14,3115   31120 0                   COM52
0794                                14,3116   77775 1  ST52ST   VLOAD
0795  REF   5  LAST  756            14,3117   02611 0                   STARSAV1
0796                                14,3120   53521 1  COM52    MXV     UNIT
0797  REF  38  LAST  754            14,3121   01734 0                   REFSMMAT
0798  REF  10  LAST  759            14,3122   02766 1           STORE   STAR
0799                                14,3123   45001 1           SETPD   CALL
0800                                14,3124   00001 0                   0
0801  REF   7  LAST  750            14,3125   47530 1                   CDUTRIG         COMPUTES SINES AND COSINES FOR CALCSXA
0802                                14,3126   77624 1           CALL                      NOW EXPECT TO SEE THE CDU ANGLES.
0803  REF   1                       14,3127   46034 1                   CALCSXA
0804                                14,3130   71214 0           BON     DLOAD
0805  REF   8  LAST  752            14,3131   01710 0                   CULTFLAG
0806  REF   1                       14,3132   31276 0                   R52L            GR 90 DEGREES
0807  REF   7  LAST  451            14,3133   02776 0                   PAC
0808                                14,3134   51025 1           DSU     BPL
0809  REF   1                       14,3135   31267 0                   38TRDEG
0810  REF   1                       14,3136   31241 1                   R52J            GR 50 DEGREES
0811                                14,3137   45345 1           DLOAD   DSU
0812  REF   8  LAST  759            14,3140   02776 0                   PAC
0813  REF   1                       14,3141   31275 0                   20DEGSMN
0814                                14,3142   77440 1           BMN     EXIT
0815  REF   2  LAST  759            14,3143   31241 1                   R52J
0816  REF   9  LAST  759            14,3144   3 1775 0          CA      PAC
0817  REF   1                       14,3145   54 330 0          TS      PACTEMP
0818  REF 182  LAST  757            14,3146   0 6006 1  R52JA   TC      INTPRET
0819                                14,3147   43014 0           BON     BOFF
0820  REF   5  LAST  758            14,3150   00705 0                   TARG1FLG
0821  REF   1                       14,3151   31170 0                   R52E
0822  REF   4  LAST  758            14,3152   04741 1                   P24FLAG
0823  REF   1                       14,3153   31161 0                   R53CHK
0824                                14,3154   71214 0           BOFCLR  DLOAD
0825  REF   2  LAST  565            14,3155   04241 1                   NEWLMFLG
0826  REF   1                       14,3156   16530 0                   RATESUB
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0827	REF	7	LAST	759	14,3157	02347	0			AOPTIME
0828	REF	2	LAST	757	14,3160	00364	0		STORE	AOPOLD
0829					14,3161	77414	0	R53CHK	BON	EXIT
0830	REF	2	LAST	757	14,3162	00311	1			R53FLAG
0831	REF	2	LAST	759	14,3163	31170	0			R52E
0832	REF	1			14,3164	3 3265	0		CAF	V06N92 NO
0833	REF	172	LAST	755	14,3165	0 4636	0		TC	BANKCALL
0834	REF	3	LAST	747	14,3166	20710	0		CADR	GODSPR
0835	REF	183	LAST	759	14,3167	0 6006	1		TC	INTPRET
0836					14,3170	77776	1	R52E	EXIT	
0837	REF	2	LAST	759	14,3171	3 0330	1		CA	PACTEMP
0838	REF	6	LAST	757	14,3172	55'312	1		TS	DESOPTT
0839	REF	8	LAST	743	14,3173	3 1773	0		CA	SAC
0840	REF	4	LAST	451	14,3174	55'313	0		TS	DESOPTS
0841	REF	17	LAST	596	14,3175	0 5354	0	R52F	TC	CHECKMM
0842					14,3176	00030	1		MM	24
0843	REF	1			14,3177	1 3202	0		TCF	R52FA NO
0844	REF	16	LAST	740	14,3200	3 4773	0		CAF	FIVE YES DELAY .05 SEC
0845	REF	2	LAST	760	14,3201	1 3203	1		TCF	R52FA +1
0846	REF	6	LAST	559	14,3202	3 5011	1	R52FA	CAF	.5SEC WAIT .5 SEC
0847	REF	173	LAST	760	14,3203	0 4636	0	+1	TC	BANKCALL
0848	REF	13	LAST	712	14,3204	01731	0		CADR	DELAYJOB
0849	REF	2	LAST	212	14,3205	3 4757	0		CAF	TARG1BIT
0850	REF	33	LAST	721	14,3206	7 0075	1		MASK	FLAGWRD1
0851	REF	176	LAST	745	14,3207	10 000	0		CCS	A
0852	REF	1			14,3210	0 3223	1		TC	R52HA
0853	REF	1			14,3211	3 4752	0		CAF	TERMIBIT
0854	REF	17	LAST	721	14,3212	7 0103	1		MASK	FLAGWRD7
0855					14,3213	0 0006	1		EXTEND	
0856	REF	1			14,3214	1 3034	1		BZF	R52C
0857	REF	2	LAST	757	14,3215	3 1577	0	R52Q	CA	R52BNKSV
0858	REF	22	LAST	757	14,3216	54 003	0		TS	EBANK
0859	REF	184	LAST	760	14,3217	0 6006	1		TC	INTPRET
0860					14,3220	77650	1		GOTO	
0861	REF	4	LAST	757	14,3221	02576	1			SAVQR52
0862					14,3222	77776	1	R52H	EXIT	LEM
0863	REF	174	LAST	760	14,3223	0 4636	0	R52HA	TC	BANKCALL
0864	REF	3	LAST	559	14,3224	76333	0		CADR	R61CSM
0865	REF	11	LAST	559	14,3225	3 4764	0		CAF	TRACKBIT
0866	REF	34	LAST	760	14,3226	7 0075	1		MASK	FLAGWRD1
0867					14,3227	0 0006	1		EXTEND	
0868	REF	1			14,3230	1 3215	0		BZF	R52Q
0869	REF	185	LAST	760	14,3231	0 6006	1		TC	INTPRET
0870					14,3232	52014	0		BOF	GOTO
0871	REF	13	LAST	743	14,3233	00750	0			UPDATFLG
0872	REF	1			14,3234	31236	1			R52SYNC

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0873   REF   1                  14,3235   31040 1                    R52D +1
0874                            14,3236   77776 1  R52SYNC   EXIT
0875   REF   1                  14,3237   3 3311 1           CAF     1.8SEC
0876   REF   3  LAST  760       14,3240   1 3203 1           TCF     R52FA +1
0877                            14,3241   77776 1  R52J      EXIT
0878   REF   2  LAST  759       14,3242   3 3266 0           CA      38TRDEG
0879   REF   3  LAST  760       14,3243   54 330 0           TS      PACTEMP
0880   REF   1                  14,3244   0 3146 1           TC      R52JA
0881   REF   1                  14,3245   3 4763 1  R52M     CAF     R53FLBIT        IS R53FLAG SET
0882   REF  18  LAST  278       14,3246   7 0074 0           MASK    FLAGWRD0
0883   REF 177  LAST  760       14,3247   10 000 0           CCS     A
0884   REF   1                  14,3250   0 3316 0           TC      R52G            YES
0885                            14,3251   0 0004 0           INHINT                  NO
0886   REF   2  LAST  241       14,3252   3 7645 1           CAF     PRIO24
0887   REF  32  LAST  717       14,3253   0 5135 0           TC      FINDVAC
0888   REF  48  LAST  630       E7,1722                      EBANK=  MRKBUF1
0889   REF   1                  14,3254    03260 0           2CADR   R53JOB
0889   REF   1                  14,3255    30067 0
0890                            14,3256   0 0003 1           RELINT
0891   REF   2  LAST  761       14,3257   0 3316 0           TC      R52G
0892   REF 186  LAST  760       14,3260   0 6006 1  R53JOB   TC      INTPRET
0893                            14,3261    77624 1           CALL
0894   REF   2  LAST  628       14,3262    31571 0                    R53
0895                            14,3263    77776 1  ENDPLAC   EXIT                    INTERPRETER RETURN TO ENDOFJOB(R22 USES)
0896   REF  78  LAST  756       14,3264   0 5205 0           TC      ENDOFJOB
0897                            14,3265    01534 1  V06N92   VN      00692
0898                            14,3266    25252 0  38TRDEG  2DEC    .66666667       CORRESPONDS TO 50 DEGS IN TRUNNION
0898                            14,3267    25254 0
0899                            14,3270    00000 1  2.4SECDP 2DEC    240
0899                            14,3271    00360 1
0900                            14,3272    00000 1  .5SECDP  2DEC    50
0900                            14,3273    00062 0
0901                            14,3274    61740 0  20DEGSMN DEC     -07199
0902                            14,3275    77777 0           DEC     -0
0903                            14,3276    77414 0  R52L     BON     EXIT
0904   REF   6  LAST  759       14,3277    00705 0                    TARG1FLG
0905   REF   3  LAST  759       14,3300    31241 1                    R52J
0906   REF   1                  14,3301   3 3310 0           CAF     OCT404
0907   REF 175  LAST  760       14,3302   0 4636 0           TC      BANKCALL
0908   REF   1                  14,3303    21766 0           CADR    PRIOLARM
0909   REF   1                  14,3304   1 3312 0           TCF     TERM52          TERMINATE
0910   REF   1                  14,3305   1 3175 0           TCF     R52F            PROCEED
0911   REF   2  LAST  761       14,3306   1 3175 0           TCF     R52F            NO PROVISION FOR NEW DATA
0912   REF  79  LAST  761       14,3307   1 5205 1           TCF     ENDOFJOB

0913                            14,3310    00404 1  OCT404   OCT     404

0914                            14,3311    00264 1  1.8SEC   DEC     180

0915   REF 176  LAST  761       14,3312   0 4636 0  TERM52   TC      BANKCALL
```

0916	REF	3	LAST	570	14,3313	20575 1		CADR	KLEENEX	
0917	REF	45	LAST	737	14,3314	0 4655 0		TC	POSTJUMP	
0918	REF	2	LAST	241	14,3315	16031 1		CADR	TERMSXT	
0919	REF	18	LAST	760	14,3316	0 5354 0	R52G	TC	CHECKMM	
0920					14,3317	00030 1		MM	24	
0921	REF	4	LAST	761	14,3320	1 3202 0		TCF	R52FA	NO
0922	REF	2	LAST	565	14,3321	11'131 1		CCS	PASSCNT	IS THIS THE NTH(N = NO.PASS)TIME THRU
0923	REF	1			14,3322	1 3407 0		TCF	NOT4TH	NO
0924	REF	20	LAST	744	14,3323	4 0076 1		CS	FLAGWRD2	HAS A NEW MARK BEEN TAKEN
0925	REF	1			14,3324	7 4766 0		MASK	P24MKBIT	
0926	REF	178	LAST	761	14,3325	10 000 0		CCS	A	
0927	REF	2	LAST	761	14,3326	1 3037 1		TCF	R52D	NO
0933	REF	187	LAST	761	14,3327	0 6006 1		TC	INTPRET	YES OBTAIN ADDRESS OF LAST MARK
0934					14,3330	46135 1		SLOAD	BHIZ	
0935	REF	13	LAST	248	14,3331	03754 1			P22DEX	
0936	REF	1			14,3332	31411 1			LSTMRK	
0937					14,3333	54160 1		AXC,1	XSU,1	
0938	REF	28	LAST	565	14,3334	03530 1		ECADR	SVMRKDAT -7	
0939	REF	14	LAST	762	14,3335	03753 0			P22DEX	
0940					14,3336	70730 1	R52K	SXA,1	DLOAD*	
0941	REF	2	LAST	79	14,3337	01077 0			MARKDATA	
0942					14,3340	00001 0			0,1	
0943	REF	13	LAST	617	14,3344	03670 0		STORE	S22TOFF	
0944	REF	35	LAST	759	14,3345	34041 0		STCALL	TDEC1	INT TO TIME OF MARK
0945	REF	7	LAST	759	14,3346	27170 1			CSMCONIC	
0946					14,3347	77775 1		VLOAD		
0947	REF	7	LAST	617	14,3350	00017 1			RATT1	
0948	REF	10	LAST	618	14,3351	01046 1		STORE	CSMPOS	EARTH B29 MOON B27
0949					14,3352	45150 1		LXA,1	CALL	
0950	REF	3	LAST	762	14,3353	01077 0			MARKDATA	
0951	REF	3	LAST	610	14,3354	47017 1			GETUM	
0952	REF	14	LAST	618	14,3355	25072 0		STOVL	UM	UNIT TIME OF SIGHT VECTOR
0953	REF	11	LAST	762	14,3356	01046 1			CSMPOS	
0954					14,3357	77656 1		UNIT		
0955	REF	12	LAST	759	14,3360	36152 1		STCALL	ALPHAV	ALPHAV +4 = SINL FOR SETRE
0956	REF	2	LAST	611	14,3361	26654 1			SETRE	
0957					14,3362	43345 1		DLOAD	DAD	CORRECT RO FOR ALT OF LMK
0958	REF	5	LAST	618	14,3363	02240 0			ERADM	
0959	REF	7	LAST	647	14,3364	00753 0			ALT	
0960	REF	6	LAST	762	14,3365	02240 0		STORE	ERADM	
0961					14,3366	77624 1		CALL		COMPUTE LANDMARK VECTOR
0962	REF	3	LAST	617	14,3367	61331 1			S22F2410	
0963					14,3370	70414 1		BOFF	VSR2	
0964	REF	26	LAST	675	14,3371	04343 1			CMOONFLG	
0965					14,3372	31373 1			+1	

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C966   REF  13  LAST  762   14,3373   16152 0          STODL   ALPHAV
C967   REF  14  LAST  762   14,3374   03670 0                  S22TOFF
C968                        14,3375   77624 1          CALL                    COMPUTE LAT,LONG,ALT
C969   REF   6  LAST  745   14,3376   26453 1                  LAT-LONG
C970                        14,3377   77624 1          CALL
C971   REF   3  LAST  745   14,3400   62363 0                  LLASRD
C972                        14,3401   77414 0          SET     EXIT
C973   REF   3  LAST  759   14,3402   04061 1                  NEWLMFLG
C974   REF  56  LAST  755   14,3403   0 5561 0          TC      DOWNFLAG
C9741  REF   4  LAST  565   14,3404   00052 0          ADRES   P24MKFLG
C9742  REF  81  LAST  730   14,3405   4 4770 1          CS      ONE
C9743  REF   2  LAST  565   14,3406   6 0737 1          AD      NO.PASS
C975   REF   3  LAST  762   14,3407   55'131 1 NOT4TH   TS      PASSCNT
C976   REF   4  LAST  762   14,3410   1 3037 1          TCF     R52D
C977                        14,3411    52160 1 LSTMRK   AXC,1   GOTO
C978   REF  29  LAST  762   14,3412   03573 0          ECADR   SVMRKDAT +28D
C979   REF   1              14,3413   31336 0                  R52K
C980   REF   1              07,2000                    SETLOC  RATEBNK
C981                        07,2530                    BANK

C9815  REF   1                                         COUNT*  $$/R52
C982                        07,2530   45345 1 RATESUB  DLOAD   DSU
C983   REF   8  LAST  760   07,2531   02347 0                  ADPTIME
C984   REF   3  LAST  760   07,2532   00364 0                  ADPOLD
C985                        07,2533   77634 0          RTB
C986   REF   1              07,2534   45636 0                  SGNAGREE
C987                        07,2535   77612 1          SL4
C988   REF   4  LAST  635   07,2536   14772 0          STODL   RATETEMP        TIME DIF SCALLED B24
C989   REF   9  LAST  763   07,2537   02347 0                  ADPTIME
C990   REF   4  LAST  763   07,2540   00364 0          STORE   ADPOLD          UPDATE OLD TIME REG
C991                        07,2541   77545 0          DLOAD   EXIT            LOAD SHAFT AND TRUNNION SCALE FACTORS
C992   REF   2  LAST   91   07,2542   01771 1                  TRUNSF
C993   REF   5  LAST  763   07,2543   3 0772 0          CA      RATETEMP +1
C994   REF   6  LAST  763   07,2544   56 771 0          XCH     RATETEMP        TIME DIF SP SCALED B10
C995                        07,2545   22 007 0          ZL
C996   REF 272  LAST  752   07,2546   3 0155 0          CA      MPAC +1         SHAFTSF B25
C997                        07,2547   0 0006 1          EXTEND
C998   REF   7  LAST  763   07,2550   10 771 1          DV      RATETEMP        B15
C999   REF  74  LAST  703   07,2551   56 001 0          XCH     L
1000   REF   9  LAST  760   07,2552   3 1773 0          CA      SAC             SHAFT
1001                        07,2553   0 0006 1          EXTEND
1002   REF   5  LAST  760   07,2554   21'313 0          MSU     DESOPTS         B-1
1003                        07,2555   0 0006 1          EXTEND
1004   REF  75  LAST  763   07,2556   7 0001 1          MP      L               B14
1005   REF   5  LAST  756   07,2557   55'657 0          TS      SRTEMP
1006                        07,2560   22 007 0          ZL
1007   REF 273  LAST  763   07,2561   3 0154 1          CA      MPAC            TRUNSF B27
1008                        07,2562   0 0006 1          EXTEND
1009   REF   8  LAST  763   07,2563   10 771 1          DV      RATETEMP        B17
1010   REF  76  LAST  763   07,2564   56 001 0          XCH     L
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1011   REF   4  LAST  761   07,2565  3 0330 1          CA      PACTEMP          TRUNNION
1012                       07,2566  0 0006 1          EXTEND
1013   REF   7  LAST  760   07,2567  21'312 1          MSU     DESUPTT          B-3
1014                       07,2570  0 0006 1          EXTEND
1015   REF  77  LAST  763   07,2571  7 0001 1          MP      L                B14
1016   REF   2  LAST   98   07,2572  55'656 1          TS      TRTEMP
1017   REF  82  LAST  763   07,2573  3 4770 0          CAF     ONE              INITIALIZE FOR SHAFT RATE
1018   REF   9  LAST  763   07,2574  54 772 1  MAGCK   TS      RATETEMP +1      CHECK IF SHAFT,TRUN RATES GR THAN MAX
1019   REF  10  LAST  764   07,2575  50 772 0          INDEX   RATETEMP +1
1020   REF   3  LAST  764   07,2576  3 1656 0          CA      TRTEMP
1021                       07,2577  0 0006 1          EXTEND
1022   REF   1             07,2600  6 2610 1          BZMF    NEGRATE
1023   REF   1             07,2601  6 2626 1          AD      -MAXSRT
1024                       07,2602  0 0006 1          EXTEND
1025   REF   1             07,2603  6 2617 0          BZMF    CMDCMP
1026   REF   2  LAST  764   07,2604  4 2626 0          CS      -MAXSRT
1027   REF  11  LAST  764   07,2605  50 772 0          INDEX   RATETEMP +1
1028   REF   4  LAST  764   07,2606  55'656 1          TS      TRTEMP           SET RATE TO +MAX RATE
1029   REF   2  LAST  764   07,2607  1 2617 1          TCF     CMDCMP
1030                       07,2610  4 0000 0  NEGRATE  COM
1031   REF   3  LAST  764   07,2611  6 2626 1          AD      -MAXSRT
1032                       07,2612  0 0006 1          EXTEND
1033   REF   3  LAST  764   07,2613  6 2617 0          BZMF    CMDCMP
1034   REF   4  LAST  764   07,2614  3 2626 1          CA      -MAXSRT
1035   REF  12  LAST  764   07,2615  50 772 0          INDEX   RATETEMP +1
1036   REF   5  LAST  764   07,2616  55'656 1          TS      TRTEMP           SET RATE TO -MAX RATE
1037   REF  13  LAST  764   07,2617  10 772 1  CMDCMP  CCS     RATETEMP +1
1038   REF   1             07,2620  1 2574 1          TCF     MAGCK            GO DO TRUN RATE
1039   REF 188  LAST  762   07,2621  0 6006 1          TC      INTPRET
1040                       07,2622  77745 1           DLOAD
1041   REF   6  LAST  764   07,2623  02657 1                   TRTEMP
1042   REF   5  LAST  209   07,2624  34736 1           STCALL  TRATE
1043   REF   2  LAST  759   07,2625  31161 0                   R53CHK
1044                       07,2626  77177 0  -MAXSRT  DEC     -384             MAX PULSES
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P1047   NAME - LOCSAM ALIAS S50

R1048   FUNCTION -TO COMPUTE QUATITIGS LISTED BELOW ,USED IN THE
R1049             IMU ALIGNMENT PROGRAMS
R1050   DEFINE:
R1051        RATT=POSITION VECTOR OF CM  WRT PRIMARY BODY
R1052        VATT=VELOCITY VECTOR OF CM  WRT PRIMARY BODY
R1053        RE  =RADIUS OF EARTH
R1054        RM  =RADIUS OF MOON
R1055        ECLIPOL= POLE OF ECLIPTIC SCALED BY TANGENTIAL VELOCITY OF EARTH
R1056                 WRT TO SUN  OVER  THE VELOCITY OF LIGHT
R1057        REM =POSITION OF MOON  WRT  EARTH
R1058        RES =POSITION OF SUN  WRT EARTH
R1059        C = VELOCITY OF LIGHT
R1060
R1061
R1062             EARTH IS PRIMARY                MOON IS PRIMARY
R1063                    -                               -
R1064             VEARTH=-1(RATT)                 VEARTH=-1(REM+RATT)
R1065
R1066                     -                               -
R1067             VMOON= 1(REM-RATT)              VMOON =-1(RATT)
R1068
R1069                     -                               -
R1070             VSUN = 1(RES)                   VSUN  =1(RES-REM)
R1071
R1072                          -1
R1073             CEARTH=COS(SIN (RE/RATT)+5)     CEARTH=COS 5
R1074
R1075                                                     -1
R1076             CMOON= COS 5                    CMOON=COS(SIN (RM/RATT)+5)
R1077
R1078
R1079             CSUN = COS 15                   CSUN = COS 15
R1080
R1081
R1082                          VEL/C = VSUN X ECLIPOL + VATT/C
R1083
R1084
R1085
R1086   CALL -    DLOAD  CALL
R1087                    DESIRED TIME
R1088                    LOCSAM
R1089   INPUTS - MPAC = TIME
R1090
R1091   OUTPUTS- VEARTH,VMOON,VSUN,CEARTH,CMOON,CSUN,VEL/C
R1092
R1093   SUBROUTINES- LSPOS,CSMCONIC
R1094
R1095   DEBRIS - VAC AREA,SEE SUBROUTINES
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R1096
 1097  REF   1                13,2000                        SETLOC  SR52/1
 1098                         13,2345                        BANK

 1099  REF   1                                               COUNT*  $$/S50

 1100  REF   1                13,2345                LOCSAM  =       S50
 1101                         13,2345   77620 0      S50     STQ
 1102  REF   3  LAST  452     13,2346   00300 1              QMAJ
 1103  REF   7  LAST  754     13,2347   36607 0              STCALL  TSIGHT
 1104  REF   2  LAST  601     13,2350   54136 1              LSPOS
 1105  REF   2  LAST   99     13,2351   26752 0              STOVL   VMOON
 1106                         13,2352   00003 1              2D
 1107  REF   2  LAST   99     13,2353   16744 1              STODL   VSUN
 1108  REF   8  LAST  766     13,2354   02607 1              TSIGHT
 1109  REF  36  LAST  762     13,2355   34041 0              STCALL  TDEC1
 1110  REF   8  LAST  762     13,2356   27170 1              CSMCONIC
 1111                         13,2357   61131 0              SSP     TIX,2
 1112  REF  11  LAST  751     13,2360   00052 0              S2
 1113                         13,2361   00000 1              0
 1114  REF   1                13,2362   26405 1              MOONCNTR
 1115                         13,2363   52375 1  EARTCNTR    VLOAD   VSU
 1116  REF   3  LAST  766     13,2364   02752 0              VMOON
 1117  REF  25  LAST  759     13,2365   00001 0              RATT
 1118                         13,2366   77656 1              UNIT
 1119  REF   4  LAST  766     13,2367   26752 0              STOVL   VMOON
 1120  REF  26  LAST  766     13,2370   00001 0              RATT
 1121                         13,2371   57456 1              UNIT    VCOMP
 1122  REF   3  LAST   99     13,2372   16736 1              STODL   VEARTH
 1123  REF   1                13,2373   34636 0              RSOBE
 1124                         13,2374   77624 1              CALL
 1125  REF   1                13,2375   26445 0              CCCOS
 1126  REF   2  LAST  753     13,2376   14017 1              STODL   CEARTH
 1127  REF   1                13,2377   34654 1              CSSS
 1128  REF   1                13,2400   24023 0              STOVL   CMOON
 1129  REF   3  LAST  766     13,2401   02744 1              VSUN
 1130                         13,2402   77656 1              UNIT
 1131  REF   4  LAST  766     13,2403   36744 0              STCALL  VSUN
 1132  REF   1                13,2404   26432 0              ENDSAM
 1133                         13,2405   40575 1  MOONCNTR    VLOAD   VSR8
 1134  REF   5  LAST  766     13,2406   02752 0              VMOON
 1135                         13,2407   51362 1              VSR1    BVSU
 1136  REF   5  LAST  766     13,2410   02744 1              VSUN
 1137                         13,2411   77656 1              UNIT
 1138  REF   6  LAST  766     13,2412   26744 1              STOVL   VSUN
 1139  REF   6  LAST  766     13,2413   02752 0              VMOON
 1140                         13,2414   53455 0              VAD     UNIT
 1141  REF  27  LAST  766     13,2415   00001 0              RATT
 1142                         13,2416   77676 0              VCOMP
 1143  REF   4  LAST  766     13,2417   26736 1              STOVL   VEARTH
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1144   REF  28  LAST  766   13,2420  00001 0                 RATT
1145                        13,2421  57456 1          UNIT   VCOMP
1146   REF   7  LAST  766   13,2422  16752 0          STODL  VMOON
1147   REF   1              13,2423  34634 1                 RSUBM
1148                        13,2424  77624 1          CALL
1149   REF   2  LAST  766   13,2425  26445 0                 CCCOS
1150   REF   2  LAST  766   13,2426  14023 0          STODL  CMOON
1151   REF   2  LAST  766   13,2427  34654 1                 CSS5
1152   REF   3  LAST  766   13,2430  24017 1          STOVL  CEARTH
1153   REF   7  LAST  766   13,2431  02744 1                 VSUN
1154                        13,2432  77635 1  ENDSAM  VXV
1155   REF   2  LAST  602   13,2433  34644 0                 ECLIPOL
1156   REF   6  LAST  603   13,2434  27452 1          STOVL  VEL/C
1157   REF  22  LAST  746   13,2435  00007 0                 VATT
1158                        13,2436  53361 0          VXSC   VAD
1159   REF   2  LAST  602   13,2437  34642 0                 1/C
1160   REF   7  LAST  767   13,2440  03452 1                 VEL/C
1161   REF   8  LAST  767   13,2441  17452 1          STODL  VEL/C
1162   REF   1              13,2442  34656 0                 CSSUN
1163   REF   1              13,2443  34021 0          STCALL CSUN
1164   REF   4  LAST  766   13,2444  00300 1                 QMAJ
1165                        13,2445  70471 1  CCCOS   DDV    SR1
1166                        13,2446  00045 0                 360
1167                        13,2447  43336 0          ASIN   DAD
1168   REF   1              13,2450  34640 1                 5DEGREES
1169                        13,2451  70546 1          COS    SR1
1170                        13,2452  77616 0          RVQ
1171   REF   1              16,2000                  SETLOC P50S2
1172                        16,2633                  BANK
11725  REF   1                                       COUNT* $$/S50
1173                        16,2633  00065 1  RSUBM   2DEC   1738090 B-29     MOON RADIUS IN METERS
1173                        16,2634  01265 1
1174                        16,2635  00302 0  RSUBE   2DEC   6378166 B-29
1174                        16,2636  24533 1
1175                        16,2637  00343 0  5DEGREES 2DEC  .013888889       SCALED IN REVS
1175                        16,2640  21616 0
1176                        16,2641  00000 1  1/C     2DEC   .000042696 B-1   1/(9835712 FT/CS)  SCALED CSEC/M B+7
1176                        16,2642  13143 0
1177                        16,2643  00000 1  ECLIPOL 2DEC   0                 POLE OF ECLIPTIC FOR B0=.409157363336RAD
1177                        16,2644  00000 1
1178                        16,2645  77777 0          2DEC   -.0000395319722 AND CONST.AB = 20.496 ARC-SEC
1178                        16,2646  53213 1
1179                        16,2647  00001 0          2DEC   +.0000911652662 ECLIPOL = CONST.AB.(0, -SIN B0, COS B0)
1179                        16,2650  17630 1
1180                        16,2651  00001 0  TSIGHT1 2DEC   24000
1180                        16,2652  16700 1
1181                           0016          CEARTH   =      14D
1182                           0020          CSUN     =      16D
1183                           0022          CMOON    =      18D
1184                        16,2653  07760 1  CSS5    2DEC   .2490475         (COS 5)/4
1184                        16,2654  14473 1
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 1185                        16,2655   07564 1  CSSUN    2DEC    .24148          COS 15  /4
 1185                        16,2656   15042 0
 1186   REF   1              16,2657             R54      =       CHKSDATA

R1187   NAME - CHKSDATA

R1188   FUNCTIONAL DESCRIPTION - CHECKS THE VALIDITY OF A PAIR OF STAR SIGHTINGS. WHEN A PAIR OF STAR SIGHTINGS ARE MADE
R1190   BY THE ASTRONAUT THIS ROUTINE OPERATES AND CHECKS THE OBSERVED SIGHTINGS AGAINST STORED STAR VECTORS IN THE
R1192   COMPUTER TO INSURE A PROPER SIGHTING WAS MADE. THE FOLLOWING COMPUTATIONS ARE PERFORMED_

R1194                    OS1 = OBSERVED STAR 1 VECTOR
R1195                    OS2 = OBSERVED STAR 2 VECTOR
R1196                    SS1 = STORED STAR 1 VECTOR
R1197                    SS2 = STORED STAR 2 VECTOR
R1198                     A1 = ARCCOS(OS1 - OS2)
R1199                     A2 = ARCCOS(SS1 - SS2)
R1200                      A = ABS(2(A1 - A2))

R1201   THE ANGULAR DIFFERENCE IS DISPLAYED FOR ASTRONAUT ACCEPTENCE
R1202   EXIT MODE 1. FREEFLAG SET  IMPLIES  ASTRONAUT WANTS TO PROCEED
R1203             2. FREEFLAG RESET IMPLIES ASTRONAUT WANTS TO RECYCLE          ERANCE)
R1205   OUTPUT - 1.VERB 6,NOUN 3- DISPLAYS ANGULAR DIFFERENCE BETWEEN 2 SETS OF STARS.
R1207           2.STAR VECTORS FROM STAR CATALOG ARE LEFT IN 6D AND 12D.

R1208   ERASABLE INITIALIZATION REQUIRED -
R1209           1.MARK VECTORS ARE STORED IN STARAD AND STARAD +6.
R1210           2.CATALOG VECTORS ARE STORED IN 6D AND 12D.
R1211   DEBRIS -
 1212   REF   8  LAST  640   E7,1777                          EBANK=  WHOCARES
 1213   REF   1                                              COUNT*  $$/R54
 1214                        16,2657   43020 1  CHKSDATA    STQ     SET
 1215   REF   1              16,2660   02777 1              QMIN
 1216   REF   2  LAST  755   16,2661   00074 1              FREEFLAG
 1217                        16,2662   77760 0  CHKSAB      AXC,1                   SET X1 TO STORE  EPHEMERIS DATA
 1218   REF   7  LAST  755   16,2663   02735 1              STARAD
R1219
 1220                        16,2664   47773 1  CHKSB       VLOAD*  DOT*           CAL. ANGLE THETA
 1221                        16,2665   00001 0              0,1
 1222                        16,2666   00007 0              6,1
 1223                        16,2667   65552 0              SL1     ACOS
 1224   REF   1              16,2670   00025 0              STORE   THETA
 1225                        16,2671   43014 0              BOFF    INVERT          BRANCH TO CHKSD IF THIS IS 2ND PASS
 1226   REF   3  LAST  768   16,2672   00354 0              FREEFLAG
 1227   REF   1              16,2673   34702 0              CHKSD
 1228   REF   4  LAST  768   16,2674   00174 0              FREEFLAG                CLEAR FREEFLAG
 1229                        16,2675   71360 1              AXC,1   DLOAD           SET X1 TO MARK ANGLES
 1230                        16,2676   00006 1              6D
 1231   REF   2  LAST  768   16,2677   00025 0              THETA
 1232                        16,2700   34023 1              STCALL  18D
 1233   REF   1              16,2701   34664 1              CHKSB
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1234                                16,2702   45345 1  CHKSD    DLOAD    DSU
1235  REF   3  LAST  768           16,2703   00025 0                    THETA
1236                                16,2704   00023 0                    18D              COMPUTE POS DIFF
1237                                16,2705   47046 0           ABS      RTB
1238  REF   2  LAST  763           16,2706   45636 0                    SGNAGREE
1239  REF   1                      16,2707   01251 0           STORE    NORMTEM1
1240                                16,2710   77414 0           SET      EXIT
1241  REF   5  LAST  768           16,2711   00074 1                    FREEFLAG
1242  REF 138  LAST  756           16,2712   3 4772 1          CAF      ZERO
1243  REF 177  LAST  761           16,2713   0 4636 0          TC       BANKCALL
1244  REF   4  LAST  699           16,2714   20715 0           CADR     CLEANDSP

1245  REF   1                      16,2715   3 2727 1          CAF      V86N5
1246  REF 178  LAST  769           16,2716   0 4636 0          TC       BANKCALL
1247  REF  21  LAST  755           16,2717   20743 0           CADR     GOFLASH
1248  REF  42  LAST  755           16,2720   1 4103 0          TCF      GOTOPOOH
1249  REF   1                      16,2721   0 2724 1          TC       CHKSDA           PROCEED
1250  REF  57  LAST  763           16,2722   0 5561 0          TC       DOWNFLAG
1251  REF   6  LAST  769           16,2723   00014 1           ADRES    FREEFLAG
1252  REF 189  LAST  764           16,2724   0 6006 1 CHKSDA   TC       INTPRET
1253                                16,2725   77650 1           GOTO
1254  REF   2  LAST  768           16,2726   02777 1                    QMIN
1255                                16,2727   01405 1 V86N5     VN       605
12555 REF   1                                           COUNT* $$/R50
1256                                16,2730   77773 1 MATMOVE   VLOAD*                     TRANSFER MATRIX
1257                                16,2731   00001 0                    0,1
1258                                16,2732   10001 1           STORE    0,2
1259                                16,2733   77773 1           VLOAD*
1260                                16,2734   00007 0                    60,1
1261                                16,2735   10007 1           STORE    60,2
1262                                16,2736   77773 1           VLOAD*
1263                                16,2737   00015 0                    120,1
1264                                16,2740   10015 1           STORE    120,2
1265                                16,2741   77616 0           RVQ
1266                                16,2742   00056 1 DEGREE1   DEC      46
1267                                16,2743   37722 1 DEG359    DEC      16338
1268                                16,2744   0 0004 0 RDCDUS   INHINT                    READ CDUS
1269                                16,2745   0 0006 1          EXTEND
1270  REF  16  LAST  710           16,2746   3 0033 1          DCA      CDUX
1271  REF  12  LAST  600           16,2747   50 120 1          INDEX    FIXLOC
1272                                16,2750   52 002 1          DXCH     1
1273  REF  11  LAST  710           16,2751   3 0034 0          CA       CDUZ
1274  REF  13  LAST  769           16,2752   50 120 1          INDEX    FIXLOC
1275                                16,2753   54 003 0          TS       3
1276                                16,2754   0 0003 1          RELINT
1277  REF   6  LAST  548           16,2755   0 6030 1          TC       DANZIG

R1278  NAME - CALCSMSC
R1279  FUNCTION - DETERMINE AND COMPUTE THE DESIRED GIMBAL ANGLES TO BE USED          FOR COARSE ALIGNMENT.
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R1281   CALLING SEQUENCE - CALL CALCSMSC
R1282   INPUT - DESIRED IMU INERTIAL ORIENTATION VECTORS-XSMD,YSMD,ZSMD
R1283   OUTPUT - GIMBAL ANGLES LEFT IN THETAD,+1,+2                    +
R1284   SUBROUTINES USED - 1.CDUTRIG 2.CALCSMSC 3.CALCGA
 1285   REF  2 LAST  767   16,2000                        SETLOC  P50S2
 1286                      16,2756                        BANK
 1287   REF  1                                            COUNT*  $$/R51
 1288                      16,2756   41345 0  CALCSMSC   DLOAD   DMP
 1289   REF  1             16,2757   01142 1            SINCDUY
 1290   REF  2 LAST  545   16,2760   01152 0            COSCDUZ
 1291                      16,2761   77676 0            DCOMP
 1292                      16,2762   70525 1            PDDL    SR1
 1293   REF  2 LAST  545   16,2763   01144 1            SINCDUZ
 1294                      16,2764   41325 0            PDDL    DMP
 1295   REF  1             16,2765   01150 1            COSCDUY
 1296   REF  3 LAST  770   16,2766   01152 0            COSCDUZ
 1297                      16,2767   76466 1            VDEF    VSL1
 1298   REF  6 LAST  751   16,2770   16714 1            STODL   XNB
 1299   REF  3 LAST  546   16,2771   01146 0            SINCDUX
 1300                      16,2772   72405 0            DMP     SL1
 1301   REF  3 LAST  770   16,2773   01144 1            SINCDUZ
 1302                      16,2774   00033 1            STORE   26D
 1303                      16,2775   65205 0            DMP     PDDL
 1304   REF  2 LAST  770   16,2776   01142 1            SINCDUY
 1305   REF  3 LAST  546   16,2777   01154 0            COSCDUX
 1306                      16,3000   45205 1            DMP     DSU
 1307   REF  2 LAST  770   16,3001   01150 1            COSCDUY
 1308                      16,3002   41325 0            PDDL    DMP
 1309   REF  4 LAST  770   16,3003   01146 0            SINCDUX
 1310   REF  4 LAST  770   16,3004   01152 0            COSCDUZ
 1311                      16,3005   65276 1            DCOMP   PDDL
 1312   REF  4 LAST  770   16,3006   01154 0            COSCDUX
 1313                      16,3007   65205 0            DMP     PDDL
 1314   REF  3 LAST  770   16,3010   01142 1            SINCDUY
 1315   REF  3 LAST  770   16,3011   01150 1            COSCDUY
 1316                      16,3012   43205 1            DMP     DAD
 1317                      16,3013   00033 1            26D
 1318                      16,3014   76466 1            VDEF    VSL1
 1319   REF  5 LAST  751   16,3015   02730 1            STORE   ZNB
 1320                      16,3016   76435 1            VXV     VSL1
 1321   REF  7 LAST  770   16,3017   02714 1            XNB
 1322   REF  4 LAST  427   16,3020   02722 1            STORE   YNB
 1323                      16,3021   77616 0            RVQ
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P1324 PROGRAM NAME - P51 - IMU ORIENTATION DETERMINATION DATE - AUGUST 1,1969
R1326 MODIFICATION BY ALBERT,BARNERT,HASLAM LOG SECTION - P51-P5

R1328 FUNCTION -

R1329 DETERMINES THE INERTIAL ORIENTATION OF THE IMU. THE PROGRAM IS SELECTED BY DSKY ENTRY. THE SIGHTING
R1331 ROUTINE IS CALLED TO COLLECT THE CDU COUNTERS AND SHAFT AND TRUNNION ANGLES FOR A SIGHTED STAR. THE DATA IS
R1333 THEN PROCESSED AS FOLLOWS.

R1334 1. SEXTANT ANGLES ARE COMPUTED IN TERMS OF NAVIGATIONAL BASE COORDINATES. LET SA AND TA BE THE SHAFT AND
R1336 TRUNNION ANGLES, RESPECTIVELY. THEN,

R1337
R1338 $\bar{V}_{NB} = (SIN(TA)*COS(SA),\ SIN(TA)*SIN(SA),\ COS(TA))$ (A COLUMN VECTOR)
R1340

R1341 THE OUTPUT IS A HALF-UNIT VECTOR STORED IN STARM.

R1342 2. THIS VECTOR IN NAV.BASE COORDS. IS THEN TRANSFORMED TO ONE IN STABLE MEMBER COORDINATES.

R1344
R1345 $\bar{V} = Q_1 * Q_2 * Q_3 * \bar{V}^T_{NB}$, WHERE
R1346

R1347 $Q_1 = \begin{pmatrix} COS(IG) & 0 & -SIN(IG) \\ 0 & 1 & 0 \\ SIN(IG) & 0 & COS(IG) \end{pmatrix}$, IG=INNER GIMBAL ANGLE

THE GIMBAL ANGLES ARE COMPUTED FROM THE CDU COUNTERS AT NBSM (USING AXIS-ROT AND CDULOGIC)

R1355
R1356 $Q_2 = \begin{pmatrix} COS(MG) & SIN(MG) & 0 \\ -SIN(MG) & COS(MG) & 0 \\ 0 & 0 & 1 \end{pmatrix}$, MG=MIDDLE GIMBAL ANGLE
R1360

R1361
R1362 $Q_3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & COS(OG) & SIN(OG) \\ 0 & -SIN(OG) & COS(OG) \end{pmatrix}$, OG=OUTER GIMBAL ANGLE
R1366

R1367 3. THE STAR NUMBER IS SAVED AND THE SECOND STAR IS THEN SIMILARLY PROCESSED.

R1369 4. THE ANGLE BETWEEN THE TWO STARS IS THEN CHECKED AT CKSDATA.

R1370 5. REFSMMAT IS THEN COMPUTED AT AXISGEN AS FOLLOWS.
R1371
R1372 LET $\bar{S}_A$ AND $\bar{S}_B$ BE TWO STAR VECTORS EXPRESSED IN TWO COORDINATE SYSTEMS,A AND B (BASIC AND STABLE MEMBER).

```
R1374                  1      2

R1375    DEFINE,       -      -
R1376                  U   =  S
R1377                   A      A1

R1378                  -          -      -
R1379                  V   =  UNIT(S   X  S   )
R1380                   A             A1     A2

R1381                  -      -      -
R1382                  W   =  U   X  V
R1383                   A      A      A
R1384          AND
R1385                  -      -
R1386                  U   =  S
R1387                   B      B1

R1388                  -          -      -
R1389                  V   =  UNIT(S   X  S   )
R1390                   B             B1     B2

R1391                  -      -      -
R1392                  W   =  U   X  V
R1393                   B      B      B

R1394          THEN    -          -          -          -
R1395                  X   =  U   *U  +  V   *V  +  W   *W
R1396                         B1  A     B1  A     B1  A

R1397                  -          -          -          -              (REFSMMAT)
R1398                  Y   =  U   *U  +  V   *V  +  W   *W
R1399                         B2  A     B2  A     B2  A

R1400                  -          -          -          -
R1401                  Z   =  U   *U  +  V   *V  +  W   *W
R1402                         B3  A     B3  A     B3  A

R1403          THE INPUTS CONSIST OF THE FOUR HALF-UNIT VECTORS STORED AS FOLLOWS

R1404                  -
R1405                  S      IN 6-11 OF THE VAC AREA
R1406                   A1

R1407                  -
R1408                  S      IN 12-17 OF THE VAC AREA
R1409                   A2

R1410                  -
R1411                  S      IN STARAD
```

```
R1412                  B1

R1413                  -
R1414                  S    IN STARAD +6
R1415                   B2

R1416   CALLING SEQUENCE

R1417     THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

R1418   SUBROUTINES CALLED.

R1419         GOPERF3
R1420         GOPERF1R
R1421         GODSPR
R1422         IMUCOARS
R1423         IMUFIN20
R1424         R53
R1425         SXTNB
R1426         NBSM
R1427         MKRELEAS
R1428         CHKSDATA
R1429         MATMOVE

R1430   ALARMS

R1431         NONE.
R1432   ERASABLE INITIALIZATION

R1433         IMU ZERO FLAG SHOULD BE SET.

R1434   OUTPUT

R1435         REFSMMAT
R1436         REFSMFLG

R1437   DEBRIS

R1438         WORK AREA
R1439         STARAD
R1440         STARIND
R1441         BESTI
R1442         BESTJ

  1443  REF   1              14,2000                    SETLOC P50S1
  1444                       14,3414                    BANK
  1445  REF   1                                         COUNT* $$/P5153
  1446  REF   2  LAST  225  14,3414              P53     EQUALS P51
  1447  REF  46  LAST  392  14,3414  4 1333 1   P51     CS     IMODES30
  1448  REF   2  LAST  150  14,3415  7 4760 0           MASK   IMUOPBIT
```

```
1449  REF 179  LAST  762   14,3416  10 000 0          CCS   A
1450  REF   1                14,3417  0 3423 1          TC    P51A
1451  REF  27  LAST  753    14,3420  0 5671 1          TC    ALARM
1452                         14,3421   00210 1          OCT   210
1453  REF  43  LAST  769    14,3422  0 4103 1          TC    GOTOPOOH
1454  REF 179  LAST  769    14,3423  0 4636 0  P51A    TC    BANKCALL
1455  REF   1                14,3424   03745 1          CADR  R02ZERO

1456  REF   1                14,3425  3 4776 0  P51AA   CAF   PRFMSTAQ
1457  REF 180  LAST  774    14,3426  0 4636 0          TC    BANKCALL
1458  REF   9  LAST  755    14,3427   21067 0          CADR  GOPERF1
1459  REF  44  LAST  774    14,3430  0 4103 1          TC    GOTOPOOH      TERM.
1460  REF   1                14,3431  0 3454 1          TC    P51B          V 33
1461  REF  72  LAST  755    14,3432  0 5402 1          TC    PHASCHNG
1462                         14,3433   05024 1          OCT   05024
1463                         14,3434   13000 0          OCT   13000
1464  REF   1                14,3435  3 4772 1          CAF   P51ZERO
1465  REF  20  LAST  749    14,3436  55'307 0          TS    THETAD        ZERO THE GIMBALS
1466  REF  21  LAST  774    14,3437  55'310 0          TS    THETAD +1
1467  REF  22  LAST  774    14,3440  55'311 1          TS    THETAD +2
1468  REF   3  LAST  747    14,3441  3 5025 0          CAF   V06N22
1469  REF 181  LAST  774    14,3442  0 4636 0          TC    BANKCALL
1470  REF   2  LAST  449    14,3443   20705 1          CADR  GODSPRET
1471  REF   1                14,3444  3 3565 1          CAF   V41K          NOW DISPLAY COARSE ALIGN VERB 41
1472  REF 182  LAST  774    14,3445  0 4636 0          TC    BANKCALL
1473  REF   3  LAST  774    14,3446   20705 1          CADR  GODSPRET
1474  REF   2  LAST  749    14,3447  0 3742 0          TC    COARSUB       PERFORM ALIGNMENT
1475  REF  73  LAST  774    14,3450  0 5402 1          TC    PHASCHNG
1476                         14,3451   05024 1          OCT   05024
1477                         14,3452   13000 0          OCT   13000
1478  REF   1                14,3453  1 3425 0          TCF   P51AA         COARSE ALIGN DONE - RECYCLE FOR FINE
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P1479 DO STAR SIGHTING AND COMPUTE NEW REFSMMAT

```
1480  REF 190  LAST  769   14,3454  0 6006 1  P51B    TC      INTPRET
1481                       14,3455   40331 1           SSP     SETPD
1482  REF   7  LAST  758   14,3456   00305 1           STARIND         INDEX-STAR 1 OR 2
1483                       14,3457   00000 1           0
1484                       14,3460   00001 0           0
1485                       14,3461   77234 1           RTB     VLOAD
1486  REF   3  LAST  749   14,3462   31566 0           SET1/PDT
1487  REF  14  LAST  749   14,3463   11762 1           ZEROVEC
1488  REF  20  LAST  749   14,3464   01472 1           STORE   GCOMP
1489                       14,3465   43014 0           SET     CLEAR
1490  REF   4  LAST  749   14,3466   01060 0           DRIFTFLG        ENABLE T4 COMPENSATION
1491  REF   6  LAST  758   14,3467   00666 1           TARG2FLG        SHOW MARK IS STAR - NOT LANDMARK
1492                       14,3470   77776 1           EXIT
1493  REF  74  LAST  774   14,3471  0 5402 1  P51C    TC      PHASCHNG
1494                       14,3472   05024 1           OCT     05024
1495                       14,3473   13000 0           OCT     13000
1496  REF  19  LAST  762   14,3474  0 5354 0           TC      CHECKMM
1497                       14,3475   00065 1           MM      53              BACKUP PROGRAM
1498  REF   1              14,3476  1 3504 1           TCF     P51C.1          NOT P53
1499  REF 191  LAST  775   14,3477  0 6006 1           TC      INTPRET
1500                       14,3500   77624 1           CALL
1501  REF   2  LAST  754   14,3501   36105 0                   R56
1502                       14,3502   77650 1           GOTO
1503  REF   1              14,3503   31507 1                   P51C.2
1504  REF 192  LAST  775   14,3504  0 6006 1  P51C.1   TC      INTPRET
1505                       14,3505   77624 1           CALL
1506  REF   3  LAST  761   14,3506   31571 0                   R53             SIGHTING ROUTINE
1507                       14,3507   77624 1  P51C.2   CALL                    COMPUTE LOS IN SM FROM MARK DATA
1508  REF   2  LAST  754   14,3510   36052 0                   SXTSM
1509                       14,3511   77606 1           PUSH
1510                       14,3512   53135 0           SLOAD   BZE
1511  REF   8  LAST  775   14,3513   00305 1                   STARIND
1512  REF   1              14,3514   31520 1                   P51D
1513                       14,3515   45575 1           VLOAD   STADR
1514  REF   8  LAST  758   14,3516   41160 0           STCALL  STARSAV2        DOWNLINK
1515  REF   1              14,3517   31526 1                   P51E
1516                       14,3520   45575 1  P51D     VLOAD   STADR
1517  REF   6  LAST  759   14,3521   61166 1           STODL   STARSAV1
1518  REF   9  LAST  766   14,3522   02607 1                   TSIGHT
1519                       14,3523   77624 1           CALL
1520  REF   3  LAST  756   14,3524   31651 1                   PLANET
1521  REF   5  LAST  755   14,3525   02601 1           STORE   PLANVEC
1522                       14,3526   77776 1  P51E     EXIT
1523  REF  75  LAST  775   14,3527  0 5402 1           TC      PHASCHNG
1524                       14,3530   05024 1           OCT     05024
1525                       14,3531   13000 0           OCT     13000
1526  REF   9  LAST  775   14,3532  10 304 1           CCS     STARIND
1527  REF   1              14,3533  1 3542 0           TCF     P51F            STAR 2
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1528  REF  76  LAST  775   14,3534  0 5402 1          TC      PHASCHNG
1529                       14,3535   05024 1          OCT     05024
1530                       14,3536   13000 0          OCT     13000
1531  REF  46  LAST  754   14,3537  3 4770 0          CAF     BIT1
1532  REF  10  LAST  775   14,3540  54 304 1          TS      STARIND
1533  REF   1             14,3541  1 3471 1          TCF     P51C          GO DO SECOND STAR
1534  REF  77  LAST  776   14,3542  0 5402 1  P51F    TC      PHASCHNG
1535                       14,3543   05024 1          OCT     05024
1536                       14,3544   13000 0          OCT     13000
1537  REF 193  LAST  775   14,3545  0 6006 1          TC      INTPRET
1538                       14,3546   45145 0          DLOAD   CALL
1539  REF  10  LAST  775   14,3547   02607 1                  TSIGHT
1540  REF   4  LAST  775   14,3550   31651 1                  PLANET
1541                       14,3551   24015 0          STOVL   12D
1542  REF   6  LAST  775   14,3552   02601 1                  PLANVEC
1543                       14,3553   24007 0          STOVL   6D
1544  REF   7  LAST  775   14,3554   02611 0                  STARSAV1
1545  REF   8  LAST  768   14,3555   26736 1          STOVL   STARAD
1546  REF   9  LAST  775   14,3556   02617 0                  STARSAV2
1547  REF   9  LAST  776   14,3557   36744 0          STCALL  STARAD +6
1548  REF   2  LAST  768   14,3560   34657 1                  CHKSDATA      CHECK STAR ANGLES IN STARAD AND
1549                       14,3561   77414 0          BON     EXIT
1550  REF   7  LAST  769   14,3562   00314 1                  FREEFLAG
1551  REF   1             14,3563   11716 1                  P51G
1552  REF   2  LAST  774   14,3564  0 3425 1          TC      P51AA
15525 REF   1             04,2000                    SETLOC  P50S4
15526                     04,3716                    BANK

15528 REF   1                                        COUNT*  $$/P5153
1553                       04,3716   77624 1  P51G    CALL
1554  REF   3  LAST  755   04,3717   47432 1                  AXISGEN       COME BACK WITH REFSMMAT IN XDC
1555                       04,3720   75160 1          AXC,1   AXC,2
1556  REF   5  LAST  747   04,3721   02713 0                  XDC
1557  REF  39  LAST  759   04,3722   01733 1                  REFSMMAT
1558                       04,3723   45014 0          CLEAR   CALL
1559  REF   9  LAST  750   04,3724   01662 1                  REFSMFLG
1560  REF   3  LAST  749   04,3725   34730 1                  MATMOVE
1561                       04,3726   77414 0          SET     EXIT
1562  REF  10  LAST  776   04,3727   01462 0                  REFSMFLG
1563  REF  45  LAST  774   04,3730  0 4103 1          TC      GOTOPOOH
15635 REF   2  LAST  773   14,2000                    SETLOC  P50S1
15636                     14,3565                    BANK

15638 REF   2 LAST  773 TO  776:   105   105*        COUNT*  $$/P5153
1564  REF   3  LAST  748      4776          PRFMSTAQ  =       OCT15
1565  REF 139  LAST  769      4772          P51ZERO   =       ZERO
1566  REF  17  LAST  760      4773          P51FIVE   =       FIVE
1567                       14,3565   12200 0  V41K    VN      4100
1568  REF  17  LAST  709   14,3566  3 0025 0  SET1/PDT CA      TIME1
1569  REF   9  LAST  539   14,3567  55'277 0           TS      1/PIPADT
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1570 REF 7 LAST 769 14,3570 1 6030 0 TCF DANZIG

```
P1571      SXTSM COMPUTES AN LOS VECTOR IN SM COORD FROM OCDU AND ICDU MARK DATA

 1572  REF   1              17,2000                        SETLOC P50S3
 1573                       17,2052                        BANK
 15735 REF   1                                             COUNT* $$/R51
 1574                       17,2052  77745 1  SXTSM        DLOAD
 1575  REF  49  LAST  761   17,2053  03723 1                MRKBUF1
 1576  REF  11  LAST  776   17,2054  02607 1                STORE  TSIGHT
 1577                       17,2055  77760 0                AXC,1
 1578  REF  50  LAST  778   17,2056  03722 0                MRKBUF1      ADDRESS OF MARK DATA FOR P50'S
 1579                       17,2057  77620 0  SXTSM1        STQ          CALLED HERE FROM GETUM (P20 AND P22)
 1580  REF   5  LAST  767   17,2060  00300 1                QMAJ
 1581                       17,2061  66744 0                LXC,2  SLOAD*
 1582  REF  11  LAST  776   17,2062  00304 0                STARIND
 1583  REF   1              17,2063  41673 0                MKUNCDR,2
 1584                       17,2064  76744 1                LXC,2  VLOAD*
 1585  REF 274  LAST  763   17,2065  00154 1                MPAC
 1586                       17,2066  00001 0                0,1
 1587                       17,2067  10001 1                STORE  0,2
 1588                       17,2070  77743 1                DLOAD*
 1589                       17,2071  00006 1                5,1
 1590                       17,2072  10006 0                STORE  5,2
 1591                       17,2073  77773 1  SXTSM2        VLOAD*
 1592                       17,2074  00003 1                2,1
 1593  REF   8  LAST  596   17,2075  35172 0                STCALL CDUSPOT
 1594  REF   2  LAST  512   17,2076  46000 0                SXTNB
 1595                       17,2077  77624 1                CALL
 1596  REF   2  LAST  597   17,2100  47642 1                TRG*NBSM     TRANSFER LOS TO SM
 1597                       17,2101  34041 0                STCALL 32D
 1598  REF   6  LAST  778   17,2102  00300 1                QMAJ
 1599  REF   7  LAST  630   17,2103  03674 1  MKUNCDR       ECADR  MARKDOWN
 1600  REF   2  LAST  183   17,2104  03460 0                ECADR  MARK2DWN
```

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P1601 NAME - R53 - SIGHTING MARK ROUTINE

```
P1602   FUNCTION -
R1603           TO PERFORM A SATISFACTORY NUMBER OF SIGHTING MARKS FOR THE REQUESTING PROGRAM (OR ROUTINE). SIGHTINGS
R1605   CAN BE MADE ON A STAR OR LANDMARK. WHEN THE CMC ACCEPTS A MARK IT RECORDS AND STORES 5 ANGLES (3 ICDUS AND 2
R1607   OCDUS) AND THE TIME OF THE MARK.

R1608   CALLING SEQUENCE
R1609     R53 IS CALLED AND RETURNS IN INTERPRETIVE CODE. RETURN IS VIA QPRET.
R1610     THERE IS NO ERROR EXIT IN THIS ROUTINE ITSELF.

R1611   SUBROUTINES CALLED
R1612     SXTMARK
R1613     OPTSTALL
R1614     GOFLASH

R1615   ERASABLE INITIALIZATION
R1616     TARGET FLAG - STAR OR LANDMARK
R1617     MARKINDX - NUMBER OF MARKS WANTED
R1618     STARIND - INDEX TO BESTI OR BESTJ (STAR NUMBER)
R1619   OUTPUT
R1620     MARKSTAT CONTAINS INDEX TO VACANT AREA WHERE MARK DATA IS STORED
R1621     BESTI (INDEXED BY STARIND) CONTAINS STAR NUMBER SIGHTED
R1622   DEBRIS
R1623     MARKINDX CONTAINS NUMBER OF MARKS DESIRED
 1624   REF   2  LAST  639    14,2000                    SETLOC RT53
 1625                         14,3571                    BANK

 1626   REF   1                                          COUNT* $$/R53
 1627                         14,3571   43020 1  R53     STQ    SET        SET SIGHTING MARK FLAG
 1628   REF   2  LAST  121    14,3572   03457 1          R53EXIT
 1629   REF   3  LAST  760    14,3573   00071 1          R53FLAG
 1630                         14,3574   77776 1          EXIT
 1631   REF 183  LAST  774    14,3575   0 4636 0 R53A    TC     BANKCALL
 1632   REF   2  LAST  452    14,3576    16000 0         CADR   SXTMARK
 1633   REF  20  LAST  775    14,3577   0 5354 0         TC     CHECKMM
 1634                         14,3600    00030 1         MM     24
 1635                         14,3601   1 3603 0         TCF    +2
 1636   REF   1               14,3602   1 3612 0         TCF    R53A1
 1637   REF  21  LAST  780    14,3603   0 5354 0         TC     CHECKMM
 1638                         14,3604    00026 0         MM     22         P22?
 1639   REF   8  LAST  437    14,3605   3 4766 1         CAF    FOUR       NO, IS MARKINDX = 1
 1640   REF   1               14,3606   6 3650 1         AD     MINS       YES, IS MARKINDX = 5 (CHECKMM LEAVES 0)
 1641   REF  12  LAST  452    14,3607   6 0301 0         AD     MARKINDX
 1642                         14,3610   0 0006 1         EXTEND
 1643   REF   1               14,3611   1 3575 1         BZF    R53A       NO MARKS TAKEN.  DO AGAIN.
 1644   REF 184  LAST  780    14,3612   0 4636 0 R53A1   TC     BANKCALL
 1645   REF   4  LAST  452    14,3613    16073 1         CADR   MKRELEAS
16457   REF 140  LAST  776    14,3614   3 4772 1 R53C1   CAF    ZERO
16458   REF 185  LAST  780    14,3615   0 4636 0         TC     BANKCALL
16459   REF   5  LAST  769    14,3616    20715 0         CADR   CLEANDSP
```

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 1646   REF  28  LAST  700   14,3617  4 4763 0  R53B     CS      B1T6          CUT BETWEEN P20S AND P50S
 1647   REF  15  LAST  754   14,3620  6 1214 1           AD      MODREG        P22,P23 CALL
 1648                        14,3621  0 0006 1           EXTEND
 1649   REF   1              14,3622  6 3631 0           BZMF    R53D          YES
 1653   REF   1              14,3623  3 3635 1  R53C     CAF     V01N71
 1654   REF  36  LAST  745   14,3624  0 5535 1           TC      VNFLASH
 1655   REF   2  LAST  756   14,3625  0 3636 1  R53Z     TC      CHKSCODE
R16551  ROUTINE TO ALLOW ONLY +0 <= STARCODE <= +50, OTHERWISE 'OPERATOR ERROR'

 1656   REF  13  LAST  756   14,3626  0 4362 1           TC      FALTON
 1657   REF   1              14,3627  0 3623 0           TC      R53C
 1658   REF   1              14,3630  0 3732 1           TC      STORIJ        SET BESTI(BESTJ) = 1ST(2ND) STARCODE
 1659   REF 194  LAST  776   14,3631  0 6006 1  R53D     TC      INTPRET
 1660                        14,3632   77614 1  R53OUT   SETGO
 1661   REF   2  LAST  757   14,3633   03420 1           TERMIFLG      SET TERMINATE FOR R52
 1662   REF   3  LAST  780   14,3634   03457 1           R53EXIT
 1663   REF  21  LAST  756      6211           SIGHTSIX =      SIX
 1664                        14,3635   00307 0  V01N71   VN      0171
R1665
R1666     ****** KEEP IN SAME BANK AS R51 AND R53 *********
 1667   REF  10  LAST  754   14,3636  11'140 1  CHKSCODE CCS     STARCODE
 16675  REF   1              14,3637  1 3643 1           TCF     SCPOS         > 0, CHECK IF <= 50
 1668   REF   2  LAST  382   14,3640  1 6710 0           TCF     Q+2           = +0, OK
 16685  REF 141  LAST  735   14,3641  0 0002 0           TC      Q             NEGATIVE STARCODE OF ANY
 1669   REF 142  LAST  781   14,3642  0 0002 0           TC      Q             MAGNITUDE IS IMPROPER
 1670   REF   1              14,3643  6 3647 1  SCPOS    AD      NEG47
 1671                        14,3644  0 0006 1           EXTEND
 1672   REF   3  LAST  781   14,3645  6 6710 1           BZMF    Q+2           <= 50, OK
 1673   REF 143  LAST  781   14,3646  0 0002 0           TC      Q             > 50, IMPROPER
 1675                        14,3647   77730 0  NEG47    OCT     77730
 1676                        14,3650   77772 0  MIN5     DEC     -5
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P1677   NAME-S52.2
R1678   FUNCTION-COMPUTE GIMBAL ANGLES FOR DESIRED SM AND PRESENT VEHICLE
R1679   CALL-  CALL  S52.2
R1680   INPUT- X,Y,ZSMD
R1681   OUTPUT- OGC,IGC,MGC,THETAD,+1,+2
R1682   SUBROUTINES-CDUTRIG,CALCSMSC,MATMOVE,CALCGA
 1683   REF   1                 11,2000                         SETLOC  S52/2
 1684                           11,2247                         BANK

 1685   REF   1                                                 COUNT*  $$/S52.2
 1686                           11,2247   45020 1   S52.2       STQ     CALL
 1687   REF   7  LAST  778      11,2250   00300 1               GMAJ
 1688   REF   8  LAST  759      11,2251   47530 1               CDUTRIG
 1689                           11,2252   77624 1               CALL
 1690   REF   2  LAST  751      11,2253   34756 1               CALCSMSC
 1691                           11,2254   66370 0               AXT,1   SSP
 1692                           11,2255   00022 1                       18D
 1693   REF  28  LAST  758      11,2256   00051 0                       S1
 1694                           11,2257   00006 1                       6D
 1695                           11,2260   61373 1   S52.2A      VLOAD*  VXM
 1696   REF   8  LAST  770      11,2261   02736 1                       XNB +18D,1
 1697   REF  40  LAST  776      11,2262   01734 0                       REFSMMAT
 1698                           11,2263   77656 1               UNIT
 1699   REF   9  LAST  782      11,2264   06736 0               STORE   XNB +18D,1
 1700                           11,2265   77700 0               TIX,1
 1701   REF   1                 11,2266   22260 0                       S52.2A
 1702                           11,2267   75160 1   S52.2.1     AXC,1   AXC,2
 1703   REF  12  LAST  748      11,2270   00306 1                       XSMD
 1704   REF  29  LAST  749      11,2271   02671 0                       XSM
 1705                           11,2272   77624 1               CALL
 1706   REF   4  LAST  776      11,2273   34730 1                       MATMOVE
 1707                           11,2274   77624 1               CALL
 1708   REF   3  LAST  629      11,2275   47344 1                       CALCGA
 1709                           11,2276   77650 1               GOTO
 1710   REF   8  LAST  782      11,2277   00300 1                       QMAJ
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P1711      THE ADVTRACK ROUTINE IS USED TO COMPUTE AN OPTICS LOS VECTOR TO
R1712   A POINT ON THE GROUND TRACK 60 DEGRESS FORWARD OF THE LOCAL VERTICAL
R1713   OF AN ADVANCED ORBIT A SPECIFIED NUMBER OF REVOLUTIONS FROM NOW

 1714   REF   1                26,2000                        SETLOC 26P50S
 1715                         26,2040                        BANK
 17155  REF   1                                               COUNT* $$/R52
 1716                         26,2040  77601 0  ADVTRACK SETPD
 1717                         26,2041  00001 0                 0
 1718                         26,2042  41575 0        VLOAD   PUSH          INITIALIZE FOR RP-TO-R
 1719   REF   3  LAST  459    26,2043  15330 0                UNITZ         UZ VEC IN PD 0-5
 1720                         26,2044  41434 1        RTB     PUSH          TIME IN PD 6-7
 1721   REF  24  LAST  758    26,2045  51751 0                LOADTIME
 1722   REF  10  LAST  763    26,2046  36347 1        STCALL  AOPTIME       TIME ALSO IN AOPTIME FOR CSMCONIC
 1723   REF   5  LAST  745    26,2047  55345 0                RP-TO-R       GET MOON ROTATION VEC IN REF
 1724   REF  11  LAST  759    26,2050  16766 1        STODL   STAR
 1725   REF  11  LAST  783    26,2051  02347 0                AOPTIME       PICK UP TIME
 1726   REF  37  LAST  766    26,2052  34041 0        STCALL  TDEC1         UPDATE STATE TO TIME
 1727   REF   9  LAST  766    26,2053  27170 1                CSMCONIC
 1728                         26,2054  47375 0        VLOAD   VXV
 1729   REF  23  LAST  767    26,2055  00007 0                VATT
 1730   REF  29  LAST  767    26,2056  00001 0                RATT
 1731                         26,2057  24031 0        STOVL   24D           SAVE -UNIT(V X R) FOR 2ND ROTATION
 1732   REF  30  LAST  783    26,2060  00001 0                RATT
 1733                         26,2061  57456 1        UNIT    VCOMP
 1734                         26,2062  41401 1        SETPD   PUSH          PUSH LOS=-UNIT(RVEC)  PD 0-5
 1735                         26,2063  00001 0                 0
 1736                         26,2064  54335 0        SLOAD   SL
 1737   REF  20  LAST  638    26,2065  03752 1                LANDMARK
 1738                         26,2066  20214 1                11D
 1739                         26,2067  41342 1        SR1     DMP
 1740   REF   1                26,2070  14135 0                MPERIOD
 1741   REF  12  LAST  783    26,2071  36347 1        STCALL  AOPTIME       ROTATE ANG ABOUT UR
 1742   REF   1                26,2072  54105 1                ROTA
 1743                         26,2073  53575 0        VLOAD   UNIT
 1744                         26,2074  00031 0                24D           PICK UP 2ND ROTATION AXIS
 1745   REF  12  LAST  783    26,2075  16766 1        STODL   STAR
 1746   REF   1                26,2076  14133 0                DP1/6
 1747                         26,2077  77625 0        DSU
 1748   REF  13  LAST  783    26,2100  02347 0                AOPTIME       2ND RAT ANGLE = 60 - A
 1749   REF  14  LAST  783    26,2101  36347 1        STCALL  AOPTIME
 1750   REF   2  LAST  783    26,2102  54105 1                ROTA          GO ROTATE 2ND TIME
 1751   REF  13  LAST  783    26,2103  36766 0        STCALL  STAR          STORE FINAL LOS IN STAR
 1752   REF   3  LAST  759    26,2104  31120 0                COM52         RETURN TO SR52.1

 1753                         26,2105  73545 1  ROTA  DLOAD   SIN
 1754   REF  15  LAST  783    26,2106  02347 0                AOPTIME
 1755                         26,2107  47315 0        PDVL    VXV           PUSH 1/2SIN(A)  PD  6-7
 1756   REF  14  LAST  783    26,2110  02766 1                STAR            UR VEC
 1757                         26,2111  00001 0                0               LOS
```

```
1758                                26,2112  72561 0          VXSC   VSL2        1/2SIN(A)(URXLOS)  PD 6-11
1759                                26,2113  50315 0          PDVL   DOT
1760   REF  15  LAST  783           26,2114  02766 1                 STAR
1761                                26,2115  00001 0                 0
1762                                26,2116  72561 0          VXSC   VSL2
1763   REF  16  LAST  784           26,2117  02766 1                 STAR
1764                                26,2120  71525 0          PDDL   COS         1/2(UR . LOS)UR  12-17
1765   REF  16  LAST  783           26,2121  02347 0                 AOPTIME
1766                                26,2122  51315 1          PDVL   BVSU        PUSH 1/2COS(A)  18-19
1767                                26,2123  00015 0                 12D
1768                                26,2124  00001 0                 0
1769                                26,2125  76561 1          VXSC   VSL1        UP 18-19
1770                                26,2126  53255 0          VAD    VAD         UP 12-17  UP 6-11
1771                                26,2127  40256 1          UNIT   SETPD
1772                                26,2130  00001 0                 0
1773                                26,2131  43406 1          PUSH   RVQ

1774                                26,2132  05252 1  DP1/6   2DEC   .16666666
1774                                26,2133  25251 0
1775                                26,2134  01414 1  MPERIOD 2DEC   .047619      APPROX LUNAR ROT ANG IN 2HRS X 16
1775                                26,2135  06044 1
```

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P1776   NAME - R56 - ALTERNATE LOS SIGHTING MARK ROUTINE
R1777   FUNCTIONAL DESCRIPTION
R1778           TO PERFORM SIGHTING MARKS FOR THE BACK-UP ALIGNMENT PROGRAMS (P53,P54). THE ASTRONAUT KNOWS THE
R1780   COORDINATES (OPTICS) OF THE ALTERNATE LINE OF SIGHT HE MUST USE FOR THIS ROUTINE. WHEN THE ASTRONAUT KEYS IN
R1782   ENTER IN RESPONSE TO THE FLASHING V50 N25 R1-XXXXX THE CMC STORES THE THREE ICDU ANGLES AND TWO ANGLES DISPLAYED
R1784   IN N92.

R1785   CALLING SEQUENCE
R1786           CALL
R1787                   R56

R1788   SUBROUTINES CALLED
R1789           A PORTION OF SXTMARK (VAC.AREA SEARCH)
R1790           GOFLASH
R1791           GOPERF1

R1792   ERASABLE INITIALIZATION
R1793           STARIND-INDEX TO STAR NUMBER

R1794   OUTPUT
R1795           MARKSTAT-INDEX TO VAC.AREA WHERE OUTPUT IS STORED.
R1796           BESTI (INDEXED BY STARIND) CONTAINS STAR NUMBER.
R1797           ICDU AND OCDU ANGLES IN VAC. AREA AS FOLLOWS-
R1798                   VAC +2  CDUY
R1799                   VAC +3  CDUS
R1800                   VAC +4  CDUZ
R1801                   VAC +5  CDUT
R1802                   VAC +6  CDUX

 1804   REF   2  LAST  778    17,2000                          SETLOC  P50S3
 1805                          17,2105                          BANK
 18055  REF   1                                                COUNT*  $$/R56
 1806                          17,2105   77420 1  R56           STQ     EXIT
 1807   REF   4  LAST  781    17,2106   03457 1                        R53EXIT
 1808   REF   1                17,2107  3 2162 0                CAF     V06N94B
 1809   REF  37  LAST  781    17,2110  0 5535 1                 TC      VNFLASH
 1810   REF 186  LAST  780    17,2111  0 4636 0  R56A           TC      BANKCALL
 1811   REF   3  LAST  568    17,2112   16062 1                 CADR    TESTMARK

 1812   REF 141  LAST  780    17,2113  3 4772 1                 CAF     ZERO
 1813   REF 187  LAST  785    17,2114  0 4636 0                 TC      BANKCALL
 1814   REF   6  LAST  780    17,2115   20715 0                 CADR    CLEANDSP

 1815   REF   1                17,2116  3 2161 0  R56A1          CAF     V853            DISPLAY V53 REQUESTING ALTERNATE MARK
 1816   REF 188  LAST  785    17,2117  0 4636 0                 TC      BANKCALL
 1817   REF   1                17,2120   20601 1                 CADR    GOMARK2
 1818   REF  46  LAST  776    17,2121  1 4103 0                 TCF     GOTOPOOH        V34-TERMINATE
 1819   REF   1                17,2122  1 2116 1                 TCF     R56A1           V33-DONT PROCEED-JUST ENTER TO MARK
 1820   REF 195  LAST  781    17,2123  0 6006 1                 TC      INTPRET
 1821                          17,2124   77745 1                 DLOAD
```

```
1822  REF  51 LAST  778  17,2125  03726 1            MRKBUF1 +3
1823  REF  10 LAST  763  17,2126  16774 1  STODL     SAC
1824  REF  52 LAST  786  17,2127  03730 0            MRKBUF1 +5
1825  REF  10 LAST  759  17,2130  02776 0  STORE     PAC
1826                     17,2131  77776 1  EXIT
1827                     17,2132  0 0004 0  INHINT
1828  REF  11 LAST  710  17,2133  0 4606 0  TC       E7SETTER

1829  REF  53 LAST  786  E7,1722              EBANK=   MRKBUF1
1830                     17,2134  0 0006 1  EXTEND
1831  REF  31 LAST  757  17,2135  3 0025 0  DCA      TIME2
1832  REF  54 LAST  786  17,2136  53'723 1  DXCH     MRKBUF1
1833  REF   8 LAST  710  17,2137  3 0033 1  CA       CDUY          ENTER-THIS IS A BACKUP SYSTEM MARK
1834  REF  55 LAST  786  17,2140  55'724 0  TS       MRKBUF1 +2
1835  REF  12 LAST  769  17,2141  3 0034 0  CA       CDUZ
1836  REF  56 LAST  786  17,2142  55'726 1  TS       MRKBUF1 +4
1837  REF  17 LAST  769  17,2143  3 0032 0  CA       CDUX
1838  REF  57 LAST  786  17,2144  55'730 0  TS       MRKBUF1 +6
1839                     17,2145  0 0003 1  RELINT
1840  REF   4 LAST  757  17,2146  3 5043 0  CAF      EBANK5        MAY NOT NEED TO DO THIS
1841  REF  23 LAST  760  17,2147  54 003 0  TS       EBANK

1842  REF   3 LAST  769  E5,1777              EBANK=   QMIN

1843  REF   7 LAST  568  17,2150  0 5527 1  TC       CLEARMRK      ENABLE EXTENDED VERBS
1844  REF   1            17,2151  3 4321 0  CAF      OCT16
1845  REF 189 LAST  785  17,2152  0 4636 0  TC       BANKCALL
1846  REF  10 LAST  774  17,2153  21067 0  CADR     GOPERF1
1847  REF  47 LAST  785  17,2154  0 4103 1  TC       GOTOPOOH      TERM.
1848  REF   1            17,2155  1 2157 1  TCF      R56B          PROCEED-MARK COMPLETED
1849  REF   1            17,2156  1 2111 0  TCF      R56A          RECYCLE - DO ANOTHER MARK - LIKE REJECT
1850  REF 190 LAST  786  17,2157  0 4636 0  R56B     TC       BANKCALL
1851  REF   1            17,2160  31614 0  CADR     R53C1
1852                     17,2161  15200 1  VB53     VN       05300         ALTERNATE MARK VERB
1853                     17,2162  01536 0  V06N94B  VN       00694
1854  REF   3 LAST  776  14,2000              SETLOC   P50S1
1855                     14,3651              BANK

18555 REF   1                                 COUNT*   $$/PLNET
1856  REF  12 LAST  778  14,3651  02607 1  PLANET   STORE    TSIGHT
1857                     14,3652  45020 1            STQ      CALL
1858  REF   4 LAST  786  14,3653  02777 1                     QMIN
1859  REF   2 LAST  750  14,3654  26345 1                     LOCSAM
1860                     14,3655  77775 1            VLOAD
1861  REF   5 LAST  766  14,3656  02736 1                     VEARTH
1862                     14,3657  24001 0            STOVL    OD
1863  REF   8 LAST  767  14,3660  02744 1                     VSUN
1864  REF   6 LAST  786  14,3661  26736 1            STOVL    VEARTH
1865                     14,3662  00001 0                     OD
1866  REF   9 LAST  786  14,3663  02744 1            STORE    VSUN
```

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1867                          14,3664   77776 1  NOSAM    EXIT
1868  REF   2 LAST  781      14,3665   0 3732 1           TC       STORIJ          SET BESTI(BESTJ) = 1ST(2ND) STARCODE
1869  REF 180 LAST  774      14,3666   10 000 0           CCS      A
1870  REF   1                14,3667   1 3700 1           TCF      NOTPLAN
1871  REF   1                14,3670   3 5035 1           CAF      VNPLANV
1872  REF  38 LAST  785      14,3671   0 5535 1           TC       VNFLASH
1873  REF 196 LAST  785      14,3672   0 6006 1           TC       INTPRET
1874                          14,3673    74375 0           VLOAD    VXSC
1875  REF   6 LAST  639      14,3674    03705 0                    STARSAV3
1876  REF   1                14,3675    31731 0                    1/SQR3
1877                          14,3676    52056 0           UNIT     GOTO
1878  REF   1                14,3677    31723 0                    CORPLAN
1879  REF 181 LAST  787      14,3700   4 0000 0  NOTPLAN  CS       A
1880  REF   1                14,3701   6 3727 0           AD       DEC227
1881                          14,3702   0 0006 1           EXTEND
1882  REF   1                14,3703   6 3714 0           BZMF     CALSAM1
1883  REF  12 LAST  778      14,3704   50 304 0           INDEX    STARIND
1884  REF  10 LAST  754      14,3705   3 0302 0           CA       BESTI
1885  REF  14 LAST  769      14,3706   50 120 1           INDEX    FIXLOC
1886  REF  29 LAST  751      14,3707   54 046 1           TS       X1
1887  REF 197 LAST  787      14,3710   0 6006 1           TC       INTPRET
1888                          14,3711    52173 0           VLOAD*   GOTO
1889  REF  11 LAST  752      14,3712    33776 1                    CATLOG,1
1890  REF   2 LAST  787      14,3713    31723 0                    CORPLAN
1891  REF 198 LAST  787      14,3714   0 6006 1  CALSAM1  TC       INTPRET
1892                          14,3715    70740 0           LXC,1    DLOAD*
1893  REF  13 LAST  787      14,3716    00304 0                    STARIND
1894  REF  11 LAST  787      14,3717    00303 1                    BESTI,1
1895                          14,3720    76740 0           LXC,1    VLOAD*
1896  REF 275 LAST  778      14,3721    00154 1                    MPAC
1897  REF  10 LAST  776      14,3722    02372 0                    STARAD -228D,1
1898                          14,3723    53455 0  CORPLAN  VAD      UNIT
1899  REF   9 LAST  767      14,3724    03452 1                    VEL/C
1900                          14,3725    77650 1           GOTO
1901  REF   5 LAST  786      14,3726    02777 1                    QMIN
1902                          14,3727    00343 0  DEC227   DEC      227
1903  REF   3 LAST  639         5035              VNPLANV  =        V06N88
1904                          14,3730    22363 1  1/SQR3   2DEC     .57735021
1904                          14,3731    11623 0
1905  REF   3 LAST  564      14,3732   4 7677 1  STORIJ   CS       HIGH9           CALLED AT R53Z, NOSAM(PLANET)
1906  REF  11 LAST  781      14,3733   7 1140 1           MASK     STARCODE
1907                          14,3734   0 0006 1           EXTEND
1908  REF   1                14,3735   7 6211 1           MP       SIGHTSIX
1909  REF  78 LAST  764      14,3736   56 001 0           XCH      L
1910  REF  14 LAST  787      14,3737   50 304 0           INDEX    STARIND
1911  REF  12 LAST  787      14,3740   54 302 1           TS       BESTI
1912  REF 144 LAST  781      14,3741   0 0002 0           TC       Q               RETURN TO CALLER
19125 REF   2 LAST  749 TO  750:     43     43*          COUNT*   $$/R50
1913  REF 145 LAST  787      14,3742   3 0002 0  COARSUB  CA       Q
1914  REF   6 LAST  787      14,3743   55'777 0           TS       QMIN
```

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1915  REF   6  LAST  314   14,3744  3 1335 0  STALLOOP CA      MODECADR        IS IMU IN USE?
1916                       14,3745  0 0006 1           EXTEND
1917  REF   1              14,3746  1 3753 1           BZF     CORSCALL        NO, GO AHEAD WITH COARSE ALIGN
1918  REF  12  LAST  709   14,3747  3 5016 0           CAF      1SEC           YES, SO WAIT A SEC
1919  REF 191  LAST  786   14,3750  0 4636 0           TC      BANKCALL
1920  REF  14  LAST  760   14,3751   01731 0           CADR    DELAYJOB
1921  REF   1              14,3752  0 3744 0           TC      STALLOOP                        AND TRY AGAIN
1922  REF 192  LAST  788   14,3753  0 4636 0  CORSCALL TC      BANKCALL
1923  REF   3  LAST  428   14,3754   16724 1           CADR    IMUCOARS        PERFORM COARSE ALIGN
1924  REF 193  LAST  788   14,3755  0 4636 0           TC      BANKCALL
1925  REF  10  LAST  755   14,3756   17644 1           CADR    IMUSTALL
1926  REF   3  LAST  755   14,3757  0 3766 0           TC      217ALARM        BAD END
1927  REF 194  LAST  788   14,3760  0 4636 0           TC      BANKCALL
1928  REF   1              14,3761   17133 0           CADR    IMUFIN2C        PERFORM FINE ALIGN
1929  REF 195  LAST  788   14,3762  0 4636 0           TC      BANKCALL
1930  REF  11  LAST  788   14,3763   17644 1           CADR    IMUSTALL
1931  REF   4  LAST  788   14,3764  0 3766 0           TC      217ALARM        BAD END
1932  REF   7  LAST  787   14,3765  0 1777 1           TC      QMIN
1933                       14,3766  0 0004 0  217ALARM INHINT                  JUST LIKE 'CURTAINS,' NOW DEPARTED
1934  REF 146  LAST  787   14,3767  3 0002 0           CA      Q
1935  REF   1              14,3770  0 5673 0           TC      ALARM2
1936                       14,3771   00217 0           OCT     00217
1937  REF   3  LAST  283   14,3772  0 1363 0           TC      ALMCADR         RETURN TO USER
```

P0001 LUNAR AND SOLAR EPHEMERIDES SUBROUTINES

R0002 FUNCTIONAL DESCRIPTION

R0003 THESE SUBROUTINES ARE USED TO DETERMINE THE POSITION AND VELOCITY
R0004 VECTORS OF THE SUN AND THE MOON RELATIVE TO THE EARTH AT THE
R0005 SPECIFIED GROUND ELAPSED TIME INPUT BY THE USER.

R0006 THE POSITION OF THE MOON IS STORED IN THE COMPUTER IN THE FORM OF
R0007 A NINTH DEGREE POLYNOMIAL APPROXIMATION WHICH IS VALID OVER A 15
R0008 DAY INTERVAL BEGINNING SHORTLY BEFORE LAUNCH. THEREFORE THE TIME
R0009 INPUT BY THE USER SHOULD FALL WITHIN THIS 15 DAY INTERVAL.

R0010 LSPOS COMPUTES THE POSITION VECTORS OF THE SUN AND THE MOON.

R0011 LUNPOS COMPUTES THE POSITION VECTOR OF THE MOON.

R0012 LUNVEL COMPUTES THE VELOCITY VECTOR OF THE MOON.

R0014 CALLING SEQUENCE

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R0015          DLOAD  CALL
R0016                 TIME          GROUND ELAPSED TIME
R0017                 SUBROUTINE    LSPOS OR LUNPOS OR LUNVEL
```

R0018 INPUT

R0019 1) SPECIFIED GROUND ELAPSED TIME IN CS X B-28 LOADED IN MPAC.

R0020 2) TIMEMO - TIME AT THE CENTER OF THE RANGE OVER WHICH THE LUNAR
R0021 POSITION POLYNOMIAL IS VALID IN CS X B-42.

R0022 3) VECOEM - VECTOR COEFFICIENTS OF THE LUNAR POSITION POLYNOMIAL
R0023 LOADED IN DESCENDING SEQUENCE IN METERS/CS**N X B-2

R0024 4) RESO - POSITION VECTOR OF THE SUN RELATIVE TO THE EARTH AT
R0025 TIMEMO IN METERS X B-38.

R0026 5) VESO - VELOCITY VECTOR OF THE SUN RELATIVE TO THE EARTH AT
R0027 TIMEMO IN METERS/CS X B-9.

R0028 6) OMEGAES - ANGULAR VELOCITY OF THE VECTOR RESO AT TIMEMO IN
R0029 REV/CS X B+26.

R0030 ALL EXCEPT THE FIRST INPUT ARE INCLUDED IN THE PRE-LAUNCH
R0031 ERASABLE DATA LOAD.

R0032 OUTPUT - LSPOS

R0033 1) 2D OF VAC AREA CONTAINS THE POSITION VECTOR OF THE SUN RELATIVE

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R0034           TO THE EARTH AT TIME INPUT BY THE USER IN METERS X B-38.

R0035         2) MPAC CONTAINS THE POSITION VECTOR OF THE MOON RELATIVE TO THE
R0036            EARTH AT TIME INPUT BY THE USER IN METERS X B-29.

R0037   OUTPUT - LUNPOS

R0038         MPAC CONTAINS THE POSITION VECTOR OF THE MOON RELATIVE TO THE
R0039         EARTH AT THE TIME INPUT BY USER IN METERS X B-29.

R0040   OUTPUT - LUNVEL

R0041         MPAC CONTAINS THE VELOCITY VECTOR OF THE MOON RELATIVE TO THE
R0042         EARTH AT TIME INPUT BY THE USER IN METERS/CS X B-7.

R0046   SUBROUTINES USED

R0047         NONE

R0048   REMARKS

R0049         THE VAC AREA IS USED FOR STORAGE OF INTERMEDIATE AND FINAL RESULTS
R0050         OF COMPUTATIONS.

R0051         S1, X1 AND X2 ARE USED BY THESE SUBROUTINES.
R0052         PRELAUNCH ERASABLE DATA LOAD ARE ONLY ERASABLE STORAGE USED BY
R0053         THESE SUBROUTINES.
R0054         RESTARTS DURING OPERATION OF THESE SUBROUTINES MUST BE HANDLED BY
R0055         THE USER.

 0057   REF   1                 26,2000                        SETLOC  EPHEM
 0058                           26,2136                        BANK

 0059   REF   1                                                COUNT*  $$/EPHEM
 0060   REF   9  LAST  768     E7,1777                        EBANK=  WHOCARES
 0063                           26,2136  52170 0  LSPOS       AXT,1   GOTO
 0064   REF   1                 26,2137  54163 1                  RES             AREA.  THE POSITION VECTOR OF THE MOON
 0065   REF   1                 26,2140  54146 0                  LSTIME          IS STORED IN MPAC.
 0066                           26,2141  52170 0  LUNPOS       AXT,1   GOTO            COMPUTES THE POSITION VECTOR OF THE MOON
 0067   REF   1                 26,2142  54201 0                  REM             AND STORES IT IN MPAC.
 0068   REF   2  LAST  790     26,2143  54146 0                  LSTIME
 0069                           26,2144  77770 1  LUNVEL       AXT,1
 0070   REF   1                 26,2145  54212 1                  VEM             AND STORES IT IN MPAC.
 0075                           26,2146  54201 0  LSTIME       SETPD   SR
 0076                           26,2147  00001 0                  OD
 0077                           26,2150  20617 0                  14D
 0078                           26,2151  57571 0          TAD     DCOMP
 0079   REF  11  LAST  540     26,2152  01707 0                  TEPHEM
 0080                           26,2153  57571 0          TAD     DCOMP
 0081   REF   2  LAST   92      26,2154  02034 1                  TIMEMO
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0082                            26,2155  66261 1          SL      SSP
0083                            26,2156  20221 1                  16D
0084  REF  29  LAST  782        26,2157  00051 0                  S1
0085                            26,2160  00006 1                  6D
0086                            26,2161  77650 1          GOTO
0087  REF  30  LAST  787        26,2162  00046 0                  X1
0088                            26,2163  41206 0  RES     PUSH     DMP                                    PD- 2
0089  REF   1                   26,2164  02147 1                  OMEGAES
0090                            26,2165  71406 0          PUSH     COS                                    PD- 4
0091                            26,2166  65361 0          VXSC     PDDL                                   PD- 8
0092  REF   2  LAST   93        26,2167  02133 1                  RESO
0093                            26,2170  63356 1          SIN      PDVL                                   PD-10
0094  REF   3  LAST  791        26,2171  02133 1                  RESO
0095                            26,2172  53406 0          PUSH     UNIT                                   PD-16
0096                            26,2173  53435 0          VXV      UNIT
0097  REF   3  LAST  630        26,2174  02141 1                  VESO
0098                            26,2175  76435 1          VXV      VSL1                                   PD-10
0099                            26,2176  53361 0          VXSC     VAD                                    PD-02
0100                            26,2177  77772 0          VSL1
0102                            26,2200  14003 1  RESA    STODL    2D          RES IN METERS X B-38 IN 2D OF VAC. PD- 0
0103                            26,2201  63370 0  REM     AXT,1    PDVL                                   PD- 2
0104                            26,2202  00066 1                  54D
0105  REF   2  LAST   93        26,2203  02037 1                  VECQEM
0106                            26,2204  52761 0  REMA    VXSC     VAD*
0107                            26,2205  00001 0                  0D
0108  REF   3  LAST  791        26,2206  02133 1                  VECQEM +60D,1
0109                            26,2207  72500 1          TIX,1    VSL2        REM IN METERS X B-29 IN MPAC.
0110  REF   1                   26,2210  54204 0                  REMA
0111                            26,2211  77616 0          RVQ
0112                            26,2212  65370 0  VEM     AXT,1    PDDL                                   PD- 2
0113                            26,2213  00060 1                  48D
0114  REF   1                   26,2214  14233 0                  NINEB4
0115                            26,2215  74206 0          PUSH     VXSC                                   PD- 4
0116  REF   4  LAST  791        26,2216  02037 1                  VECQEM
0117                            26,2217  77761 1  VEMA    VXSC
0118                            26,2220  00001 0                  0D
0119                            26,2221  14005 1          STODL    4D                                     PD- 2
0120                            26,2222  41425 1          DSU      PUSH                                   PD- 4
0121  REF   1                   26,2223  31771 1                  ONEB4
0122                            26,2224  53357 0          VXSC*    VAD
0123  REF   5  LAST  791        26,2225  02125 0                  VECQEM +54D,1
0124                            26,2226  00005 1                  4D
0125                            26,2227  72500 1          TIX,1    VSL2        VEM IN METERS/CS X B-7 IN MPAC.
0126  REF   1                   26,2230  54217 1                  VEMA
0127                            26,2231  77616 0          RVQ
0128                            26,2232  22000 1  NINEB4  2DEC     9.0 B-4
0128                            26,2233  00000 1
0129  REF   1                   34,3770           ONEB4   =        DP2(-4)     1 B-4
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R0001   PROGRAM:                P61
R0002   MOD NO.:                0    MAR. 13, 1967
R0003   MOD BY:                 R. HIRSCHKOP
R0004   MOD NO:  1              MOD BY:  RR BAIRNSFATHER     DATE:  22 JUN 67    RESTARTS.
R0006   MOD NO:  2              MOD BY:  RR BAIRNSFATHER     DATE:  17 JAN 68    COLOSSUS GSOP CHANGES.
R0008   MOD NO:  3              MOD BY:  RR BAIRNSFATHER     DATE:   8 MAY 68    DELETE CMSM MANEUVER (PCR 50)
R0091   MOD NO:  4              MOD BY:  RR BAIRNSFATHER     DATE:   1 JUL 69    PCR 787: TICK TTE
R0010   FUNCTION:               TO CALCULATE AND DISPLAY EMS INITIALIZATION DATA
R0011   CALLING SEQUENCE-       BY V37
R0012   EXIT-                   TO P62
R0013   SUBROUTINE CALLS-       S61.1 , S61.3 , GOFLASH , FLAGUP , R02BOTH

R0014   ERASABLE INITIALIZATION:
R0015           EMSALT  (-29) M         .05G ALTITUDE ABOVE FISCHER ELLIPSOID   PAD LOADED.
R0017           ALFAPAD  /180           HYPERSONIC CM TRIM ANGLE OF ATTACK      PAD LOADED
R0019   OUTPUT: THE FOLLOWING REGISTERS ARE WRITTEN IN FOR USE BY DISPLAYS
R0020           GMAX   100 GMAX  (-14)  G,S     MAXIMUM ACCELERATION
R0021           VPRED  (-7)  M/CS       PREDICTED VELOCITY AT 400K FT
R0022           GAMMAEI  GAMMA/360      PREDICTED GAMMA    AT 400K FT
R0023           RTGO   THETAH/360       RANGE ANGLE TO SPLASH FROM EMSALT       EMSALT IS PAD LOADED
R0025           VIO    (-7) M/CS        INERTIAL VELOCITY  AT      EMSALT       EMSALT IS PAD LOADED
R0027           TTE    (-28) CS         TIME     TO                 EMSALT       EMSALT IS PAD LOADED
R0029           LAT(SPL)  /360          TARGET LOCATION                         LEFT BY DSKY
R0031           LNG(SPL)  /360          TARGET LOCATION                         LEFT BY DSKY
R0033           HEADSUP   (0)           +1 = LIFT DOWN,  -1 = LIFT UP           LEFT BY DSKY
R0035   DEBRIS: SEE SUBROUTINES.

 0037   REF   1                 26,2000                 SETLOC P60S
 0038                           26,2234                 BANK

 0039   REF  13  LAST  540      E6,1661                 EBANK= AOG

 0040   REF   1                                         COUNT* $$/P61

 0041   REF  33  LAST  726      26,2234  3 4753 1  P61   CA     BIT14            EXTENDED VERB SHOULD BE FREE THIS CLOSE
 0042   REF  14  LAST  521      26,2235  55'247 0        TS     EXTVBACT         TO V37
A0043                                                                           LOCK OUT EXTENDED VERBS SO CAN USE TFF
A0044                                                                           ROUTINES.EXT VERB ERASE IS USED

 0045   REF  83  LAST  764      26,2236  4 4770 1        CS     ONE              REMOVE IF HEADSUP EVER ON UPLINK DATA
 0046   REF   3  LAST  293      26,2237  55'726 1        TS     HEADSUP          PRELOAD

 0047   REF   1                 26,2240  0 2546 1        TC     S61.1            CHECK STATE VECTOR AND IMU ORIENTATION
A0048                                                                   RV 60GENRET. DOES PHASCHNG, GROUP 4.

 0049   REF   1                 26,2241  3 5034 0        CA     V06N61           LAT(SPL)     LNG(SPL)     HEADSUP
A0050                                                                           XXX.XX DEG   XXX.XX DEG   XXXXX.
 0051   REF   6  LAST  756      26,2242  0 5540 0        TC     VNFLASHR
 0054   REF   1                 26,2243  0 2247 1        TC     P61.4
 0056   REF  78  LAST  776      26,2244  0 5402 1  P61.3 TC     PHASCHNG
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 0057                          26,2245   00014 1           OCT     00014

 0058   REF  80 LAST  761     26,2246   0 5205 0          TC      ENDOFJOB

 0061                          26,2247   22 007 0  P61.4   ZL
 0062   REF   4 LAST  792     26,2250   11'726 1          CCS     HEADSUP       C(HEADSUP)=  +1/-1
 0063   REF  34 LAST  792     26,2251   3 4753 1          CA      BIT14         IF HEADSUP POS,ROLLC =180 DEG.(LIFT DWN)
 0064                          26,2252   12 253 0          NOOP                  IF HEADSUP NEG,ROLLC=0 (LIFT UP)
 0065   REF   7 LAST  293     26,2253   53'716 1          DXCH    ROLLC         ROLLC IS USED BY S62.3: GIM ANG AT .05G

 00655  REF  35 LAST  793     26,2254   3 4753 1  AGIN,MON CA      BIT14         LOCK OUT EXTENDED VERBS.(REDUNDANT ON
 00656  REF  15 LAST  792     26,2255   55'247 0          TS      EXTVBACT       INITIAL PASS)

 0066   REF 199 LAST  787     26,2256   0 6006 1          TC      INTPRET
 0067                          26,2257    77745 1  NEWRNVN DLOAD
 0068   REF  10 LAST  730     26,2260   01044 0                   PIPTIME       SAVE TIME OF RN,VN TO DETERMINE IF AN
 0069   REF   2 LAST  122     26,2261   37651 1          STCALL  MM            UPDATE HAS OCCURRED
 0070   REF   1               26,2262   52063 0                   STARTEN1      INITIALIZE
 0071                          26,2263   43175 0          VLOAD   CLEAR         'TTE' WILL BE DECREMENTED UNTIL
 0072   REF  10 LAST  730     26,2264   01030 0                   RN
 00722  REF   1               26,2265   03274 0                   .05GSW        THE DRAG > 0.05 G .
A00723                                                                           .05GSW SET =1 BY  FRESH START.
 0073   REF  15 LAST  648     26,2266   02320 1          STORE   RONE
 0074                          26,2267   77656 1          UNIT
 0075   REF   1               26,2270   26334 1          STOVL   URONE
 0076   REF  10 LAST  717     26,2271   01036 0                   VN
 0077   REF  11 LAST  524     26,2272   02326 1          STORE   VONE
 0078                          26,2273   53435 0          VXV     UNIT
 0079   REF   2 LAST  793     26,2274   02334 1                   URONE
 0080   REF   2 LAST  122     26,2275   03502 0          STORE   UNI
 0081                          26,2276   45345 1  DUMPP61 DLOAD   DSU
 0082   REF   3 LAST  793     26,2277   03651 0                   MM            INITIAL VALUE OF PIPTIME
 0083   REF  11 LAST  793     26,2300   01044 0                   PIPTIME
 0084                          26,2301   45040 1          BMN     CALRB
 0085   REF   1               26,2302   54257 0                   NEWRNVN       UPDATED... GO TRY AGAIN
 0086   REF   1               26,2303   54652 1                   S61.2         GET DISPLAY DATA FOR N60 AND N63
A0087                                                                            AND RETURN IN BASIC, BELOW.
 0089   REF   8 LAST  786     26,2304   0 5527 1  P61.1   TC      CLEARMRK
 0090   REF   1               26,2305   3 5033 1          CA      V06N60        GMAX          VPRED         GAMMAEI
A0091                                                                            XXX.XX G      XXXXX. FPS    XXX.XX DEG
 0092   REF  39 LAST  787     26,2306   0 5535 1          TC      VNFLASH
R0099   'TICKTTE' DECREMENTS 'TTE' DISPLAY NOUN N63 AT A 2 SECOND RATE. 'TICKTTE' IS LOCATED IN 'SERVICER' AND
R0101   OPERATES ONLY DURING P61 THROUGH P63. THUS N63 IS 'ON CALL' & ON ENTRY  DOWNLIST THROUGH P63.
R0102   'TICKTTE' WILL GIVE PROPER ANSWER IN EVENT OF RESTART OR A RECYCLE VIA   V32.

 0106   REF   1               26,2307   3 2425 0          CA      V16N63        RTGO          VIO           TTE
A0107                                                                            XXXX.X NM     XXXXX. FPS    XXBXX M,S
 0108   REF 196 LAST  788     26,2310   0 4636 0          TC      BANKCALL
 0109   REF  22 LAST  769     26,2311    20743 0          CADR    GOFLASH
 0110   REF  48 LAST  786     26,2312   0 4103 1          TC      GOTOPOOH
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 0111                        26,2313  0 2315 1        TC     +2
 0112  REF   1               26,2314  0 2254 0        TC     AGIN,MON      REDO CONIC CALC. ASSUME EXT VB INACTIVE

R0113                                .... THEN FALL INTO P62
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L P61-P67 USER'S PAGE NO. 4 E6 S3

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RC114   PROGRAM-                P62
RC115   MOD NO.-                0    MAR. 13, 1967
RC116   MOD BY-                 R. HIRSCHKOP
RC117   MOD NO:  1              MOD BY:  RR BAIRNSFATHER      DATE: 21 MAR 67
RC118   MOD NO:  2              MOD BY:  RR BAIRNSFATHER      DATE:  22 JUN 67     RESTARTS.
RC120   MOD NO:  3              MOD BY:  RR BAIRNSFATHER      DATE:  17 JAN 68     COLOSSUS GSOP CHANGES.
RC122   MOD NO:  4              MOD BY:  RR BAIRNSFATHER      DATE:   8 MAY 68     MOVE START OF DESIRED GIMBAL CALC.
RC124   FUNCTION-               1) TO NOTIFY CREW WHEN GNC SYSTEM IS PREPARED FOR CM/SM SEPARATION
RC126                           2) TO ORIENT THE CM TO THE CORRECT ATTITUDE FOR ATMOSPHERIC ENTRY
RC128   CALLING SEQUENCE-       BY V37 OR DIRECTLY FROM P61
RC129   EXIT-                   TO P63
RC130   ERASABLE INITIALIZATION:
RC131           ALFAPAD                                       LEFT BY PAD LOAD
RC132           LADPAD                                        LEFT BY PAD LOAD
RC133           LODPAD                                        LEFT BY PAD LOAD
RC134           LAT(SPL)        (MAY BE CHANGED BELOW)        LEFT BY DSKY, VIA P61
RC136           LNG(SPL)        (MAY BE CHANGED BELOW)        LEFT BY DSKY, VIA P61
RC138           HEADSUP         (MAY BE CHANGED BELOW)        LEFT BY DSKY, VIA P61
RC140   SUBROUTINE CALLS:       NEWMODEX , S61.1 , CM/DAPIC , CM/DAPON , RC2BOTH , GOPERF1 , GOFLASH , GODSPR

 C142   REF   1                                        COUNT* $$/P62

 C143   REF   5 LAST  537   26,2315  0 5344 1    +2   TC     NEWMODEX        MODE CHANGE IF ENTERED FROM P61
 C144                       26,2316    00076 0         MM     62              MODE CHANGE AUTOMATIC VIA V 37.
 C145   REF  84 LAST  792   26,2317  3 4770 0         CA     ONE
 C146   REF   7 LAST  537   26,2320  54 332 1         TS     ONLSTCOD

 C147   REF   2 LAST  792   26,2321  0 2546 1  P62    TC     S61.1           CHECK STATE VECTOR AND IMU ORIENTATION.

 C148   REF 200 LAST  793   26,2322  0 6006 1         TC     INTPRET
 C149                       26,2323   47131 1         SSP    RTB
 C150   REF   2 LAST  116   26,2324   03325 0                POSEXIT
 C151   REF   1             26,2325   54402 0                P62.3           CALCULATE DESIRED .05G GIMBAL ANGLES,
A0152                                                                        WITHOUT DISPLAY.
 C153   REF   1             26,2326   41703 0                CM/DAPIC        START CM/POSE AND BODY RATE CALC

A0154                                                   DOES 2PHSCHNG, OCT 40116, OCT 05024, OCT 13000.
A0155                                                                        CM/DAPIC SETS EBANK = EBAOG

A0156                                                                        AND RETURNS IN BASIC TO P62.2.
 C157                       26,2327  0 0006 1  P62.2  EXTEND
 C158   REF   1             26,2330  3 2431 0         DCA    POSECADR        CONTINUE WITH CM/POSE AFTER AV G.
 C159   REF  10 LAST  740   26,2331  53'062 0         DXCH   AVEGEXIT

 C160   REF   1             26,2332  3 2545 1         CAF    OCT41           REQUEST SEPARATION
 C161   REF 197 LAST  793   26,2333  0 4636 0         TC     BANKCALL
 C162   REF   1             26,2334   21147 0         CADR   GOPERF1R
 C163   REF  49 LAST  793   26,2335  0 4103 1         TC     GOTOPOOH
 C164                       26,2336  0 2341 0         TC     +3              PROCEED
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L P61-P67 USER'S PAGE NO. 5 E6 S3

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A0165                                                   NOTE:  NODOFLAG WILL BE SET IN CM/DAPON. <<<
 0166                       26,2337  0 2332 1    TC      -5              ENTER
 0167  REF   1              26,2340  0 2244 1    TC      P61.3           FOR PHASCHNG AND ENDOFJOB.

 0168  REF  46 LAST  762    26,2341  0 4655 0 +3 TC      POSTJUMP
 0169  REF   1              26,2342    41624 1    CADR    CM/DAPON        DISABLE RCS DAP, ENABLE ENTRY DAP AND
A0170                                                                   DO ATTITUDE HOLD.

A0171                                                   WILL IDLE UNTIL CM/POSE DOES ONE UPDATE.
A0172                                                   CM/DAPON DOES NO PHASCHNG.

 0173  REF   2 LAST  792    26,2343  3 5034 0 P62.1 CA      V06N61          LAT(SPL)    LNG(SPL)    HEADSUP
A0174                                                                   XXX.XX DEG  XXX.XX DEG  0000X.

A0175                                                       TERMINATE  ATTITUDE HOLD. SET UP COMMANDS:
A0176                                                       ROLLC,  ALFACOM,  BETACOM.  BEGIN MANUVER TO
A0177                                                       ENTRY ATTITUDE.

 0178  REF 198 LAST  795    26,2344  0 4636 0    TC      BANKCALL
 0179  REF  23 LAST  793    26,2345    20743 0    CADR    GOFLASH
 0180                       26,2346  0 2343 1    TC      -3
 0181                       26,2347  0 2351 1    TC      +2
 0182                       26,2350  0 2343 1    TC      -5

 0183  REF  79 LAST  792    26,2351  0 5402 1    TC      PHASCHNG
 0184                       26,2352    04024 0    OCT     04024           USE ENTRYVN FOR DISPLAY BELOW.

A0185                                                   EBANK WAS SET IN CM/DAPON TO EBAOG

 0186  REF   5 LAST  793    26,2353  11'726 1    CCS     HEADSUP         C(HEADSUP) = +/- 1
 0187  REF  36 LAST  793    26,2354  3 4753 1    CA      BIT14           IF HEADSUP POS,ROLLC=180 DEG (LIFT DWN)
 0188                       26,2355  12 356 1    NOOP                    IF HEADSUP NEG,ROLLC=0 DEG  (LIFT UP)

 0189  REF   8 LAST  793    26,2356  55'715 1    TS      ROLLC
 0190  REF   1              26,2357  3 1411 1    CA      ALFAPAD         NOMINAL ALFATRIM PAD LOADED, NEG. NO.
 0191                       26,2360  22 007 0    ZL
 0192  REF   2 LAST  116    26,2361  53'604 0    DXCH    ALFACOM         SET ALFACOM = ALFA TRIM, BETACOM=0

 0193  REF  85 LAST  795    26,2362  3 4770 0    CA      ONE             PERMITS EXDAP2 TO CHANGE FLAG TO +0
 0194  REF   1              26,2363  55'727 0    TS      P63FLAG         AS INDICATOR. STARTS UP P63.

 0195  REF   4 LAST  774    26,2364  3 5025 0    CA      V06N22          SET UP DISPLAY FOR CDU DESIRED VALUES
 0196  REF   1              26,2365  55'122 0    TS      ENTRYVN         FROM ENTRY ATTITUDE CALC, THAT IS
A0197                                                                   ALREADY GOING.
 0198  REF  62 LAST  744    26,2366  0 5547 1    TC      UPFLAG          TURN ON ENTRY DISPLAY
 0199  REF   1              26,2367    00134 1    ADRES   ENTRYDSP       ENTRYDSP = 92D  BIT 13  FLAG 6
A01991                                 SKIP
```

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```
0200  REF   5  LAST  187   26,2370  4 1700 0          CS      CMDAPMOD        GO DIRECTLY TO P63 IF BODY ATTITUDE
0201  REF  86  LAST  796   26,2371  7 4770 1          MASK    ONE             IS SUCH THAT THE DELAY TASK: WAKEP62
0202                       26,2372  0 0006 1          EXTEND                  WILL BE OMITTED.
0203  REF   1              26,2373  1 2422 0          BZF     P63.1           DISABLE GRP 4, GO TO ENDOFJOB.

A0204                                                                        (IE, CONTINUE IF CMDAPMOD = -1, OR +0)
0205  REF   1              26,2374  0 2406 1          TC      P63

A0206                                                                       PUT JOB TO SLEEP UNTIL VEHICLE MANUVER HAS
A0207                                                                       REDUCED ALFA TO +/-45 DEG. CONSIDER REMAINING
A0208                                                                       65 DEG (25 DEG IF ALFA NEG) TO ALFA TRIM TO
A0209                                                                       OCCUR AT 3 DEG/SEC, AND TERMINATE P62 AT THAT
A0210                                                                       TIME.
A0211                                                                       TASK WAKEP62 IS CALLED FROM ENTRY DAP.

0212  REF   4  LAST  628   26,2375  3 5052 0  WAKEP62  CA      PRIO13
0213  REF  15  LAST  737   26,2376  0 5121 0            TC      NOVAC
0214  REF  14  LAST  792   E6,1661                     EBANK=  AOG
0215  REF   2  LAST  797   26,2377    02406 1          2CADR   P63
0215                       26,2400    54066 0
0216  REF  38  LAST  737   26,2401  0 5314 1          TC      TASKOVER

A0218                                                                       EACH 2 SEC, CALCULATE GIMBAL ANGLES FOR ENTRY CON-
A0219                                                                       DITIONS THAT WILL HOLD IF REORIENTATION WERE MADE
A0220                                                                       AT PRESENT RN, VN. COME HERE FROM CM/POSE AND ALSO
A0221                                                                       IN KEPLER PHASE OF ENTRY.
0222                       26,2402  52131 0  P62.3     SSP     GOTO            SET RETURN ADDRESS SO THAT   ROUTINE
0223  REF   4  LAST  752   26,2403  00053 1            QPRET                   GOES DIRECTLY TO ENTRY GUIDANCE EXIT
0224  REF   1              26,2404  53574 1            ENDEXIT                 THAT DOES ENTRY DISPLAY ,GRP 5.
0225  REF   1              26,2405  20412 1            S62.3                    PUT DESIRED CDU VALUES IN CPHI'S FOR
A0226                                                                       N22 DISPLAY.
```

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```
P0227                P63
R0228  PROGRAM-              P63
R0229  MOD NO.-              0    MAR. 13, 1967
R0230  MOD BY-               R. HIRSCHKOP
R0231  MOD NO: 1             MOD BY:  RR BAIRNSFATHER     DATE:  22 JIN 67     RESTARTS.
R0233  MOD NO: 2             MOD BY:  RR BAIRNSFATHER     DATE:  14 JUL 67     REVISED RESTARTS
R0235  FUNCTION-             1) TO INITIALIZE THE ENTRY EQUATIONS
R0236                        2) TO CONTINUE TO HOLD THE CM TO THE CORRECT ATTITUDE WITH RESPECT TO THE ATMOSPHERE FOR
R0238                           THE ONSET OF ENTRY DECELERATION. ROLL ANGLE IS LIFT UP/DOWN AS SPECIFIED BY HEADSUP.
R0240                        3) TO SENSE .05 G
R0241  CALLING SEQUENCE-     DIRECTLY FROM P62
R0242  EXIT-                 TO ENDOFJOB
R0243  SUBROUTINE CALLS-     NEWMODEX , GODSPR

 0244  REF   1                                          COUNT* $$/P63

 0245  REF   6  LAST  795    26,2406  0 5344 1  P63     TC     NEWMODEX
 0246                        26,2407   00077 1          MM     63

A0247                                                              ARRIVE WITH EBANK = A0G.

 0248  REF   1              26,2410  3 2427 1          CA     ENTCADR      CONTINUE AT STARTENT AFTER CM/POSE .

A0249                                                              AT END OF STARTENT, CHANGE ADDRESS IN GOTOADDR
A0250                                                              TO CONTINUE AT  SCALEPOP  THEREAFTER.

 0251  REF   3  LAST  795    26,2411  55'724 0          TS     POSEXIT

 0252  REF   1              26,2412  3 2426 0          CA     V06N64       G            VI           R TO SPLSH
A0253                                                              XXX.XX G     XXXXX. FPS   XXXX.X NM
 0254  REF   2  LAST  796    26,2413  55'122 0          TS     ENTRYVN      FOR DISPLAY CALL IN OVERNOUT.

 2541  REF  87  LAST  797    26,2414  4 4770 1          CS     ONE          IN CASE FLAG IS LEFT AT +1 BY DAP. THE
 2542  REF   2  LAST  796    26,2415  55'727 0          TS     P63FLAG      -1 ASSURES THAT EXO-ATM DAP WILL NOT
A2543                                                              CALL P63 OUT OF SEQUENCE IN P66 .

 2545  REF  80  LAST  796    26,2416  0 5402 1          TC     PHASCHNG     THIS IS REQUIRED TO PRESERVE CLEANDSP
 2546                        26,2417   00004 0          OCT    00004        RETURN IN EVENT OF AN EXTENDED VERB..

 2547  REF 199  LAST  796    26,2420  0 4636 0          TC     BANKCALL     FLUSH 'N22' DISPLAY, IF ON. (OMIT
 2548  REF   7  LAST  785    26,2421   20715 0          CADR   CLEANDSP     DISPLAY DURING 'STARTENT' PASS.)

 0255  REF  81  LAST  798    26,2422  0 5402 1  P63.1   TC     PHASCHNG
 0256                        26,2423   00004 0          OCT    00004        DISABLE. DISPLAY RESTARTED VIA ENTRY.

 0257  REF  81  LAST  793    26,2424  0 5205 0          TC     ENDOFJOB

 0260                        26,2425   04077 0  V16N63   VN     1663
 0261                        26,2426   01500 0  V06N64   VN     0664
 0262  REF   1              26,2427   52000 0  ENTCADR  CADR   STARTENT
```

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```
0263   REF   6  LAST  305   E7,1451                    EBANK= RTINIT        TO CARY OVER INTO ENTRY STEERING.
0264   REF   1              26,2430   03404 1  POSECADR 2CADR  CM/POSE
0264   REF   1              26,2431   76067 1
```

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R0265 PROGRAM- P64
R0266 MOD NO.- 1 SEPT. 19, 1967
R0267 MOD BY- R. HIRSCHKOP
R0268 MOD NO: 2 MOD BY: RR BAIRNSFATHER DATE: 8 MAY 68 REVISED COMMENTS FOR COLOSSUS
R02691 MOD NO: 3 MOD BY: RR BAIRNSFATHER DATE: 1 MAR '69 N74
R0270 FUNCTION- 1. TO START ENTRY GUIDANCE AT .05G SELECTING ROLL ATTITUDE, CONSTANT DRAG LEVEL, AND
R0272 DRAG THRESHOLD, KA , WHICH ARE KEYED TO THE .05G POINT.
R0274 2. SELECT FINAL PHASE P67 IF V < 27000 FPS WHEN .2G OCCURS.
R0276 3. ITERATE FOR UP-CONTROL SOLUTION P65 IF V > 27000 FPS AND IF ALTITUDE RATE AND DRAG
R0278 LEVEL CONDITIONS ARE SATISFIED. ENTER P65 WHEN CONSTANT DRAG CONTROLLER HAS BROUGHT RANGE
R0280 AS PREDICTED TO WITHIN 25 NM OF DESIRED RANGE.
R0281 4. SELECT FINAL PHASE P67 IF NO UP-CONTROL SOLUTION EXISTS WITH VL > 18000 FPS.
R0283 CALLING SEQUENCE- BY RTB FROM REENTRY CONTROL
R0284 EXIT- BACK TO REENTRY CONTROL
R0285 SUBROUTINE CALLS- NEWMODEX

```
 0287   REF   1                26,2000                    SETLOC P60S1
 0288                          26,2432                    BANK

R0289                THIS DISPLAY IS CALLED EACH PASS THROUGH STEERING. RESTART PROTECTION IS VIA STEERING.

 0291   REF   1                                           COUNT* $$/P64

 0292   REF   7  LAST  798    26,2432  0 5344 1  P64      TC     NEWMODEX    ENTER VIA RTB WHEN .05G IS EXCEEDED.
 0293                         26,2433   00100 0           MM     64
 0294   REF   1               26,2434  3 2437 0           CA     V06N74      ROLLC          VI             D
A0295                                                                       XXX.XX DEG     XXXXX. FPS     XXX.XX G
 0296   REF   3  LAST  798    26,2435  55'122 0           TS     ENTRYVN     DISPLAY VIA OVERNOUT.

 0297   REF   8  LAST  777    26,2436  0 6030 1           TC     DANZIG      ... AND CONTINUE IN INITROLL ...


 0298                         26,2437   01512 0  V06N74   VN     0674
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P0299   PROGRAM:            P65
R0300   MOD NO:  0          MOD BY:  RR BAIRNSFATHER     DATE:  17 JAN 68     COLOSSUS GSOP ADDITION.
R0302   FUNCTION:           TO CONTINUE ENTRY GUIDANCE, USING THE UP-CONTROL PHASE TO STEER TO A CONTROLLED EXIT
R0304                       CONDITION. THIS PHASE TERMINATES  A) IF D  < Q7 FPSS, GO TO P66   ,
R0306                                                         B) IF RDOT NEG, AND IF V < VL +500FPS, GO TO P67.
R0308
R0309   CALLING SEQUENCE:   BY RTB FROM REENTRY CONTROL
R0310   EXIT:               BACK TO REENTRY CONTROL, OR TO ENDOFJOB.
R0311   SUBROUTINE CALLS:   NEWMODEX

 0312   REF   1                                                COUNT* $$/P65

 0313   REF   8 LAST  800   26,2440  0 5344 1  P65      TC     NEWMODEX        ENTER VIA RTB WHEN RANGE < 25 N M OF
 0314                       26,2441    00101 1           MM     65              TARGET.

 0315   REF   5 LAST  797   26,2442  3 5052 0           CA     PRIO13
 0316   REF  16 LAST  797   26,2443  0 5121 0           TC     NOVAC
 0317   REF   4 LAST  800      1122                     EBANK= ENTRYVN
 0318   REF   2 LAST  234   26,2444    02456 1          2CADR  P65.1
 0318                       26,2445    54062 1
 0319   REF  29 LAST  738   26,2446  0 5362 0           TC     2PHSCHNG        2 PHASE CHG REQUIRED TO PREVENT RE-
 0320                       26,2447    00554 0           OCT    00554           STARTING FLASHING DISPLAY TWICE.
 0321                       26,2450    10035 0           OCT    10035           4.55 SPOT AND SERVICER, HERE.
 3212   REF   1            01,2223             4P55SPT1 =      4.55SPOT
 0314   REF  10 LAST  740   01,2250             5P3SPT8  =      5.3SPOT
 0322   REF 201 LAST  795   26,2451  0 6006 1           TC     INTPRET
 0323                       26,2452    47131 1           SSP    RTB
 0324   REF   2 LAST  122   26,2453    03646 0                  GOTOADDR        CHANGE ENTRY MODE TO UPCONTRL.
 0325   REF   1            26,2454    53034 0                  UPCONTRL
 0326   REF   1            26,2455    52120 0                  REFAZE10        GO HERE TO REESTABLISH ENTRY SEQUENCER.
A0327                                                                           AND CONTINUE AT UPCONTRL...

 0328   REF  58 LAST  769   26,2456  0 5561 0  P65.1    TC     DOWNFLAG
 0329   REF   2 LAST  796   26,2457    00134 1           ADRES  ENTRYDSP        ENTRYDSP = 92D  BIT 13 FLAG 6
A0329
 0330   REF   1            26,2460  3 2472 1           CA     V16N69          ROLLC        DL  (Q7)       VL
 0331   REF 200 LAST  798   26,2461  0 4636 0           TC     BANKCALL        XXX.XX DEG   XXX.XX G      XXXXX. FPS
 0332   REF   4 LAST  632   26,2462    21101 1          CADR   GOFLASHR
 0333                       26,2463  0 2460 1           TC     -3              NODOFLAG IS SET..
 0334                       26,2464  0 2467 0           TC     +3
 0335                       26,2465  0 2460 1           TC     -5
 0336   REF   2 LAST  796   26,2466  0 2244 1           TC     P61.3           EST. GRP 4 FOR DSPLAY AND DO ENDOFJOB
A0337                                                                          IF PROCEED, CONTINUE.
 0338   REF  63 LAST  796   26,2467  0 5547 1           TC     UPFLAG
 0339   REF   3 LAST  801   26,2470    00134 1           ADRES  ENTRYDSP        ENTRYDSP = 92D   BIT13 FLAG 6
A0339
 0340   REF   2 LAST  797   26,2471  0 2422 1           TC     P63.1           DISABLE GRP 4,START UP ENTRY DISPLAY

A0341                                                                          NO6V68 VIA OVERNOUT, AS USED IN P64.
```

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0342 26,2472 04105 1 V16N69 VN 1669

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```
P0343   PROGRAM:              P66
R0344   MOD NO:  0            MOD BY:  RR BAIRNSFATHER      DATE:  17 JAN 68     COLOSSUS GSOP ADDITIONS.
R0346   FUNCTION:             KEEP CM ATTITUDE IN TRIM TO THE RELATIVE VELOCITY VECTOR. ENTRY GUIDANCE STOPS GENERATING
R0348                         ROLL COMMANDS UNTIL DRAG BUILDS UP TO  Q7+0.5 FPSS.
R0349
R0350   CALLING SEQUENCE:     VIA RTB FROM REENTRY CONTROL.
R0351   EXIT:                 BACK TO REENTRY CONTROL.
R0352   SUBROUTINE CALLS:     NEWMODEX

 0353   REF   1                                                  COUNT* $$/P66

 0354   REF   9  LAST  801    26,2473  0 5344 1  P66     TC      NEWMODEX      ENTER VIA RTB WHEN D < Q7 FPSS
 0355                         26,2474   00102 1          MM      66

 0356   REF   5  LAST  796    26,2475  3 5025 0          CA      V06N22        OGA          IGA          MGA
A0357                                                                          XXX.XX DEG   XXX.XX DEG   XXX.XX DEG
 0358   REF   1               26,2476  0 2502 1          TC      P66END        IN CASE CAME FROM P65, GO DISABLE GRP4,
A0359                                                                          AND SET ENTRYDSP TO DO DISPLAY VIA
A0360                                                                          OVERNOUT.
A0361                                                                          ... AND CONTINUE AT KEP2
```

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P0362 P67

R0363 PROGRAM- P67
R0364 MOD NO.- 0 MAR. 16, 1967
R0365 MOD BY- R. HIRSCHKOP
R0366 FUNCTION- TO TERMINATE STEERING WHEN THE CM VELOCITY WRT EARTH = 1000 FT/SEC
R0368 CALLING SEQUENCE-
R0369 EXIT- TO POOH
R0370 SUBROUTINE CALLS- GOFLASH

R0371 THIS DISPLAY IS CALLED EACH PASS THROUGH STEERING. RESTART PROTECTION IS VIA STEERING.

```
 0373   REF   1                                          COUNT* $$/P67

 0374   REF  10  LAST  803   26,2477  0 5344 1  P67     TC     NEWMODEX        ENTER VIA RTB
 0375                        26,2500   00103 0          MM     67
 0376   REF   1              26,2501  3 2510 1          CA     V06N66          ROLLC          XRNGERR        DNRNGERR
A0377                                                                         XXX.XX DEG     XXXX.X NM      XXXX.X NM
 0378   REF   5  LAST  801   26,2502  55'122 0  P66END  TS     ENTRYVN         DISPLAY VIA OVERNOUT.

 0379   REF  64  LAST  801   26,2503  0 5547 1          TC     UPFLAG          (IN CASE CAME FROM P65. ENTRY DISPLAY
 0380   REF   4  LAST  801   26,2504   00134 1          ADRES  ENTRYDSP        WILL FLUSH FLASHING DISP. IF STILL ON)
A03802                                                                        BIT 13 FLAG 6
 0381   REF  82  LAST  798   26,2505  0 5402 1  KILLGRP4 TC     PHASCHNG        DISABLE GRP4, IN CASE CAME FROM HUNTEST.
 0382                        26,2506   00004 0          OCT    00004           (COME TO KILLGRP4 VIA RTB,RET TO CALLER)

 0383   REF   9  LAST  800   26,2507  0 6030 1          TC     DANZIG          ... AND CONTINUE AT PREDICT3 ...

 0384                        26,2510   01502 1  V06N66  VN     0666

 0386   REF   1              26,2000                   SETLOC P60S2
 0387                        26,2511                   BANK

 03875  REF   2 LAST  804 TO  804:    10    10*        COUNT* $$/P67
 0388   REF   1              26,2511  3 2544 0  P67.1    CA     V16N67          RTOGO          LAT            LONG
A0389                                                                         XXXX.X NM      XXX.XX DEG     XXX.XX DEG
 0390   REF 201  LAST  801   26,2512  0 4636 0          TC     BANKCALL
 0391   REF  24  LAST  796   26,2513   20743 0          CADR   GOFLASH
 0392                        26,2514  0 2517 0          TC     +3              EFFECTIVE GOTOPOOH
 0393                        26,2515  0 2517 0          TC     +2
 0394   REF   2  LAST  234   26,2516  0 2511 0          TC     P67.1           REDO

 0395                        26,2517  0 0004 0          INHINT
 03955  REF   1              26,2520  3 4767 0          CA     CM/DSBIT
 0396   REF   1              26,2521  6 4770 0          AD     GYMDIBIT
 03965                       26,2522  4 0000 0          COM
 0397   REF   1              26,2523  7 0102 0          MASK   CM/FLAGS        CM/DSTBY , GAMDIFSW
 0398   REF   2  LAST  804   26,2524  54 102 0          TS     CM/FLAGS
 0399                        26,2525  0 0003 1          RELINT
```

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```
0400                              26,2526  0 0006 1        EXTEND
0401   REF   1                    26,2527  3 2644 0        DCA     SERVCAD2
0402   REF   11  LAST  795        26,2530  53'062 0        DXCH    AVEGEXIT

0403   REF   50  LAST  795        26,2531  1 4103 0        TCF     GOTOPOOH
```

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```
0404                                26,2532  43175 0  P67.2    VLOAD   CLEAR       CALC PRESENT LAT, LONG, ALT.
0405  REF  11  LAST  793            26,2533  01030 0                   RN
0406  REF   9  LAST  745            26,2534  00662 0                   ERADFLAG    USE PAD RAD FOR ALT.(NOT SEEN ANYWAY)
0407  REF  14  LAST  763            26,2535  16152 0           STODL   ALPHAV
0408  REF  12  LAST  793            26,2536  01044 0                   PIPTIME     USE TIME OF RN
0409                                26,2537  45014 0           CLEAR   CALL
0410  REF  17  LAST  745            26,2540  01663 0                   LUNAFLAG
0411  REF   7  LAST  763            26,2541  26453 1                   LAT-LONG
0412                                26,2542  77634 0  P67.3    RTB                 ENTRY EXIT THAT OMITS DISPLAY.
0413  REF   1                       26,2543  53607 0                   SERVNOUT

0414                                26,2544  04103 1  V16N67   VN      1667
0415                                26,2545  00041 1  OCT41    OCT     41
0416  REF   1                       26,2643           SERVCAD2 =       SERVCAD1
```

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```
P0417   SUBROUTINE NAME:     S61.1
R0418   MOD NO:  0                                                    DATE:           21 FEB 67
R0420   MOD BY:  RR BAIRNSFATHER                                      LOG SECTION:    P61-P67
R0422   MOD NO:  1          MOD BY:  RR BAIRNSFATHER     DATE:  22 JUN 67     RESTARTS.
R0424   FUNCTIONAL DESCRIPTION:     CALLED BY BOTH P61 AND P62
R0425           FIRST,TEST TO SEE IF  AVERAGEG  IS ON. IF NOT, UPDATE THE STATE VECTOR TO PRESENT TIME + TOLERANCE
R0427           AND TURN ON  AVERAGEG  AT THAT TIME, AND CONTINUE.  OTHERWISE CONTINUE:  SEE IF  IMU Y AXIS IS
R0429           WITHIN 30 DEG OF V*R.  IF YES, EXIT SUBROUTINE S61.1.    IF NO,  SEE IF -Y AXIS OF IMU IS WITHIN
R0431           30 DEG OF V*R.  IF YES, DISPLAY ALARM:  01427  IMU REVERSED.
R0432                           IF NO, DISPLAY ALARM:  01426  IMU UNSATISFACTORY.
R0434           IN EITHER OF THESE LAST 2 CASES, WAIT  10 SEC  AND THEN EXIT SUBROUTINE  S61.1.

R0436   REMARK:                THERE WILL BE A SHORT 10 SEC DELAY IF AN ALARM EXIT IS TAKEN. THE DELAY FOR INTEGRATION IS
R0438                          AS SHORT AS CAN BE MADE, BUT IS ARBITRARY SINCE IT  DEPENDS ON THE AGE OF THE STATE VECTOR.

R0440   CALLING SEQUENCE:  CALL
R0441                           S61.1
R0442                       C(MPAC) UNSPECIFIED
R0443                       PUSHLOC UNSPECIFIED

R0444   SUBROUTINES CALLED:  LOADTIME, CSMPREC, TPAGREE,
R0445                        WAITLIST, JOBSLEEP, JOBWAKE, PREREAD, ALARM, GODSPR, BANKCALL, DELAYJOB
R0447   NORMAL EXIT MODES:   RVQ
R0448   ALARMS:  01426       IMU UNSATISFACTORY
R0449            01427       IMU REVERSED
R0450   OUTPUT:  POSSIBLE ALARMS
R0451            POSSIBLY TDEC1, RATT, VATT, RN, VN
R0452   ERASABLE INITIALIZATION REQUIRED:
R0453            AVEGFLAG                 AVERAGEG ON OR OFF                 LEFT BY SERVICER
R0455            PIPTIME  (-28) CS        TIME OF PIPA UPDATE                LEFT BY READACCS
R0457            RN       (-29) M         STATE VECTOR                       LEFT BY AVERAGEG
R0459            VN       (-7) M/CS       STATE VECTOR                       LEFT BY AVERAGEG
R0461            REFSMMAT  (-1)           .5 REF TO SM MATRIX                LEFT BY LAST IMU ALIGNMENT
R0463   DEBRIS:  QPRET
R0464            POSSIBLY PIPTIME1, RATT, VATT, TDEC1, RN1, VN1, QTEMP, X1   IF UPDATED
R0466            PUSH LIST LOCS USED BY CSMPREC

 0467   REF  15  LAST  797   E6,1661                    EBANK= AOG          FOR 60GENRET , S61DT
 0469   REF   1              26,2000                    SETLOC P60S3
 0470                        26,2546                    BANK

 0471   REF   1                                         COUNT* $$/S61.1

 0472                        26,2546  0 0006 1  S61.1   EXTEND
 0473   REF   2  LAST  119   26,2547  23'773 0          QXCH   60GENRET     SAVE RET ADDR IN EB 6
 0474   REF 202  LAST  804   26,2550  0 4636 0          TC     BANKCALL
 0475   REF   8  LAST  743   26,2551   03731 1          CADR   R02BOTH
 0476   REF 202  LAST  801   26,2552  0 6006 1          TC     INTPRET

 0477                        26,2553   45014 0          BON    CALRB
```

```
0478   REF   2  LAST  517   26,2554   00716 1                    AVEGFLAG        IS AVERAGEG ON
0479   REF   1              26,2555   54605 0                    S61.1A          YES
0480   REF   2  LAST  740   26,2556   27566 1                    MIDTOAV2        GET FUTURE STATE VECTOR SOON AS CAN

0481   REF 276  LAST  787   26,2557   3 0155 0           CA      MPAC +1         RETURN INHINTED ***
0482   REF   3  LAST  234   26,2560   55'774 0           TS      S61DT           FOR RESTART.
0483   REF  21  LAST  710   26,2561   0 5233 0           TC      WAITLIST
0484   REF   9  LAST  698   E7,1425                      EBANK=  DVTOTAL
0485   REF   2  LAST  234   26,2562   02567 1            2CADR   S61.1C
0485                        26,2563   54067 1
0486   REF  83  LAST  804   26,2564   0 5402 1           TC      PHASCHNG
0487                        26,2565   40434 0            OCT     40434
0487.5 REF   1              01,2204                4P43SPT1 =      4.43SPOT
0488   REF  82  LAST  798   26,2566   0 5205 0           TC      ENDOFJOB

0489   REF   6  LAST  801   26,2567   3 5052 0  S61.1C   CA      PRIO13
0490   REF  33  LAST  761   26,2570   0 5135 0           TC      FINDVAC
0491   REF  16  LAST  807   E6,1661                      EBANK=  ACG
0492   REF   2  LAST  234   26,2571   02604 1            2CADR   S61.1A-1
0492                        26,2572   54066 0
0493                        26,2573   0 0006 1           EXTEND
0494   REF   2  LAST  806   26,2574   3 2644 0           DCA     SERVCAD1        HE WHO STARTS AVERAGEG MUST SERVICE
0495   REF  12  LAST  805   26,2575   53'062 0           DXCH    AVEGEXIT        THE EXIT.

0496   REF  30  LAST  801   26,2576   0 5362 0           TC      2PHSCHNG
0497                        26,2577   00454 1            OCT     00454
0498                        26,2600   00175 1            OCT     00175
04980.2 REF   1             01,2207                5P45SPT1 =      4.45SPOT
04980.4 REF   1             01,2272                5P17SPT1 =      5.17SPOT
04981  REF  12  LAST  786   26,2601   0 4606 0           TC      E7SETTER

0499   REF  47  LAST  796   26,2602   0 4655 0           TC      POSTJUMP
0500   REF   3  LAST  700   26,2603   76607 1            CADR    PREREAD         PREREAD DOES TC TASKOVER.

0501   REF 203  LAST  807   26,2604   0 6006 1  S61.1A-1 TC      INTPRET
0502                        26,2605   77204 1  S61.1A   BOVB    VLOAD
0503   REF   2  LAST  305   26,2606   57544 0                    TCDANZIG        TURN OFF OVFIND, IF ON
0504   REF  11  LAST  793   26,2607   01036 0                    VN              VN   (-7) M/CS
0505                        26,2610   64235 1            VXV     MXV
0506   REF  12  LAST  806   26,2611   01030 0                    RN              RN  (-29)  M
0507   REF  41  LAST  782   26,2612   01734 0                    REFSMMAT        .5 UNIT MATRIX
0508                        26,2613   71256 0            UNIT    DLOAD
0509   REF 277  LAST  808   26,2614   00160 0                    MPAC +3         GET  COS(THETA)/2
0510                        26,2615   43240 0            BMN     DAD
0511   REF   1              26,2616   54623 1                    S61.1B          DO TEST ON -YSM
0512   REF   1              26,2617   14646 0                    C(30)LIM        = 1.0 -.5 COS(30)
0513                        26,2620   47004 0            BOVB    RTB
0514   REF   1              26,2621   54642 0                    RETRN1
0515   REF   1              26,2622   54627 0                    RETRN3
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0516                                26,2623   43276 0  S61.18   DCOMP   DAD
0517  REF   2  LAST  808            26,2624   14646 0                   C(30)LIM      = 1.0 - .5 COS(30)
0518                                26,2625   77404 1           BOVB    EXIT
0519  REF   1                       26,2626   54632 1                   RETRN2

0520  REF  28  LAST  774            26,2627   0 5671 1 RETRN3   TC      ALARM
0521                                26,2630    01426 0          OCT     01426         IMU UNSATISFACTORY
0522  REF   2  LAST  809            26,2631   0 2634 1          TC      RETRN2 +2

0523  REF  29  LAST  809            26,2632   0 5671 1 RETRN2   TC      ALARM
0524                                26,2633    01427 1          OCT     01427         IMU REVERSED

0525  REF   5  LAST  753            26,2634   3 5023 0 +2       CAF     V05N09
0526  REF 203  LAST  807            26,2635   0 4636 0          TC      BANKCALL
0527  REF   4  LAST  760            26,2636    20710 0          CADR    GODSPR        DO DISPLAY
0528  REF   1                       26,2637   3 2647 0          CA      10SECS
0529  REF 204  LAST  809            26,2640   0 4636 0          TC      BANKCALL
0530  REF  15  LAST  788            26,2641    01731 0          CADR    DELAYJOB

0531  REF   3  LAST  807            26,2642   0 1773 0 RETRN1   TC      60GENRET

0532  REF  10  LAST  808            E7,1425                     EBANK=  DVTOTAL
0533  REF   3  LAST  737            26,2643    03143 1 SERVCAD1 2CADR   SERVEXIT
0533                                26,2644    76067 1
0534                                26,2645   22111 0  C(30)LIM 2DEC    .566985       = 1.0 -.5 COS(30)
C534                                26,2646   17335 1
0535                                26,2647   01750 1  10SECS   DEC     1000          1000 CS
C536                                26,2650   00000 1  60SECDP  2DEC    6000 B-28     6000 CS
0536                                26,2651   13560 0
```

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P0537
R0538   PROGRAM NAME:      S61.2                                   DATE:           14 FEB 67
R0540   MOD NO:  1                                                LOG SECTION:    P61-P67
R0542   MOD BY:  MORTH / BAIRNSFATHER
R0543   MOD NO:  2           MOD BY:  MORTH/BAIRNSFATHER   DATE:  11 MAY 67     ADD 2ND ITER FOR ERAD AT 400K FT.
R0545   MOD NO:  3           MOD BY:  RR BAIRNSFATHER      DATE:  21 NOV 67     VARIABLE MU ADDED.
R0547   MOD NO:  4           MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68     DIFFERENT EARTH/MOON SCALES IN TFF'S
R0549   FUNCTIONAL DESCRIPTION:      CALLED BY P61.  PROVIDES DISPLAYS FOR NOUNS  N60  AND  N63  .
R0551           PROGRAM CALCULATES ENTRY DISPLAY OF MAXIMUM ACCELERATION EXPECTED  (GMAX)  AND ALSO THE EXPECTED
R0553           INERTIAL VELOCITY (VPRED) AND ENTRY ANGLE  (GAMMAEI)  THAT WILL OBTAIN AT 400K FT ABOVE THE FISCHER
R0555           ELLIPSOID.  PROGRAM ALSO CALCULATES A SECOND DISPLAY RELATIVE  TO THE EMSALT  ABOVE FISCHER ELLIPSOID
R0557           AND CONSISTS OF RANGE TO SPLASH FROM NOW (RTGO) , PREDICTED INERTIAL VELOCITY (VIO) , AND THE TIME TO
R0559           GO FROM NOW (TTE) .
R0560   CALLING SEQUENCE:  CALL
R0561                              S61.2
R0562           C(MPAC) UNSPECIFIED
R0563           PUSHLOC WILL BE SET TO ZERO.

R0564   SUBROUTINES CALLED:  TFFCONIC,  CALCTFF,  TFF/TRIG,  FISHCALC,  GETERAD,  VGAMCALC
R0566   NORMAL EXIT MODES,   RTB   P61.1
R0567   ALARMS:  NONE
R0568   OUTPUT:  THE FOLLOWING REGISTERS ARE WRITTEN IN FOR USE BY DISPLAYS
R0569           GMAX   100 GMAX  (-14)  G,S       MAXIMUM ACCELERATION
R0570           VPRED  (-7)  M/CS       PREDICTED VELOCITY AT 400K FT
R0571           GAMMAEI  GAMMA/360      PREDICTED GAMMA    AT 400K FT
R0572                                   FOR TM, DP(GAMMAEI) = (GAMMAEI, RTGO) / 360
R0574           RTGO   THETAH/360       RANGE ANGLE TO SPLASH FROM EMSALT       EMSALT IS PAD LOADED
R0576           VIO    (-7) M/CS        INERTIAL VELOCITY  AT      EMSALT       EMSALT IS PAD LOADED
R0578           TTE    (-28) CS         TIME     TO                 EMSALT       EMSALT IS PAD LOADED

R0580           PUSHLOC = 0
R0581           CONIC PARAMETERS STORED IN VAC AREA (SEE TFF SUBROUTINES)
R0582   ERASABLE INITIALIZATION REQUIRED:
R0583           RONE   (-29) M          STATE VECTOR                                LEFT BY USER
R0585           VONE   (-7)  M/CS       STATE VECTOR                                LEFT BY USER
R0587           URONE  UR/2                                                         LEFT BY USER
R0589           UNI    (-1)             UNIT NORMAL V*R                             LEFT BY ENTRY / P61
R0591           THETAH  THETAH/360      RANGE ANGLE                                 LEFT BY ENTRY / P61
R0593           UNITW  (0)              UNIT POLAR VECTOR                           LEFT BY  PAD LOAD
R0595           EMSALT  (-29) M         EMS INTERFACE ALTITUDE                      LEFT BY  PAD LOAD
R0597                                   ORBITAL REENTRY:  284643 FT,  LUNAR REENTRY:  297431 FT.
R0599   DEBRIS:  QPRET,
R0600           ALL PDL LOCATIONS ABOVE 12D, INCLUDING X1,X2,S1,S2
R0601           ALSO PDL+0  ...  PDL+5,  WHERE INITIAL PUSHLOC = PDL
```

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P0602

R0603 THE FOLLOWING PUSH LIST LOCATIONS HAVE BEEN RESERVED FOR TFF ROUTINES AND ARE REPEATED HERE FOR CONVENIENCE.

R0605 OF COURSE FOR S61.2 USAGE, EARTH ORIGIN SCALING IS USED.

A0606 BELOW E: IS USED FOR EARTH ORIGIN SCALE
A0607 M: IS USED FOR MOON ORIGIN SCALE

A0608	RTERM	=	18D	TERMINAL RADIUS M	E: (-29) M: (-27)
A0609	NRTERM	=	16D	TERMINAL RADIUS M	E: (-29+NR)
A0610					M: (-27+NR)
A0611	RMAG1	=	12D	PRESENT RADIUS M	E: (-29) M: (-27)
A0612	NRMAG	=	32D	PRESENT RADIUS M	E: (-29+NR)
A0613					M: (-27+NR)
A0614	SDELF/2			SIN(THETA) /2	
A0615	CDELF/2	=	14D	COS(THETA) /2	
A0616	TFFX	=	34D	X, ARGUMENT OF SERIES T(X).	
A0617	TFFTEM	=	36D	ARG FOR TRANSFER ANGLE CALCULATION.	
A0618	TFFNP	=	28D	LC P M E: (-38+2NR)	M: (-36+2NR)
A0619	TFF/RTMU	=	30D	1/SQRT(MU)	E: (17) M: (14)
A0620	TFFVSQ	=	20D	-(VN.VN/MU) 1/M	E: (20) M: (18)

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P0621

 0623   REF   2  LAST  804   26,2000                    SETLOC P60S2
 0624                       26,2652                    BANK

 0625   REF   1                                        COUNT* $$/S61.2

AC626                                                                PDL LEFT AT ZERO BY TARGETNG

 0627                       26,2652   45345 1  S61.2   DLOAD  DSU
 06271  REF   1            26,2653   02020 1          EMSALT
 06272  REF   1            26,2654   15006 0          290KFT
 06273                      26,2655   71244 0          8PL    DLOAD
 06274  REF   1            26,2656   55002 0          LUNENT
 0628   REF   1            26,2657   31757 0          1/RTMU  ESTABLISH MU FOR ORBITAL ENTRIES
 06281                      26,2660   77624 1  CALLCON CALL
 0629   REF   1            26,2661   57151 0          TFFCONIC FILL VAC AREA WITH CONIC PARAMETERS

 0630                       26,2662   45145 0          DLOAD  CALL
 0631   REF   1            26,2663   15024 0          RTRIAL  1 ST GUESS AT TERMINAL RADIUS  (-29)
 0632   REF   2  LAST  525  26,2664   57261 0          CALCTFF SAVES MPAC IN RTERM  (18D)

 0633                       26,2665   77624 1          CALL    CALC SDELF/2,  CDELF/2
 0634   REF   2  LAST  647  26,2666   57052 1          TFF/TRIG RETURN WITH S(THETA) IN MPAC

 0635                       26,2667   77624 1          CALL    GET FISCHER RADIUS (-29) M
 0636   REF   1            26,2670   55033 1          FISHCALC ANS IN MPAC AND IN ERADM.

 0637                       26,2671   45015 1          DAD    CALL
 0638   REF   2  LAST  812  26,2672   02020 1          EMSALT
 0639   REF   3  LAST  812  26,2673   57261 0          CALCTFF SAVES MPAC IN  RTERM  (18D)

 06391  REF   2  LAST  124  26,2674   03733 0          STORE  TTE1  USED IN TARGET ITERATION (DISPTARG)
 0640                       26,2675   57415 0          DAD    DCOMP  DECR 'TTE' FROM BASE 'TTE2' IN 'SERVICER
 0641   REF   4  LAST  793  26,2676   03651 0          MM     'PIPTIME' FOR STATE VECTOR
AC0642                                                       DNLIST AND DSKY WILL USE TTE.
 0643   REF   2  LAST  124  26,2677   03735 0          STORE  TTE2  TTE=PIPTIME+TTE2=-(TTE1+MM-PIPTIME)
 06431                      26,2700   77615 0          DAD    DECREMENT 'TTE' FOR DISPLAY AND DOWNLINK
 06432  REF  13  LAST  806  26,2701   01044 0          PIPTIME UNTIL SERVICER COMES ALONG.
 06433  REF   6  LAST  293  26,2702   37727 1          STCALL TTE  'TTE' IS NEGATIVE AS IN COUNTDOWN.

AC0644                                                               TTE= TIME FROM NOW TO EMSALT +FISCHER

 0645   REF   3  LAST  812  26,2703   57052 1          TFF/TRIG S(THETA) IN MPAC ON RETURNING
AC0646                                                       AND THETA= RANGE FROM NOW TO EMSALT
 0647                       26,2704   77624 1          CALL
 0648   REF   2  LAST  812  26,2705   55033 1          FISHCALC
 0649                       26,2706   77624 1          CALL
 0650   REF   1            26,2707   11744 0          VRCALC
 0651                       26,2710   77624 1          CALL
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 0651  REF  1                  26,2711  11731 1          DISPTARG
 0652                          26,2712  77624 1    CALL
 0653  REF  2  LAST  813       26,2713  11731 1          DISPTARG
 0654  REF  5  LAST  293       26,2714  37714 1    STCALL RTGO
 0652  REF  2  LAST  647       26,2715  55054 0          VGAMCALC

 0653                          26,2716  77605 1    DMP                 MPAC = GAMMA
A0654                                                                  PDL0 HAS VGAM.
 0655                          26,2717  43265 1    BDDV   DAD
 0656  REF  1                  26,2720  15032 1           VEMSCON       -HS D 180/PI (-14)
 0657                          26,2721  00001 0           0             VGAM FROM PDL0.
 0658  REF  6  LAST  293       26,2722  17725 1    STODL  VIO           PREDICTED VELOCITY AT EMSALT.

A0659                                                  GAMMA AND VGAM AT 300K FT ARE REQUIRED BY  GMAX
A0660                                                  ALGORITHM.

 0661  REF  7  LAST  762       26,2723  02240 0          ERADM         EARTH RADIUS FROM GETERAD     (-29) M
A0662                                                                  = FISCHER RADIUS  (-29)
 0663                          26,2724  77615 0    DAD
 0664  REF  1                  26,2725  06456 0           300KFT        M  (-29)
 0665  REF  1                  26,2726  34023 1    STCALL RTERM         TERMINAL RADIUS  M  (-29)

 0666  REF  1                  26,2727  55051 0          PREVGAM       VGAMCALC WITH NEW RTERM

A0667                                                                  VBAR = (V(FPS)  - 36KF/S) / 20KF/S
R0668    CMAX = (4/(1+ 4.8 VBARSQ))*(GAM -6.05 -2.4 VBARSQ) -10(L/D -.3) +10   ASSUME L/D = 0.3, BANK =0.

A0670                                          GMAXCALC
 0671                          26,2730  45325 1    PDDL   DSU           GAM TO PDL2
 0672                          26,2731  00001 0           0             VGAM IS IN PDL0  (-7)
 0673  REF  1                  26,2732  15010 1           36KFT/S       (-7)  M/CS
 0674                          26,2733  63471 0    DDV    DSQ
 0675  REF  1                  26,2734  15012 0           20KFT/S       (-6)  M/CS
 0676                          26,2735  00001 0    STORE  0             VBARSQ  (-2)  TO PDL0

 0677                          26,2736  43205 1    DMP    DAD
 0678  REF  1                  26,2737  15014 0           KR1
A0679                                                                  GAM,    POS DOWN, FROM PDL2
 0680                          26,2740  41215 1    DAD    DMP
 0681  REF  1                  26,2741  15016 1           -6.05DEG
 0682  REF  1                  26,2742  15020 1           KR2
 0683                          26,2743  77725 1    PDDL                XCH PDL+0 FOR VBARSQ  (-2)
 0684                          26,2744  43271 1    DDV    DAD
 0685  REF  1                  26,2745  15030 0           KR4
 0686  REF  2  LAST  791       26,2746  31771 1           DP2(-4)
 0687                          26,2747  77665 1    BDDV
A0688                                                                  NUM FROM PDL+0
 0689                          26,2750  51015 1    DAD    BPL
 0690  REF  1                  26,2751  15022 0           KR3
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 0691                                  26,2752  54755 1                 +3
 0692                                  26,2753  77745 1          DLOAD
 0693   REF  23  LAST  741             26,2754  15336 0                 HI6ZEROS
 0694   REF   3  LAST  292             26,2755  17722 0          STODL  GMAX            100 GMAX  (-14)

R0695   DISPLAY USES GMAX AS SP, SO LO WORD IS WRITTEN OVER BY VPRED.

 0696   REF   8  LAST  813             26,2756  02240 0                 ERADM          = FISCHER RADIUS  (-29) M
 0697                                  26,2757  45015 1          DAD    CALL           2 ND  ITERATION FOR FISCHER RADIUS
 0698   REF   1                       26,2760  15026 1                 400KFT
 0699   REF   4  LAST  812             26,2761  57261 0                 CALCTFF        ESTABLISH TRANSFER ANGLE DATA.
 0700                                  26,2762  77624 1          CALL
 0701   REF   4  LAST  812             26,2763  57052 1                 TFF/TRIG       GET SIN, COS DELF
 0702                                  26,2764  77624 1          CALL
 0703   REF   3  LAST  812             26,2765  55033 1                 FISHCALC       GET CORRESPONDING FISCHER RADIUS.

 0704                                  26,2766  73015 1          DAD    LXA,2          SAVE HI-WORD FOR DOWNLIST.
 0705   REF   2  LAST  814             26,2767  15026 1                 400KFT         M  (-29)
 0706   REF   6  LAST  813             26,2770  03713 1                 RTGO           (RANGE ANGLE FROM EMSALT)/360
 0707   REF   2  LAST  813             26,2771  34023 1          STCALL RTERM
 0708   REF   2  LAST  813             26,2772  55051 0                 PREVGAM        VGAMCALC WITH NEW RTERM

 0709                                  26,2773  67076 1          DCOMP  SXA,2          HI-WORD OF EACH ON DOWNLIST.
 0710   REF 278  LAST  808             26,2774  00155 0                 MPAC  +1
 0711   REF  10  LAST  292             26,2775  17761 1          STODL  GAMMAEI         CONIC GAMMA/360 AT 400K FT.   ( HI-WORD)
A0712                                                                                   CONIC RTGO/360 FROM EMSALT    (LOW-WORD)
A0713                                                                                   FOR TM, DP(GAMMAEI)= (GAMMA, RTGO)/360

A0714                                                                                   VGAM FROM PDL+0   (-7)
 0715                                  26,2776  77626 0          STADR
 0716   REF   8  LAST  292             26,2777  74020 0          STORE  VPRED           CONIC VELOCITY AT 400K FT

 0717                                  26,3000  77634 0          RTB
 0718   REF   1                       26,3001  54304 1                 P61.1
A0719                                                                                   PDL BACK TO ZERO.

 0720                                  26,3002  52145 0  LUNENT  DLOAD  GOTO
 0721   REF   2  LAST  522             26,3003  06452 1                 1/RTMUE        ESTABLISH MU FOR LUNAR TYPE ENTRIES
 0722   REF   1                       26,3004  54660 0                 CALLCON
 0723                                  26,3005  00002 0  290KFT  2DEC   88392.0 B-29
 0724                                  26,3006  26244 1
 0725                                  26,3007  33335 1  36KFT/S 2DEC   109.728 B-7     (-7) M/CS = 36 KFT/S (-7)
 0726                                  26,3010  05707 1
 0727                                  26,3011  36365 1  20KFT/S 2DEC   121.92 B-7      (-6) M/CS  = 2 20KFT/S  (-7)
 0728                                  26,3012  30244 0
 0729                                  26,3013  77113 1  KR1     2DEC   -.026666667     =- 2.4  4 / 360
 0730                                  26,3014  42770 1
 0731                                  26,3015  77354 0  -6.05DEG 2DEC  -.016805556     = -6.05 / 360
 0732                                  26,3016  65030 1
 0733                                  26,3017  21450 0  KR2     2DEC   .54931641       =(360/4) 100 (-14) =  9000 B-14
 0734                                  26,3020  00001 0
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 0725                        26,3021   01750 1  KR3      2DEC   1000  B-14       = 100  (10.0)  (-14)   G,S
 0725                        26,3022   00000 1
AC726                                                                    ASSUMES L/D = 0.3, BANK =0.
 0727                        26,3023   00305 1  RTRIAL   2DEC   6460097.18 B-29  RPAD +284643 FT =21 194 545 FT
 0727                        26,3024   04541 0
AC728                                                          RPAD DEFINED AS 20 909 901.57 FT =6 373 338 M
 0729                        26,3025   00003 1  400KFT   2DEC   121920 B-29      METERS
 0729                        26,3026   27040 0

RC730  300KFT   2DEC   91440 B-29      (-29)  M

RC731  EMSALT   2DEC   86759.2 B-29    284643 FT (-29) M    (ORBITAL REENTRY)

RC732  EMSALT   2DEC   90657 B-29      297431 FT (-29) M    (LUNAR REENTRY)

 0733                        26,3027   32525 1  KR4      2DEC   .833333333
 0733                        26,3030   12525 0
 0734  REF   Z  LAST  522    23,2455             300KFT   EQUALS MINPERE
 0735                        26,3031   77777 0  VEMSCON  2DEC   -.0389676 B-14   = -HS D  /2  PI  (-14)    M SQ/ CS SQ
 0735                        26,3032   76601 1
AC736                                                                  =- 16369   .056  32.2  .3048  .3048/2 PI    (-14)
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RC737   SUBROUTINE NAME:   FISHCALC              (USED BY  S61.2)          DATE:          01.21.67
RC739   MOD NO:  0                                                         LOG SECTION:   P61-P67
RC741   MOD BY:  MORTH / BAIRNSFATHER
RC742   MOD NO:  1          MOD BY:  RR BAIRNSFATHER     DATE:  11 MAY 67    INCLUDE  GETERAD  CALL
RC744   FUNCTIONAL DESCRIPTION:  GIVEN THE PRESENT POSITION, UNITR, CALCULATE A  NEW UNITR THAT IS ROTATED THROUGH
RC746           TRANSFER ANGLE, THETA, ALONG TRAJECTORY. THEN CALCULATE  SIN(LAT)  AND USE TO OBTAIN FISCHER RADIUS.

RC748           SINCE FISHCALC USES UNI (LEFT BY ENTRY) EARTH SCALING IS ASSUMED.(WILL IMPROVE FOR SUITABLE TENNANT)

RC750   CALLING SEQUENCE:  CALL
RC751                           FISHCALC
RC752           ENTER WITH .5 SIN(THETA) IN MPAC.
RC753           PUSHLOC IS AT PDL+0, AN ARBITRARY BASE VALUE IF LEQ 8D

RC754   SUBROUTINES CALLED:  GETERAD
RC755   NORMAL EXIT MODE:    RVQ
RC756   EXIT MODES:           NONE
RC757   OUTPUT:  ERADM  (-29) M   IN MPAC ON RETURNING
RC758           NEW UNIT VECTOR NOT SAVED.
RC759           SIN(LAT) NOT SAVED.
RC760           PUSHLOC AT PDL+0
RC761   ERASEABLE INITIALIZATION REQUIRED:
RC762           SDELF/2     =SIN(THETA)  /2,   IN MPAC                  LEFT BY TFF/TRIG
RC764           CDELF/2     =COS(THETA) /2, STORED IN PDL 14D           LEFT BY TFF/TRIG
RC766           RONE   (-29) M                                          LEFT BY USER
RC768           VONE   (-7)  M/CS                                       LEFT BY USER
RC770           URONE  UR/2                                             LEFT BY USER
RC772           UNI         .5 UNIT( V*R)                               LEFT BY ENTRY / P61
RC774           UNITW       UNIT NORTH POLE                             LEFT BY PAD LOAD
RC776   DEBRIS:  QPRET,    PDL+0 ... PDL+5
RC777

AC778                                                                   _      _        _
 C779                          26,3033   47315 0  FISHCALC PDVL   VXV      URPR = UR CDELF + UHOR SDELF
 C780   REF   3  LAST  793    26,3034   02334 1                   URONE
 C781   REF   3  LAST  793    26,3035   03502 0                   UNI
 C782                          26,3036   76561 1           VXSC    VSL1
AC783                                                                   SIN(THETA) /2 FROM PDL+0
 C784                          26,3037   74315 0           PDVL    VXSC   TO PDL+0,  +5
 C785   REF   4  LAST  816    26,3040   02334 1                   URONE
 C786   REF   2  LAST  647    26,3041   00017 1                   CDELF/2  COS(THETA) /2
 C787                          26,3042   45455 1           VAD     STADR
 C7871  REF   1                26,3043   74235 0           STORE   URH      FOR USE IN RTGO FROM EMS DISPLAY
 C788                          26,3044   72441 0           DOT     SL1
 C789   REF   7  LAST  539    26,3045   01712 1                   UNITW    FULL UNIT VECTOR    UNIT NORTH
 C790   REF  15  LAST  806    26,3046   02156 1           STORE   ALPHAV +4   = .5 SIN(LAT)
 C791                          26,3047   77650 1  DUMPFISH GOTO
 C792   REF   2  LAST  635    26,3050   26570 1                   GETERAD  SAVES FISCHER RAD (-29) M IN ERADM AND
AC793                                                                   IN MPAC. RETURNS TO CALLER VIQ QPRET.
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RC794   SUBROUTINE NAME:   VGAMCALC              (USED BY  S61.2)          DATE:          01.21.67
RC796   MOD NO:    0                                                       LOG SECTION:   P61-P67
RC798   MOD BY:  MORTH / BAIRNSFATHER
RC799   MOD NO:  1          MOD BY:  RR BAIRNSFATHER     DATE:  11 APR 67
RC800   MOD NO:  2          MOD BY:  RR BAIRNSFATHER     DATE:  21 NOV 67    VARIABLE MU ADDED.
RC802   MOD NO:  3          MOD BY:  RR BAIRNSFATHER     DATE:  21 MAR  68   ACCEPT DIFFERENT EARTH/MOON SCALE
RC804   FUNCTIONAL DESCRIPTION:      EARTH CENTERED VIS VIVA CALCULATION OF TERMINAL VELOCITY AND GAMMA (REL TO
RC806           HORIZONTAL)  GIVEN  THE SCALAR QUANTITIES:  PRESENT RADIUS AND VELOCITY AND THE TERMINAL RADIUS.
RC808           THE USER MUST APPEND PROPER SIGN TO GAMMA, SINCE IT IS CALCULATED AS A POSITIVE NUMBER.
RC810           THE EQUATIONS ARE

RC811                   VGAM = SQRT(VN VN/MU + 2(RN-RTERM)/(RN RTERM)  )  RTMU

RC812                   COSGAM = H /RTERM VGAM  = SQRT(LCP)/ (RTERM VGAM/RTMU)


RC813           VGAMCALC ASSUMES THAT THE TERMINAL RADIUS IS LESS THAN THE PRESENT RADIUS. BOTH CALCTFF AND CALCTPER
RC815           MAKE THIS ASSUMPTION.

RC816   CALLING SEQUENCE:  CALL                          STCALL RTERM
RC817                        VGAMCALC                         PREVGAM
RC818           PUSHLOC AT PDL+0, ARBITRARY  IF LEQ 12D
RC819           C(MPAC) UNSPECIFIED                    C(MPAC)=NEW RTERM

RC820   SUBROUTINES CALLED:  NONE
RC821   NORMAL EXIT MODE:    RVQ
RC822   ALARMS:     NONE
RC823   OUTPUT:    GAMMA / 360 IN MPAC, POSITIVE NUMBER
RC824           VGAM E:(-7)  M:(-5)    M/CS  IN PDL+0
RC825           PUSHLOC AT PDL+2
RC826   ERASABLE INITIALIZATION REQD:
RC827           TFF/RTMU E:(17) M:(14)   1/SQRT(MU)                          LEFT BY TFFCONIC.
RC829           RMAG1  E:(-29) M:(-27)   M   PRESENT RADIUS LENGTH           LEFT BY TFFCONIC
RC831           NRMAG  E: (-29+NR)       M  NORM LENGTH OF PRESENT POSITION  LEFT BY TFFCONIC
RC833                  M: (-27+NR)
RC834           RTERM  E:(-29) M:(-27)   M  TERMINAL RADIUS LENGTH           LEFT BY CALCTFF
RC836           NRTERM E: (-29+NR)       M  NORM LENGTH OF TERMINAL RADIUS   LEFT BY CALCTFF
RC838                  M: (-27+NR)
RC839           TFFVSQ E:(20)  M:(18)  1/M   -(V SQ/MU): PRESENT VELOCITY,NORM LEFT BY TFFCONIC
RC841           TFFNP  E: (-38+2NR)      M  LCP, SEMI-LATUS RECTUM, WEIGHT NR LEFT BY TFFCONIC
RC843                  M: (-36+2NR)
RC844   DEBRIS:  QPRET,   PDL+0 ... PDL+3
RC845           RTERM,  NRTERM  IF PREVGAM ENTERED.
```

L P61-P67 USER'S PAGE NO. 27 E6 S3

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P0846
 C847                        26,3051  77657 0  PREVGAM  SL*                ENTER WITH NEW  RTERM IN MPAC
AC848                                                                     E: (-29)  M: (-27)
 C849                        26,3052  20201 0                    0,1      X1 = -NR
 C850  REF  1                26,3053  00021 1           STORE    NRTERM   RTERM  M          E:(-29+NR)   M:(-27+NR)

 C851                        26,3054  41345 0  VGAMCALC DLOAD    DMP
 C852  REF  1                26,3055  00041 1                    NRMAG    RMAG  M          E:(-29+NR)   M:(-27+NR)
 C853  REF  2 LAST  818      26,3056  00021 1                    NRTERM   RTERM  M         E:(-29+NR)   M:(-27+NR)
 C854                        26,3057  45325 1           PDDL     DSU      RMAG RTERM M     E:(-58+2NR)  M:(-54+2NR)
 C855  REF  2 LAST  818      26,3060  00041 1                    NRMAG    RMAG  M          E:(-29+NR)   M:(-27+NR)
 C856  REF  3 LAST  818      26,3061  00021 1                    NRTERM   RTERM  M         E:(-29+NR)   M:(-27+NR)
 C857                        26,3062  56257 1           SL*      DDV      2(RN-RTERM)      E:(-30+NR)   M:(-28+NR)
 C858                        26,3063  20171 1                    0 -80,1  (-8+NR)
AC859                                                                     PUSH UP PRODUCT.
 C860                        26,3064  77625 0           DSU
 C861  REF  1                26,3065  00025 0                    TFFVSQ   -(V SQ/MU)              E: (20)   M: (18)
 C862                        26,3066  41566 1           SQRT     PUSH     SAVE VGAM/RT(MU) FOR NOW. E:(10) M:(9)
 C863                        26,3067  65271 0           DDV      PDDL     XCH PDL+0, LEAVING VGAM FOR OUTPUT.
AC864                                                                     VGAM TO PDL M/CS   E: (-7)   M: (-2)
 C865  REF  3 LAST  522      26,3070  00037 0                    TFF/RTMU E: (17)  M: (14)
 C866                        26,3071  65205 0           DMP      PDDL     RTERM VGAM/RTMU  E:(-19+NR)  M:(-18+NR)
 C867  REF  4 LAST  818      26,3072  00021 1                    NRTERM   RTERM  M         E:(-29+NR)   M:(-27+NR)
 C868  REF  1                26,3073  00035 1                    TFFNP    LC P =H.H/MU  M  E:(-38+2NR)  M:(-36+2NR)
 C869                        26,3074  56366 1           SQRT     DDV                       E:(-19+NR)   M:(-18+NR)
AC870                                                                     PUSH UP DEN       E:(-19+NR)   M:(-18+NR)
AC8701                                                                    USE DDV OVFL AS LIMITER (|COS| <1.0)
 C871                        26,3075  65542 1           SR1      ACOS
 C872                        26,3076  77616 0  DUMPVGAM RVQ

AC8721                                                                    CALLER MUST SUPPLY OWN SIGN ...

AC873                                                                                              22W     27MS
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R0874   SUBROUTINE NAME:     TFF/TRIG              (USED BY  S61.2)              DATE      01.17.67
R0876   MOD NO:  0                                                               LOG SECTION:    P61-P67
R0878   MOD BY:  RR BAIRNSFATHER
R0879   MOD NO:  1            MOD BY:  RR BAIRNSFATHER      DATE:  14 APR 67
R0880   MOD NO:  2            MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR  68    ACCEPT DIFFERENT EARTH/MOON SCALE
R0882   FUNCTIONAL DESCRIPTION:      USED BY ENTRY DISPLAY TO CALCULATE SIN(THETA), COS(THETA) FROM DATA LEFT IN
R0884           PDL BY TFF SUBROUTINES. THE EQNS ARE
R0885                 COS(THETA) = 1-2 ABS(ARG) /(RN RTERM (1+X)  )
R0886                                             2
R0887                 SIN(THETA) = SGN(ARG) SQRT(1-COS (THETA) )
R0888           WHERE  THETA = TRANSFER ANGLE
R0889           AND    ARG = P Z ABS(Z)                                         IF ALFA ZZ   LEQ 1
R0891                  ARG = (P / ALFA)  SGN(Q1 + R 1/Z)                       IF ALFA Z Z   G  1
R0893           AND  ARG  HAS BEEN AFFIXED WITH THE SIGN OF SIN(THETA).
R0894   CALLING SEQUENCE:  CALL
R0895                          TFF/TRIG
R0896           PUSHLOC AT PDL+0, ARBITRARY IF NOT EQ 14D
R0897           C(MPAC) UNSPECIFIED

R0898   SUBROUTINES CALLED:  NONE
R0899   NORMAL EXIT MODES:   RVQ
R0900   ALARMS:  NONE
R0901   OUTPUT:  C(MPAC) = .5 SIN(THETA)
R0902           CDELF/2 = .5 COS(THETA)          (IN PDL 14D)
R0903           PUSHLOC AT PDL+0
R0904   ERASABLE INITIALIZATION REQUIRED:
R0905           TFFX                    X                                       LEFT BY CALCTFF OR CALCTPER
R0907           TFFTEM E: (-59+2NR)     ARG                                     LEFT BY CALCTFF OR CALCTPER
R0909                  M: (-55+2NR)     WHERE ARG = LCP ZZ SGN(DELF) OR ARG = LCP/ALFA  SGN(DELF)
R0911           NRTERM E: (-29+NR)       M  NORM LENGTH OF TERMINAL RADIUS      LEFT BY CALCTFF OR CALCTPER
R0913                  M: (-27+NR)
R0914           NRMAG  E: (-29+NR)       M  NORM LENGTH OF PRESENT POSITION     LEFT BY TFFCONIC
R0916                  M: (-27+NR)
R0917   DEBRIS:  QPRET, CDELF/2
```

```
 09173  REF   1                  27,2000                      SETLOC  P60S5
 09175                           27,3052                      BANK
 09178  REF   1                                               COUNT*  $$/S61.2
 0918                            27,3052   70545 1  TFF/TRIG  DLOAD   SR1
 0919   REF   1                  27,3053   00043 0            TFFX
 0920                            27,3054   41215 1  DAD       DMP
 0921   REF   8  LAST  648       27,3055   15334 1            HIDPHALF
 0922   REF   3  LAST  818       27,3056   00041 1            NRMAG      RMAG  M          E:(-29+NR)  M:(-27+NR)
 0923                            27,3057   55205 0  DMP       BDDV
 0924   REF   5  LAST  818       27,3060   00021 1            NRTERM     RTERM  M         E:(-29+NR)  M:(-27+NR)
 0925   REF   1                  27,3061   00045 0            TFFTEM     P ZSQ OR P/ALFA  E:(-59+2NR) M:(-55+2NR)
 0926                            27,3062   44246 1  ABS       BDSU       THE SIGN IS FOR SDELF.
 0927   REF   9  LAST  819       27,3063   15334 1            HIDPHALF
 0928   REF   3  LAST  816       27,3064   00017 1  STORE     CDELF/2    .5 COS(THETA)
 0929                            27,3065   57516 1  DSQ       DCOMP      KEEP HONEST FOR SQRT.
```

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 0930                          27,3066  75415 0           DAD     SQRT
 0931   REF   1                27,3067  15326 1                   HIDP1/4
 0932                          27,3070  43565 0 DUMPTRIG  SIGN    RVQ
 0933   REF   2  LAST  819     27,3071  00045 0                   TFFTEM      AFFIX SIGN(DELE/2)
A0934                                                                         RETURN WITH .5 SIN(THETA) IN MPAC

 09345  REF   1                04,2000           SETLOC  P60S6
 09346                         04,3731           BANK

 09348  REF   1                                  COUNT*  $$/S61.1
A0935                                                                                  16W          15 MS

 0936                          04,3731  77620 0 DISPTARG STQ               C(MPAC) = TRGO  ESTIMATE
 0937   REF   4  LAST  809     04,3732  03373 0                   60GENRET
 0939                          04,3733  43205 1           DMP     DAD       (TTE1 IS POSITIVE)
 0940   REF   1                04,3734  11752 1                   KTETA1
 0944   REF   3  LAST  812     04,3735  03733 0                   TTE1
 0945   REF   6  LAST  305     04,3736  37606 0           STCALL  DTEAROT
 0946   REF   2  LAST  305     04,3737  46223 0                   EARROT2
 0947                          04,3740  77624 1           CALL
 0948   REF   2  LAST  812     04,3741  11744 0                   VRCALC
 0949                          04,3742  77650 1           GOTO
 0950   REF   5  LAST  820     04,3743  03373 0                   60GENRET
 0951                          04,3744  50375 0 VRCALC    VLOAD   DOT
 0952   REF   2  LAST  816     04,3745  03542 1                   URH
 0953   REF   3  LAST  305     04,3746  03474 0                   RT
 0954                          04,3747  65512 1           SL2     ACOS
 0956                          04,3750  77616 0           RVQ
 09563                         04,3751  00052 0 KTETA1    2DEC*   .421844723 E2 B-14*      1100 2PI/16384(163.84)
 09563                         04,3752  05716 1
R0957   END OF PROGRAM  S61.2
```

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P0958
R0959   PROGRAM DESCRIPTION S62.3       DATE 10JAN67
R0960   MOD NO 1          LOG SECTION P60-P67
R0961   MOD BY ZELDIN
R0962   MOD NO:  2          MOD BY:  RR BAIRNSFATHER      DATE: 15 MAY 67      CHANGED TO REF COORDS.
R0964   MOD NO:  3          MOD BY:  RR BAIRNSFATHER      DATE:  17 JAN 68     ALFAPAD CHANGES MADE.
R0966   FUNCTIONAL DESCRIPTION
R0967           COMPUTE  DESIRED GIMBOL ANGLES FOR ENTRY ATTITUDE
R0968           THE FOLLOWING TRAJECTORY TRIAD IS AVAILABLE IN MEMORY AND IS COMPUTED EACH 2 SECONDS BY  CM/POSE  IN
R0970           REFERENCE COORDINATES (V = VELOCITY RELATIVE TO EARTH) :

R0971                   UXA = -UNIT(V)
R0972                   UYA =  UNIT(V*R)
R0973                   UZA =  UXA*UYA

R0974           GENERATE A DESIRED BODY TRIAD FOR TRIMMED FLIGHT WITH RESPECT TO THE RELATIVE VELOCITY VECTOR, USING
R0976           ROLL COMMAND AND TRIM ANGLE OF ATTACK:

R0977                   UXD = UNIT(UYD*UXA) SIN(ALFATRIM) + UXA COS(ALFATRIM)
R0978                   UYD = UYA COS(ROLLC) + UZA SIN(ROLLC)
R0979                   UZD = UXD * UYD

R0980           USE THE DESIRED SET (IN REFERENCE COORDS) AND  REFSMMAT  TO CALL   CALCGA   AND OBTAIN GIMBAL ANGLES
R0982           IN 2S,C IN MPAC, +2 AND THETAD, +2.

R0983   CALLING SEQUENCE
R0984         L   CALL
R0985       L+1       S62.3
R0986   NORMAL EXIT MODE
R0987           RETURN VIA QPRET DIRECTLY FROM CALCGA.
R0988   SUBROUTINES CALLED
R0989           CALCGA
R0990   ALARM OR ABORT MODES
R0991           NONE
R0992   ERASABLE INITIALIZATION REQUIRED
R0993           ROLLC  ROLL COMMAND                          DP 1:S COMP AT 1REV
R0994           ALFAPAD   SP 1S,C     /180                    LEFT BY PAD LOAD    ALFATRIM IS NEGATIVE.
R0996           UXA/2  REF COORDS                            LEFT BY CM/POSE
R0997           UYA/2  REF COORDS                            LEFT BY CM/POSE
R0998           UZA/2  REF COORDS                            LEFT BY CM/POSE
R0999   OUTPUT
R1000           CPHI   GIMBAL ANGLES (O,I,M) 2:S COMP TP (O,I,M)/180
R1001   DEBRIS
R1002         QTEMP, QPRET,PUSHLIST
R1003

 1005   REF   1             10,2000                  SETLOC P60S4
 1006                       10,2412                  BANK

 1007   REF   1                                      COUNT* $$/S62.3
```

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```
1008                          10,2412  67201 0  S62.3   SETPD   SLOAD
1009                          10,2413  00001 0          0
1010  REF   2 LAST  796       10,2414  03012 1          ALFAPAD   ALFATRIM /180 , ALFA IS NEG.
1011                          10,2415  41542 1  SR1     PUSH
1012                          10,2416  65346 0  COS     PDDL      XCH PDL, CCS TO PDL0
1013                          10,2417  65356 1  SIN     PDDL      SIN TO PDL2
1014  REF   9 LAST  796       10,2420  03316 0          ROLLC
1015                          10,2421  74346 0  COS     VXSC
1016  REF   2 LAST  122       10,2422  03550 1          UYA/2                    REF COORDS
1017                          10,2423  73525 1  PDDL    SIN       PUSH VECTOR INTO PDL4,,9
1018  REF  10 LAST  822       10,2424  03316 0          ROLLC
1019                          10,2425  53361 0  VXSC    VAD
1020  REF   2 LAST  122       10,2426  03556 1          UZA/2                    REF COORDS
A1021                                                   VECTOR FROM PDL4, 9
1022                          10,2427  77772 0  VSL1
1023  REF   5 LAST  770       10,2430  02722 1  STORE   YNB       = UYD          REF COORDS

1024                          10,2431  76435 1  VXV     VSL1
1025  REF   3 LAST  122       10,2432  03542 1          UXA/2                    REF COORDS
1026                          10,2433  65361 0  VXSC    PDDL
A1027                                                   SIN TRIM FROM PDL2
A1028                                                   XCH PDL0 FOR COS TRIM
1029                          10,2434  53361 0  VXSC    VAD
1030  REF   4 LAST  822       10,2435  03542 1          UXA/2                    REF COORDS
A1031                                                   FROM PDL0
1032                          10,2436  77772 0  VSL1
1033  REF  10 LAST  782       10,2437  02714 1  STORE   XNB       X SC AXIS (.5 UNIT)      REF COORDS

1034                          10,2440  76435 1  VXV     VSL1
1035  REF   6 LAST  822       10,2441  02722 1          YNB
1036  REF   6 LAST  770       10,2442  26730 1  STOVL   ZNB       Z SC IN REF COOR. SCALED AT 2
1037  REF  42 LAST  808       10,2443  01734 0          REFSMMAT
1038  REF  30 LAST  782       10,2444  26672 0  STOVL   XSM
1039  REF  43 LAST  822       10,2445  01742 1          REFSMMAT +6
1040  REF   5 LAST  629       10,2446  26700 1  STOVL   YSM
1041  REF  44 LAST  822       10,2447  01750 1          REFSMMAT +12D
1042  REF   6 LAST  629       10,2450  02706 1  STORE   ZSM

1043                          10,2451  77650 1  GOTO
1045  REF   4 LAST  782       10,2452  47344 1          CALCGA
A1046                                                   CALCGA WILL RETURN TO ORIGINAL CALLER
A1047                                                   VIA QPRET WITH 2,S COMP. ANGLES IN CPHI
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L SERVICER207 USER'S PAGE NO. 1 EO S3

R0001 PROGRAM NAME - PREREAD, READACCS, SERVICER, AVERAGE G.

R0002 MOD NO. 00 BY M.HAMILTON DEC.12, 1966

R0003 FUNCTIONAL DESCRIPTION

R0004 THE ROUTINES DESCRIBED BELOW ARE USED TO CALCULATE VALUES OF RN, VN, AND GDT/2 DURING ACCELERATED FLIGHT.
R0006 THE SEVERAL ROUTINES COMPRISE A PACKAGE AND ARE NOT MEANT TO BE USED AS SEPARATE SUBROUTINES.

R0008 GENERAL REFERENCES TO SERVICER OR AVERAGE G ARE UNDERSTOOD TO REFER TO THE ENTIRE SET OF ROUTINES INCLUDING
R0010 READACCS, SERVICER, AVERAGE G, INTEREAD, SMOOTHER, AND ANY ADDITIONAL ROUTINES ATTACHED AT AVGEXIT (SEE BELOW).

R0012 PROGRAMS INITIATING SERVICER ARE REQUIRED TO MAKE A WAITLIST CALL FOR PREREAD (OR, IF LIFTOFF, FOR BIBIBIAS)
R0014 AT 2 SECONDS BEFORE THE FIRST AVERAGE G UPDATE IN ORDER TO INITIALIZE THE SEQUENCE, WHICH WILL RECUR EVERY
R0016 2 SECONDS FROM THAT TIME ON AS LONG AS AVEGFLAG REMAINS SET.

R0017 THE USE OF ERASABLE AVGEXIT ALLOWS VARIOUS ROUTINES TO BE PERFORMED AS PART OF THE NORMAL CYCLE (SEE
R0019 EXPLANATION OF AVGEXIT BELOW).

R0020 DESCRIPTIONS OF INDIVIDUAL ROUTINES FOLLOW.

R0021 PREREAD

R0022 PREVIOUSLY EXTRAPOLATED VALUES COPIED FROM RN1, VN1, AND PIPTIME1 INTO RN, VN, AND PIPTIME.
R0024 LASTBIAS JOB SCHEDULED.
R0025 PIPS READ AND CLEARED VIA PIPASR SUBROUTINE.
R0026 AVERAGE G FLAG SET ON.
R0027 DRIFT FLAG SET OFF.
R0028 V37 FLAG SET ON.
R0029 INITIALIZATION OF 1) THRUST MONITOR (DVMON) - DVCNTR SET TO ONE.
R0031 2) TOTAL ACCUMULATED DELV VALUE (DVTOTAL) - SET TO ZERO.
R0033 3) AXIS VECTOR (AXIS) - SET TO (.5,0,0).
R0034 NORMLIZE JOB SCHEDULED.
R0035 READACCS TASK CALLED IN 2 SECONDS.

R0036 NORMLIZE

R0037 GDT/2 INITIALIZED VIA CALCGRAV SUBROUTINE.

R0038 READACCS

R0039 IF ONMON FLAG SET QUIKREAD ROUTINE IS PERFORMED BEFORE PIPASR ZEROS THE PIPA REGISTERS, AND THE 1/2 SEC
R0041 ONMONITOR LOOP IS INITIATED TO PROVIDE DOWNLINK INFORMATION DURING ENTRY.
R0043 PIPS READ AND CLEARED BY PIPASR SUBROUTINE.
R0044 IF CM/DSTBY IS ON, ENTRY VARIABLES INITIALIZED AND SETJTAG TASK CALLED.

```
R0047           IF AVERAGEG FLAG ON    READACCS CALLED TO RECYCLE IN 2 SECONDS.
R0048           IF AVERAGEG FLAG OFF   AVERAGE G EXIT (AVGEXIT) SET TO 2CADR AVGEND FOR FINAL PASS.
R0050           SERVICER JOB SCHEDULED.


R0051           TEST CONNECTOR OUTBIT TURNED ON.


R0052   CNMNITOR

R0053           A SEQUENCE OF THREE PASSES THROUGH QUICKREAD FOLLOWING A CALL TO READACCS WITH ONMONFLG SET AT 1/2
R0055           SEC INTERVALS. INTERVALS ARE COUNTED OUT BY PIPCTR, INITIALISED AT 3 BY READACCS

R0057       QUIKREAD

R0058           READS CURRENT PIPS INTO X,Y,ZPIPBUF. READS OLD X,Y,ZPIPBUF INTO X,Y,ZOLDBUF. VALUES ARE SENT TO
R0060             DOWNLIST DURING ENTRY.
R0061       SERVICER
R0062           DELV VALUES CHECKED TO DETECT RUNAWAY PIP -
R0063                 IF BAD PIP   1) ALARM SENT.
R0064                              2) COMPENSATION, DVTOTAL ACCUMULATION, AND DVMON BYPASSED.  CONTROL
R0066                                 TRANSFERRED TO AVERAGE G.
R0067           PIPS COMPENSATED VIA 1/PIPA SUBROUTINE.
R0068           DVTOTAL INCREMENTED BY ABSOLUTE VALUE OF DELV.
R0069           THRUST MONITOR (DVMON) PERFORMED UNLESS IDLE FLAG IS ON.
R0070           CONTROL TRANSFERRED TO AVERAGE G.


R0071           DVMON

R0072              THRESHOLD VALUE (PLACED IN DVTHRUSH BY USER) CHECKED AGAINST ABSOLUTE VALUE OF DELV TO CHECK
R0074              THRUST LEVEL.
R0075                  IF THRUST    1) ULLAGE OFF ROUTINE PERFORMED.
R0076                               2) STEERING FLAG TURNED ON AT FIRST DETECTION OF THRUST.
R0078                               3) CONTROL TRANSFERRED TO AVERAGE G.
R0079                  IF NO THRUST 1) ON FIRST PASS THROUGH MONITOR, CONTROL TRANSFERRED TO AVERAGE G.
R0081                               2) ON SUBSEQUENT PASSES, CONTROL TRANSFERRED TO ENGINE FAIL ROUTINE IF THRUST
R0083                                  HAS FAILED FOR 3 CONSECUTIVE PASSES.


R0084           ENGINE FAIL

R0085              ENGFAIL1 TASK CALLED IN 2.5 SECONDS.  THIS WILL RETURN CONTROL TO TIG-5 SO THAT THE IGNITION
R0087                 SEQUENCE MAY BE REPEATED.
R0088              ENGINOF3 PERFORMED.
R0089              DAP SET UP FOR RCS.


R0090       AVERAGE G
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R0091           RN1, VN1, GDT1/2 CALCULATED VIA CALCRVG ROUTINE BY UPDATING RN, VN WITH DELV AND AN AVERAGED VALUE
R0093           OF GDT/2.
R0094           RN1, VN1, GDT1/2, PIPTIME1 COPIED INTO RN, VN, GDT/2, PIPTIME FOR RESTART PROTECTION.
R0096           CONTROL TRANSFERRED TO ADDRESS SPECIFIED BY USER (OR BY READACCS FOR LAST PASS) IN AVGEXIT.
R0098           LAST PASS (AVGEND)  1) FREE FALL GYRO COMPENSATION SET UP.
R0099                               2) DRIFT FLAG TURNED ON.
R0100                               3) STATE VECTOR TRANSFERRED VIA AVETOMID ROUTINE.
R0102                               4) ONMONITOR FLAG RESET.
R0103                               5) V37 FLAG RESET.
R0104                               6) TEST CONNECTOR OUTBIT RESET.
R0105                               7) CONTROL TRANSFERRED TO CANV37 TO CONTINUE MM CHANGE ROUTINE (R00).


R0108   CALLING SEQUENCE

R0109           PREREAD ENTERED DIRECTLY FROM TIG-30 VIA POSTJUMP.
R0110           READACCS CALLED AS WAITLIST TASK.


R0112   SUBROUTINES CALLED

R0113           UTILITY ROUTINES - PHASCHNG FLAGUP FLAGDOWN NOVAC FINDVAC WAITLIST ALARM NEWPHASE 2PHSCHNG

R0115           OTHER - PIPASR  1/PIPA  CALCGRAV  CALCRVG  AVETOMID


R0116   NORMAL EXIT MODES

R0117           ENDOFJOB  TASKOVER  CANV37

R0118           AVGEXIT - THIS IS A DOUBLE PRECISION ERASABLE LOCATION BY WHICH CONTROL IS TRANSFERRED AT THE END
R0120                     OF EACH CYCLE OF AVERAGE G.
R0121                     THE 2CADR OF A ROUTINE TO BE PERFORMED AT THAT TIME (E.G., STEERING EQUATIONS TO BE PERFORMED
R0123                     AT 2 SECOND INTERVALS) MAY BE SET BY THE USER INTO AVGEXIT.
R0125                     ALL SUCH ROUTINES SHOULD RETURN TO SERVEXIT, WHICH IS THE NORMAL EXIT FROM AVERAGE G.

R0127           SERVEXIT - DOES A PHASE CHANGE FOR RESTART PROTECTION AND GOES TO ENDOFJOB.
R0129                      THE 2CADR OF SERVEXIT IS SET INTO AVGEXIT BY THE USER IF NO OTHER ROUTINE (SEE ABOVE).

R0131           AVGEND - LAST PASS OF AVERAGE G EXITS HERE, BYPASSING SPECIAL ROUTINE (SEE ABOVE UNDER READACCS).
R0133                    FINAL EXIT IS TO CANV37.                                    F AVERAGE G).


R0135   OUTPUT

R0136       DVTOTAL(2)  PIPTIME(2)  XPIPBUF(2)  YPIPBUF(2)  ZPIPBUF(2)
R0137       RN(6)        REFERENCE COORD.   SCALED AT 2(+29)M/CS
R0138       VN(6)        REFERENCE COORD.   SCALED AT 2(+7)M/CS
R0139       GDT/2(6)     REFERENCE COORD.   SCALED AT 2(+7)M/CS
R0140       DELV(6)      STABLE MEMB. COORD.SCALED AT 2(+14)*5.85*10(-4)M/CS (KPIP1 USED TO GET DV/2 AT 2(+7))
```

R0142 DELVREF(6) REFERENCE COORD. SCALED AT 2(+7)M/CS

R0143 INITIALIZATION

R0144 ONMONITOR FLAG SET BY ENTRY TO SHOW PIPBUF VALUES REQUIRED.
R0145 IDLE FLAG ON IF DVMON TO BE BYPASSED.
R0146 DVTHRUSH SET TO APPROPRIATE VALUE FOR DVMON.
R0147 AVGEXIT SET TO 2CADR OF ROUTINE, IF ANY, TO BE PERFORMED AFTER EACH CYCLE OF AVERAGE G. IF NO ROUTINE
R0149 TO BE DONE, AVGEXIT SET TO SERVEXIT.
R0150 VALUES NEEDED
R0151 REFSMMAT
R0152 UNITW - FULL UNIT VECTOR, IN REFERENCE COORD., OF EARTH S ROTATIONAL VECTOR
R0154 RN1, VN1, PIPTIME1 - IN REFERENCE COORD., CONSISTENT WITH TIME OF EXECUTION OF PREREAD

R0156 DEBRIS

R0157 CENTRALS A, L, Q
R0158 OTHER INTERNAL - DVCNTR(1) PIPAGE(1) PIPCTR(1) AVGEXIT(2)
R0159 EXTERNAL - ITEMP1(1) ITEMP2(1) RUPTREG1(1) TEMX(1) TEMY(1) TEMZ(1)
R0161 USEFUL DEBRIS
R0162 RN1(6) VN1(6) GDT1/2 PIPTIME1(2)
R0163 THESE LOCATIONS USED AS BUFFER STORAGE FOR NEWLY CALCULATED VALUES OF RN, VN, GDT/2,
R0165 AND PIPTIME DURING PERFORMANCE OF SERVICER ROUTINES.
R0167 UNITR - HALF UNIT VECTOR OF RN, REFERENCE COORD.
R0168 RMAG SCALED AT 2(+58) IN 36D.
R0169 RMAGSQ SCALED AT 2(+58) IN 34D.
R0170 (RE/RMAG)SQ IN 32D.

```
 0172  REF   1                37,2000                          SETLOC  SERVICES
 0173                         37,2607                          BANK

 0174  REF  11  LAST  809     E7,1425                          EBANK=  DVTOTAL
R0175  **********************************   PREREAD   ************************************************************
R0177

 0178  REF   1                                                 COUNT*  $$/SERV
 0185  REF   2  LAST  312     37,2607   3 5057 0   PREREAD     CAF     PRIO21          CALLER MUST PROTECT PREREAD
 0186  REF  17  LAST  801     37,2610   0 5121 0               TC      NOVAC
 0187  REF   5  LAST  315     E3,1460                          EBANK=  NBDX
 0188  REF   1                37,2611    03655 1               2CADR   LASTBIAS        DO LAST GYRO COMPENSATION IN FREE FALL
 0188  REF   1                37,2612    14063 1

A01882                                                                          CALL-TO AND LASTBIAS ITSELF ARE NOT
A01883                                                                               PROTECTED. REREADAC SETS 1/PIPADT
A01884                                                                               TO 2.0 SECS IN CASE LASTBIAS LOST.
A01885                                                                               (REDUNDANT IF LASTBIAS IS AOK)

 0189  REF   2  LAST  537     37,2613   0 2630 0   RED05,31 TC      PREREAD1
```

```
0190   REF   1                  37,2614  3 7654 1          CAF     PRIO32
0191   REF  34  LAST  808       37,2615  0 5135 0          TC      FINDVAC        SET UP NORMLIZE JOB REQUIRED PRIOR TO
0192   REF  12  LAST  826       E7,1425                    EBANK=  DVTOTAL
0193   REF   3  LAST  540       37,2616   03154 1          2CADR   NORMLIZE
0193                             37,2617   76067 1
0194   REF   4  LAST  712       37,2620  3 5017 1          CAF     2SECS
0195   REF  22  LAST  808       37,2621  0 5233 0          TC      WAITLIST
0196   REF  17  LAST  808       E6,1661                    EBANK=  ADG
0197   REF   2  LAST  540       37,2622   02652 1          2CADR   READACCS
0197                             37,2623   76066 0
0198   REF  29  LAST  599       37,2624  4 4767 1          CS      TWO
0199   REF   6  LAST  703       37,2625  0 4126 0          TC      NEWPHASE
0200                             37,2626   00005 1          OCT     5

02005  REF   3  LAST  540       01,2234            5P2SPT2 =       5.2SPOT
0201   REF  39  LAST  797       37,2627  1 5314 0          TCF     TASKOVER


0202                             37,2630  0 0006 1 PREREAD1 EXTEND
0203   REF  18  LAST  248       37,2631  22 070 0          QXCH    RUPTREG1

0204   REF   1                  37,2632  0 3171 0          TC      PIPASR         CLEAR + READ PIPS LAST TIME IN FREE FALL

02042  REF  88  LAST  798       37,2633  3 4770 0          CAF     ONE            SET UP PIPAGE FOR REREADAC IN CASE A
02043  REF   2  LAST   79       37,2634  55'067 0          TS      PIPAGE         RESTART OCCURS BEFORE READACCS

0205   REF  35  LAST  760       37,2635  4 0075 1          CS      FLAGWRD1       SET AVEG FLAG
0206   REF   3  LAST  210       37,2636  7 4770 1          MASK    AVEGBIT
0207   REF  36  LAST  827       37,2637  26 075 1          ADS     FLAGWRD1

0208   REF   2  LAST  315       37,2640  4 4752 1          CS      DRFTBIT
0209   REF  21  LAST  762       37,2641  7 0076 1          MASK    FLAGWRD2
0210   REF  22  LAST  827       37,2642  54 076 1          TS      FLAGWRD2       KNOCK DOWN DRIFT FLAG

0211   REF  18  LAST  760       37,2643  4 0103 1          CS      FLAGWRD7       SET V37 FLAG
0212   REF   2  LAST  210       37,2644  7 4763 0          MASK    V37FLBIT
0213   REF  19  LAST  827       37,2645  26 103 1          ADS     FLAGWRD7

0218   REF 142  LAST  785       37,2646  3 4772 1          CAF     ZERO
0224   REF  13  LAST  827       37,2647  55'425 1          TS      DVTOTAL        CLEAR DVTOTAL
0225   REF  14  LAST  827       37,2650  55'426 1          TS      DVTOTAL +1

0226   REF  19  LAST  827       37,2651  0 0070 0          TC      RUPTREG1
```

```
PC227  ************************************  READACCS  ************************************************************
 C229  REF  18  LAST  827  E6,1661                        EBANK=  AOG
 C242  REF   2  LAST  827  37,2652  0 3171 0  READACCS  TC      PIPASR

 C243  REF  18  LAST  776  37,2653  3 4773 0  PIPSDONE  CAF     FIVE
 C244  REF  79  LAST  787  37,2654  54 001 1             TS      L
 C245                      37,2655  4 0000 0            COM
 C246  REF   3  LAST  536  37,2656  53'166 0            DXCH    -PHASE5

 C2465 REF   1             01,2253                  5P5SPT1  =      5.5SPOT
 C247  REF  89  LAST  827  37,2657  3 4770 0  REDO5.5   CAF     ONE       SHOW PIPS HAVE BEEN READ
 C248  REF   3  LAST  827  37,2660  55'067 0            TS      PIPAGE

 C249  REF  30  LAST  827  37,2661  3 4767 0            CA      TWO       SET PIPCTR FOR ONMINTOR
 C250  REF   2  LAST   79  37,2662  55'066 1            TS      PIPCTR    AFTER ABOVE PHASCHNG

 C251  REF   3  LAST  804  37,2663  4 0102 0            CS      CM/FLAGS
 C252  REF   2  LAST  804  37,2664  7 4767 1            MASK    CM/DSBIT  103D BIT2
 C253  REF 182  LAST  787  37,2665  10 000 0            CCS     A
 C254  REF   2  LAST  236  37,2666  0 2740 0            TC      CHEKAVEG

 C255  REF   6  LAST  699  37,2667  4 1105 0            CS      PIPTIME1 +1
 C256  REF   2  LAST  709  37,2670  55'271 0            TS      TBASE6    FOR RESTARTS
 C260                      37,2671  0 0006 1            EXTEND            CONTINUE FOR ENTRY DAP
 C261  REF  19  LAST  828  37,2672  3 1662 1            DCA     AOG
 C262  REF   2  LAST  115  37,2673  53'670 0            DXCH    AOG/PIP
 C263  REF   2  LAST  115  37,2674  3 1663 0            CA      AMG
 C264  REF   2  LAST  115  37,2675  57'671 0            XCH     AMG/PIP
 C265                      37,2676  0 0006 1            EXTEND
 C266  REF   2  LAST  115  37,2677  3 1665 0            DCA     ROLL/180
 C267  REF   2  LAST  115  37,2700  53'673 0            DXCH    ROLL/PIP
 C268  REF   3  LAST  188  37,2701  3 1666 0            CA      BETA/180
 C269  REF   2  LAST  115  37,2702  57'674 0            XCH     BETA/PIP
 C270  REF   4  LAST  828  37,2703  3 0102 1            CA      CM/FLAGS
 C271  REF   1             37,2704  7 4755 0            MASK    CMARMBIT  93D BIT12
 C272                      37,2705  0 0006 1            EXTEND            DURING ENTRY, WHEN RCS DAP IS INACTIVE,
 C273  REF   1             37,2706  1 2723 1            BZF     NOSAVPIP  SAVE PIPAS EACH 0.5 SEC FOR TM.

 C274  REF   7  LAST  760  37,2707  3 5011 1            CAF     .5SEC
 C275  REF  16  LAST  740  37,2710  0 5223 1            TC      TWIDDLE
 C276  REF   1             37,2711  02773 0            ADRES   QUIKREAD
AC278                                                                NO NEED TO RESTART PROTECT THIS.
 C279  REF   9  LAST  439  37,2712  3 1314 0            CA      DELVX     SAVE PIPAS AS READ (BUT NOT COMPENSATED)
 C280  REF   3  LAST  137  37,2713  57'533 0            XCH     XPIPBUF
 C281  REF   3  LAST  137  37,2714  55'536 1            TS      XOLDBUF

 C282  REF   5  LAST  438  37,2715  3 1316 1            CA      DELVY
 C283  REF   3  LAST  137  37,2716  57'534 1            XCH     YPIPBUF
 C284  REF   3  LAST  137  37,2717  55'537 0            TS      YOLDBUF
```

```
 0285   REF   4  LAST  438   37,2720  3 1320 1            CA      DELVZ
 0286   REF   3  LAST  137   37,2721  57'535 0            XCH     ZPIPBUF
 0287   REF   1              37,2722  55'540 0            TS      ZOLDBUF

 0288   REF  19  LAST  828   37,2723  3 4773 0  NOSAVPIP  CA      FIVE
 0289   REF   4  LAST  236   37,2724  55'725 1            TS      CM/GYMDT

 0290   REF   1              37,2725  3 3153 0            CA      JTAGTIME        ACTIVATE CM/RCS AFTER PIPUP TO GO
A0291                                                                             IN JTAGTIME +5 CS.
 0292   REF  23  LAST  827   37,2726  0 5233 0            TC      WAITLIST
 0293   REF  20  LAST  828   E6,1661                      EBANK=  ADG
 0294   REF   2  LAST  230   37,2727   02636 0            2CADR   SETJTAG
 0294                        37,2730   32066 0

 0295   REF  29  LAST  744   37,2731  4 6214 1            CS      THREE           1.3SPOT FOR SETJTAG
 0296   REF   7  LAST  827   37,2732  0 4126 0            TC      NEWPHASE
 0297                        37,2733   00001 0            OCT     1

 02975  REF   2  LAST  230   01,2014              1P3SPT1 =       1.3SPOT
 0298   REF   4  LAST  546   37,2734  3 4125 0            CAF     OCT31           5.31SPOT FOR CHEKAVEG
 0299   REF  80  LAST  828   37,2735  54 001 1            TS      L
 0300                        37,2736  4 0000 0            COM
 0301   REF   4  LAST  828   37,2737  53'166 0            DXCH    -PHASE5

 03015  REF   1              01,2311              5P31SPT1 =       5.31SPOT
 0302   REF  37  LAST  827   37,2740  4 0075 1  CHEKAVEG  CS      FLAGWRD1
 0303   REF   4  LAST  827   37,2741  7 4770 1            MASK    AVEGBIT
 0304   REF 183  LAST  828   37,2742  10 000 0            CCS     A               IF AVEG FLAG DOWN SET FINAL EXIT AVEG
 0305   REF   1              37,2743  0 2762 0            TC      AVEGOUT

 0306   REF   5  LAST  827   37,2744  3 5017 1            CAF     2SECS
 0307   REF  17  LAST  828   37,2745  0 5223 1            TC      TWIDDLE
 0308   REF   3  LAST  827   37,2746   02652 1            ADRES   READACCS
 0310   REF   3  LAST  737   37,2747  3 4753 1  MAKESERV  CAF     PRIO20          ESTABLISH SERVICER ROUTINE
 0311   REF  35  LAST  827   37,2750  0 5135 0            TC      FINDVAC
 0312   REF  15  LAST  827   E7,1425                      EBANK=  DVTOTAL
 0313   REF   2  LAST  235   37,2751   03010 0            2CADR   SERVICER
 0313                        37,2752   76067 1

 0314   REF   9  LAST  780   37,2753  4 4766 0            CS      FOUR            RESTART SERVICER AND READACCS
 0315   REF   8  LAST  829   37,2754  0 4126 0            TC      NEWPHASE
 0316                        37,2755   00005 1            OCT     5

 03165  REF   1              01,2242              5P4SPT1  =       5.4SPOT
 0317   REF  21  LAST  711   37,2756  3 4760 1            CAF     BIT9
 0318                        37,2757  0 0006 1            EXTEND
 0319   REF  22  LAST  705   37,2760  05 011 1            WOR     DSALMOUT        TURN TEST CONNECTOR OUTBIT ON

 0320   REF  40  LAST  827   37,2761  1 5314 0            TCF     TASKOVER        END PREVIOUS READACCS WAITLIST TASK
```

```
0321                          37,2762  0 0006 1  AVEGOUT  EXTEND
0322   REF   1                37,2763  3 2767 0           DCA     AVOUTCAD
0323   REF   2  LAST  539      37,2764  53'062 0           DXCH    AVGEXIT
0324   REF   1                37,2765  1 2747 0           TCF     MAKESERV

0325   REF  16  LAST  829      E7,1425                     EBANK=  DVTOTAL
0326   REF   1                37,2766   03100 0  AVOUTCAD 2CADR   AVGEND
0326   REF   1                37,2767   76067 1
```

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P0327   ROUTINE NAME: ONMNITOR
R0328   MOD 04 BY BAIRNSFATHER  30 APR 1968                REDO ONMNITOR TO SAVE PIPS EACH 0.5 SEC FOR TM,ENTRY.
R0330   MOD 03 BY FISHER DECEMBER 1967
R0331   MOD 02 BY RYE SEPT 1967
R0332   MOD 01 BY KOSMALA 23 MAR 1967
R0333   MOD 00 BY KOSMALA 27 FEB 1967

R0334   FUNCTIONAL DESCRIPTION

R0335           THE PURPOSE OF ONMONITOR IS TO PROVIDE 1/2 SEC.READING OF PIPAS FOR DOWNLIST DURING ENTRY.
R0337           X,Y,ZPIPBUF CONTAIN PRESENT VALUES X,Y,ZOLDBUF CONTAIN VALUES FROM PREVIOUS READING.

R0339   CALLING SEQUENCE

R0340           CALL AS WAITLIST TASK. TERMINATES ITSELF IN TASKOVER

R0341   INITIALISATION

R0342           PIPCTR = 2 (FOR DT = 0.5 SEC)
R0343           X,Y,ZPIPBUF SET TO PREVIOUS PIPAX,Y,Z

R0344   OUTPUT

R0345           X,Y,ZPIPBUF, X,Y,ZOLDBUF
R0346   DEBRIS

R0347           X,Y,ZPIPBUF CONTAIN LAST PIPAX,Y,Z VALUES
R0348                   X,Y,ZOLDBUF CONTAIN LAST-BUT-ONE PIPAX,Y,Z VALUES
R0349           RUPTREG1
R0350           PIPCTR

 0351   REF   3  LAST  828   37,2770  55'066 1  ONMNITOR TS      PIPCTR

 0352   REF   9  LAST  719   37,2771  0 5255 0            TC      FIXDELAY        WAIT
 0353                        37,2772   00062 0  0.5SEC    DEC     50

 0354   REF  31  LAST  828   37,2773  3 4767 0  QUIKREAD  CAF     TWO
 0355   REF  20  LAST  827   37,2774  54 070 1    +1      TS      RUPTREG1
 0356   REF 184  LAST  829   37,2775  50 000 1            INDEX   A
 0357   REF   6  LAST  438   37,2776  3 0037 0            CA      PIPAX           SAVE ACTUAL PIPAS FOR TM.
 0358   REF  21  LAST  831   37,2777  50 070 0            INDEX   RUPTREG1
 0359   REF   4  LAST  828   37,3000  57'533 0            XCH     XPIPBUF         UPDATE X,Y,ZPIPBUF
 0360   REF  22  LAST  831   37,3001  50 070 0            INDEX   RUPTREG1
 0361   REF   4  LAST  828   37,3002  55'536 1            TS      XOLDBUF         AND X,Y,ZOLDBUF
 0362   REF  23  LAST  831   37,3003  10 070 1  CHKCTR    CCS     RUPTREG1
 0363   REF   2  LAST  828   37,3004  1 2774 0            TCF     QUIKREAD +1     LOOP AGAIN
 0364   REF   4  LAST  831   37,3005  11'066 1            CCS     PIPCTR
 0365   REF   1              37,3006  1 2770 1            TCF     ONMNITOR
 0366   REF  41  LAST  829   37,3007  0 5314 1            TC      TASKOVER
```

```
P0367   ************************************   SERVICER   ************************************************************
R0369

03693  REF   2  LAST  826   37,2000                        SETLOC SERVICES
03695                       37,3010                        BANK

0370   REF  17  LAST  830   E7,1425                        EBANK= DVTOTAL

03705  REF   2 LAST  826 TO  832:   129   129*             COUNT* $$/SERV
0371   REF  32  LAST  831   37,3010  3 4767 0  SERVICER   CAF    TWO
0372                       37,3011  0 0004 0               INHINT
0373   REF  24  LAST  831   37,3012  54 070 1  PIPCHECK   TS     RUPTREG1

0374                       37,3013  6 0000 1               DOUBLE
0375   REF 185  LAST  831   37,3014  50 000 1               INDEX  A
0376   REF  10  LAST  828   37,3015  11'314 1               CCS    DELVX
0377                       37,3016  0 3020 0               TC     +2
0378   REF   1             37,3017  0 3026 0               TC     PIPLOOP

0379   REF   1             37,3020  6 3152 1               AD     -MAXDELV      DO PIPA-SATURATION TEST BEFORE
0380                       37,3021  0 0006 1               EXTEND
0381   REF   2  LAST  832   37,3022  6 3026 0               BZMF   PIPLOOP       COMPENSATION.

0382   REF  30  LAST  809   37,3023  0 5671 1               TC     ALARM
0383                       37,3024   00205 0               OCT    00205         SATURATED-PIPA ALARM  ***CHANGE LATER
0384   REF   1             37,3025  0 3056 1               TC     AVERAGEG

0385   REF  25  LAST  832   37,3026  10 070 1  PIPLOOP    CCS    RUPTREG1
0386   REF   1             37,3027  1 3012 0               TCF    PIPCHECK

0387   REF  84  LAST  808   37,3030  0 5402 1               TC     PHASCHNG      RESTART REREADAC + SERVICER
0388                       37,3031   16035 0               OCT    16035
0389                       37,3032   20000 0               OCT    20000

03895  REF  11  LAST  801   01,2250             5P3SPT9    =      5.3SPOT
0390   REF  18  LAST  832   E7,1425                        EBANK= DVTOTAL

0391   REF   1             37,3033   03037 0               2CADR  DVTOTUP
0391   REF   1             37,3034   76067 1

0392   REF 205  LAST  809   37,3035  0 4636 0               TC     BANKCALL      PIPA COMPENSATION CALL
0393   REF   2  LAST  439   37,3036   15276 0               CADR   1/PIPA

0394   REF 204  LAST  808   37,3037  0 6006 1  DVTOTUP    TC     INTPRET
A039405                                                          THE FOLLOWING SECTION DECREMENTS 'TTE' DURING P61
A03941                                                           THROUGH P63 ONLY. (IE: IN P60'S IF DRAG< 0.05 G)
03942                      37,3040   71214 0  TICKTTE    BON    DLOAD         .05GSW IS SET =1 IN FRESH START.
039425 REF   2  LAST  793   37,3041   03314 1                  .05GSW        FLAG IS ASSIGNED ONLY TO P61-P67.
03943                      37,3042   77047 1                  +5            DO NOT COUNT 'TTE' IF DRAG > 0.05 G.
039435 REF   3  LAST  812   37,3043   03735 0                  TTE2
03944                      37,3044   77615 0               DAD
```

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 039445 REF   7 LAST  828   37,3045   01105 1                  PIPTIME1      DECREMENT 'TTE' BY 'PIPTIME1'.(BY 2 SEC)
 03945  REF   7 LAST  812   37,3046   03727 0          STORE   TTE           NEGATIVE AS IN A COUNTDOWN.
A03946                                                                      DURING P61 THRU P63,'TTE' IS DECREMENTED
A039465                                                                     AND IS ON CALL AND ON ENTRY DNLIST.

 0395                      37,3047   51575 1          VLOAD   ABVAL         GET ABS VALUE OF DELV
 0396   REF  11 LAST  188   37,3050   01315 1                  DELV
 0397                      37,3051   77405 0          DMP     EXIT
 0398   REF   1            37,3052   37365 0                  KPIP1         SCALE AT 2(+7)

 0399                      37,3053   0 0006 1         EXTEND
 0400   REF 279 LAST  814   37,3054   3 0155 0         DCA     MPAC
 0401   REF  19 LAST  832   37,3055   21'426 1         DAS     DVTOTAL       ACCUMULATE DVTOTAL
 0402   REF  85 LAST  832   37,3056   0 5402 1 AVERAGEG TC     PHASCHNG
 0403                      37,3057    10035 0          OCT     10035

 04035  REF  12 LAST  832   01,2250              5P3SPT10 =      5.3SPOT
 0404   REF 205 LAST  832   37,3060   0 6006 1         TC      INTPRET
 0405                      37,3061    77624 1         CALL
 0406   REF   1            37,3062    77336 1                 CALCRVG
 0407                      37,3063    77776 1         EXIT

 0408   REF  86 LAST  833   37,3064   0 5402 1         TC      PHASCHNG
 0409                      37,3065    10035 0          OCT     10035

 04095  REF  13 LAST  833   01,2250              5P3SPT11 =      5.3SPOT
 0410   REF   5 LAST  829   37,3066   3 4125 0         CAF     OCT31         COPY RN1,VN1,GOT102,GOBL1/2,PIPTIME1
 0411   REF   9 LAST  740   37,3067   0 5607 0         TC      GENTRAN       INTO RN ,VN ,GOT/12 ,GOBL/2 ,PIPTIME
 0412   REF   4 LAST  539   37,3070    01070 1         ADRES   RN1
 0413   REF  13 LAST  808   37,3071    01027 0         ADRES   RN
 04131                     37,3072   0 0003 1 ENDCOPY  RELINT
 0414   REF  87 LAST  833   37,3073   0 5402 1         TC      PHASCHNG
 0415                      37,3074    10035 0          OCT     10035

 04155  REF  14 LAST  833   01,2250              5P3SPT12 =      5.3SPOT
 0416                      37,3075   0 0006 1         EXTEND
 0417   REF   3 LAST  830   37,3076   3 1062 1         DCA     AVGEXIT
 0418   REF  13 LAST  358   37,3077   52 006 0         DXCH    Z             AVERAGEG EXIT

 0419   REF  14 LAST  812   37,3100   3 1044 0 AVGEND  CA      PIPTIME +1    FINAL AVERAGE G EXIT
 0420   REF   1            37,3101   55'277 0         TS      OLDBTI        SET UP FREE FALL GYRO COMPENSATION

 0421   REF  65 LAST  804   37,3102   0 5547 1         TC      UPFLAG        SET DRIFTFLG
 0422   REF   5 LAST  775   37,3103    00036 1         ADRES   DRIFTFLG      BIT 15  FLAG 2
 0425   REF  31 LAST  808   37,3104   0 5362 0         TC      2PHSCHNG

 0426                      37,3105    00005 1         OCT     5             GROUP 5 OFF
 0427                      37,3106    05022 1         OCT     05022         GROUP 2 ON FOR AVETOMID
 0428                      37,3107    20000 0         OCT     20000

 0429   REF 206 LAST  833   37,3110   0 6006 1         TC      INTPRET
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0430                                37,3111   77624 1          CALL
0431   REF   1                     37,3112   73677 0               AVETOMID      CONVERT STATE VECTOR TO REFERENCE SCALE.
0432                                37,3113   77776 1          EXIT

04321  REF 206  LAST  832          37,3114   0 4636 0         TC       BANKCALL
04322  REF   1                     37,3115    17231 1         CADR     PIPFREE

04323  REF  22  LAST  829          37,3116   4 4760 0         CS       BIT9
043235 REF  58  LAST  786          37,3117   55'722 0         TS       MRKBUF1       INVALIDATE MARK BUFFER
04324                              37,3120   0 0006 1         EXTEND
04325  REF  23  LAST  829          37,3121   03 011 1         WAND     DSALMOUT

043255 REF  59  LAST  801          37,3122   0 5561 0         TC       DOWNFLAG
043256 REF   1                     37,3123    00147 0         ADRES    CM/DSTBY

04326  REF  60  LAST  834          37,3124   0 5561 0         TC       DOWNFLAG
04327  REF   5  LAST  648          37,3125    00162 1         ADRES    V37FLAG

04328  REF  21  LAST  744          37,3126   3 0104 1         CA       FLAGWRD8
043285 REF  11  LAST  744          37,3127   7 4760 0         MASK     UTBIT
04329  REF 186  LAST  832          37,3130   10 000 0         CCS      A
043295 REF   1                     37,3131   1 3146 0         TCF      UTAVEND

0433   REF   8  LAST  268          37,3132   3 4762 0         CAF      RNDVZBIT      RESTORE GROUP 1 + 2 IF P20 IS RUNNING
0434   REF  19  LAST  761          37,3133   7 0074 0         MASK     FLAGWRD0
0435                               37,3134   0 0006 1         EXTEND
0436                               37,3135   1 3141 1         BZF      +4

0437   REF  32  LAST  833          37,3136   0 5362 0         TC       2PHSCHNG
0438                               37,3137    00111 0         OCT      111           1.11SPOT
0439                               37,3140    00132 1         OCT      132           2.13SPOT

0440   REF   6  LAST  572          01,2025                    1P11SPT7 =        1.11SPOT
0441   REF   2  LAST  558          01,2030                    2P13SPT2 =        1.13SPOT
0445   REF  48  LAST  808          37,3141   0 4655 0 ENDAVEG TC       POSTJUMP
0446   REF   2  LAST  210          37,3142    10162 0         CADR     CANV37

0447   REF  88  LAST  833          37,3143   0 5402 1 SERVEXIT TC      PHASCHNG
0448                               37,3144    00035 1         OCT      00035         A, 5.3 = REREADAC  (ONLY)

04485  REF  15  LAST  833          01,2250                    5P3SPT13 =        5.3SPOT
0449   REF  83  LAST  808          37,3145   1 5205 1         TCF      ENDOFJOB

04491  REF  33  LAST  834          37,3146   0 5362 0 UTAVEND TC       2PHSCHNG
04492                              37,3147    00111 0         OCT      111
04493                              37,3150    00002 0         OCT      2

044935 REF   7  LAST  834          01,2025                    1P11SPT8 =        1.11SPOT
04494  REF   1                     37,3151   1 3141 1         TCF      ENDAVEG
```

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```
 0450   REF   5  LAST  390      4775          DVTHRUSH EQUALS ELEVEN          15 PERCENT OF 2SEC PIPA ACCUMULATION,
A0451                                                                          FOR 503-FULL CSM/LEM....DELV SC.AT
A0452                                                                          5.85 CM/SEC.

 0453                          37,3152  63401 1 -MAXDELV DEC    -6398         3200 PPS FOR 2 SEC  CCS TAKES 1

 0454                          37,3153  00170 1 JTAGTIME DEC    120           = 1 SEC + T CDU, T CDU = .1 SEC

A0457                                                                          SHOULD BE 2-4 SECS FOR NO START
A0458                                                                                    6-8 SECS FOR FAILURE
```

```
P0459      NORMLIZE PERFORMS THE INITIALIZATION REQUIRED PRIOR TO THE FIRST ENTRY TO AVERAGEG, AND SCALES RN SO THAT IT
R0461   HAS 1 LEADING BINARY ZERO. IN MOST MISSIONS, RN WILL BE SCALED AT 2(+29), BUT IN THE 206 MISSION, RN WILL BE
R0463   SCALED AT 2(+24)M.

0464   REF   1                  37,3154  3 4776 0  NORMLIZE CAF     THIRTEEN      SET UP TO COPY 14 REGS- RN1,VN1,PIPTIME1
0465   REF  10  LAST  833       37,3155  0 5607 0           TC      GENTRAN       INTO RN,VN, PIPTIME
0466   REF   5  LAST  833       37,3156   01070 1           ADRES   RN1           FROM HERE
0467   REF  14  LAST  833       37,3157   01027 0           ADRES   RN            TO HERE

0468                             37,3160  0 0003 1           RELINT
0469   REF 207  LAST  833       37,3161  0 6006 1           TC      INTPRET
0470                             37,3162   45175 0           VLOAD   CALL          LOAD RN FOR CALCGRAV
0471   REF  15  LAST  836       37,3163   01030 0                   RN
0472   REF   2  LAST  723       37,3164   77270 1                   CALCGRAV      INITIALISE UNITR RMAG GDT1

0473   REF   3  LAST  730       37,3165   25046 1           STOVL   GDT/2
0474   REF   3  LAST   80       37,3166   01115 0                   GOBL1/2
0475   REF   3  LAST  730       37,3167   35054 0           STCALL  GOBL/2
0476   REF   4  LAST  588       37,3170   31263 1                   ENDPLAC
```

```
PC478   *****  PIPA READER *****

RC479                   MOD NO. 00  BY D. LICKLY  DEC.9 1966

RC480   FUNCTIONAL DESCRIPTION

RC481       SUBROUTINE TO READ PIPA COUNTERS, TRYING TO BE VERY CAREFUL SO THAT IT WILL BE RESTARTABLE.
RC483       PIPA READINGS ARE STORED IN THE VECTOR DELV. THE HIGH ORDER PART OF EACH COMPONENT CONTAINS THE PIPA READING,
RC485       RESTARTS BEGIN AT REREADAC.

RC486       AT THE END OF THE PIPA READER THE CDUS ARE READ AND STORED AS A
RC487   VECTOR IN CDUTEMP.  THE HIGH ORDER PART OF EACH COMPONENT CONTAINS
RC488   THE CDU READING IN 2S COMP IN THE ORDER CDUX,Y,Z.  THE THRUST
RC489   VECTOR ESTIMATOR IN FINDCDUD REQUIRES THE CDUS BE READ AT PIPTIME.

RC490   CALLING SEQUENCE AND EXIT

RC491       CALL VIA TC, ISWCALL, ETC.

RC492       EXIT IS VIA Q.

RC493   INPUT

RC494       INPUT IS THROUGH THE COUNTERS PIPAX, PIPAY, PIPAZ, AND TIME2.

RC495   OUTPUT

RC496       HIGH ORDER COMPONENTS OF THE VECTOR DELV CONTAIN THE PIPA READINGS.
RC497       PIPTIME CONTAINS TIME OF PIPA READING.

RC498   DEBRIS (ERASABLE LOCATIONS DESTROYED BY PROGRAM)

RC499               LOW ORDER DELV'S ARE ZEROED FOR TM INDICATION.
RC500               TEMX   TEMY   TEMZ   PIPAGE

 0501                                  37,3171  0 0006 1  PIPASR   EXTEND
 0502   REF   32  LAST   786           37,3172  3 0025 0           DCA     TIME2
 0503   REF    8  LAST   833           37,3173  53'105 0           DXCH    PIPTIME1       CURRENT TIME  POSITIVE VALUE
 0504   REF  143  LAST   827           37,3174  4 4772 0           CS      ZERO           INITIALIZE THESE AT NEG ZERO.
 0505   REF    2  LAST    79           37,3175  55'063 1           TS      TEMX
 0506   REF    2  LAST    79           37,3176  55'064 0           TS      TEMY
 0507   REF    2  LAST    79           37,3177  55'065 1           TS      TEMZ
```

```
0508   REF 144  LAST  837   37,3200  3 4772 1          CA     ZERO
0509   REF   5  LAST  829   37,3201  55'320 0          TS     DELVZ      OTHER DELVS OK INCLUDING LOW ORDER
0510   REF   6  LAST  828   37,3202  55'316 0          TS     DELVY

0511   REF  11  LAST  832   37,3203  55'315 0          TS     DELVX +1   LOW ORDER DELV'S ARE ZEROED FOR TM: THUS
0512   REF   7  LAST  838   37,3204  55'317 1          TS     DELVY +1   IF DNLNK'D LOW ORDER DELVS ARE NZ, THEY
0513   REF   6  LAST  838   37,3205  55'321 1          TS     DELVZ +1   CONTAIN PROPER COMPENSATION. IF=0, THEN
A0514                                                                    THE TM VALUES ARE BEFORE COMPENSATION.

0515   REF   4  LAST  828   37,3206  55'067 0          TS     PIPAGE     SHOW PIPA READING IN PROGRESS

0516                        37,3207  0 0006 1  REPIP1  EXTEND
0517   REF   7  LAST  831   37,3210  4 0040 1          DCS    PIPAX      X AND Y PIPS READ
0518   REF   3  LAST  837   37,3211  53'064 0          DXCH   TEMX
0519   REF   8  LAST  838   37,3212  52 040 1          DXCH   PIPAX      PIPAS SET TO NEG ZERO AS READ.
0520   REF  12  LAST  838   37,3213  55'314 1          TS     DELVX
0521   REF   8  LAST  838   37,3214  23'316 1          LXCH   DELVY

0522   REF   4  LAST  438   37,3215  4 0041 0  REPIP3  CS     PIPAZ      REPEAT PROCESS FOR Z PIP
0523   REF   3  LAST  837   37,3216  57'065 0          XCH    TEMZ
0524   REF   5  LAST  838   37,3217  56 041 1          XCH    PIPAZ
0525   REF   7  LAST  838   37,3220  55'320 0  DODELVZ TS     DELVZ

0526   REF 147  LAST  788   37,3221  0 0002 0          TC     Q

0527   REF  21  LAST  829   E6,1661                    EBANK= AOG

0528   REF   3  LAST  700   37,3222  11'166 0  REREADAC CCS    PHASE5     LAST PASS CHECK
0529                        37,3223  1 3225 0          TCF    +2
0530   REF  42  LAST  831   37,3224  1 5314 0          TCF    TASKOVER

05302  REF   3  LAST  539   37,3225  3 7652 1          CAF    PRIO31     RESTART MAY HAVE WIPED OUT LASTBIAS, AN
05303  REF  10  LAST  776   37,3226  55'277 0          TS     1/PIPADT       UNPROTECTED NOVAC FROM PREREAD,
A05304                                                                      WHICH SET(S) UP 1/PIPADT (THUSLY)
A05305                                                                      FOR NON-COASTING COMPENSATION....BE
A05306                                                                      SURE 1/PIPADT IS AOK. (PRIO31 IS
A05307                                                                      2.0SEC SC.AT B+8CS)

0531   REF   5  LAST  838   37,3227  11'067 0          CCS    PIPAGE
0532   REF   4  LAST  829   37,3230  1 2652 0          TCF    READACCS   PIP READING NOT STARTED. GO TO BEGINNING

0533   REF   1                37,3231  3 3267 1          CAF    DONEADR    SET UP RETURN FROM PIPASR
0534   REF 148  LAST  838   37,3232  54 002 1          TS     Q

0535   REF   8  LAST  838   37,3233  11'320 0          CCS    DELVZ
0536   REF 149  LAST  838   37,3234  0 0002 0          TC     Q          Z DONE, GO DO CDUS
0537                        37,3235  1 3240 0          TCF    +3         Z NOT DONE, CHECK Y.
0538   REF 150  LAST  838   37,3236  0 0002 0          TC     Q
0539   REF 151  LAST  838   37,3237  0 0002 0          TC     Q
```

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0540                                37,3240  22 007 0                ZL
0541  REF   9  LAST  838           37,3241  11'316 0                CCS     DELVY
0542                                37,3242  1 3245 0                TCF     +3
0543  REF   1                      37,3243  1 3254 0                TCF     CHKTEMX         Y NOT DONE, CHECK X.
0544                                37,3244  1 3245 0                TCF     +1
0545  REF   6  LAST  838           37,3245  22 041 1                LXCH    PIPAZ           Y DONE, ZERO Z PIP.

0546  REF   4  LAST  838           37,3246  11'065 1                CCS     TEMZ
0547  REF   5  LAST  839           37,3247  4 1065 1                CS      TEMZ            TEMZ NOT = -0, CONTAINS -PIPAZ VALUE.
0548  REF   1                      37,3250  1 3220 0                TCF     DODELVZ
0549                                37,3251  1 3247 1                TCF     -2
0550  REF   9  LAST  838           37,3252  23'320 1                LXCH    DELVZ           TEMZ = -0, L HAS ZPIP VALUE.
0551  REF 152  LAST  838           37,3253  0 0002 0                TC      Q

0552  REF   4  LAST  838           37,3254  11'063 1  CHKTEMX        CCS     TEMX            HAS THIS CHANGED
0553  REF   5  LAST  839           37,3255  4 1063 1                CS      TEMX            YES
0554                                37,3256  1 3261 0                TCF     +3              YES
0555                                37,3257  1 3255 1                TCF     -2              YES
0556  REF   1                      37,3260  1 3207 0                TCF     REPIP1          NO
0557  REF  13  LAST  838           37,3261  55'314 1                TS      DELVX

0558  REF   3  LAST  837           37,3262  4 1064 0                CS      TEMY
0559  REF  10  LAST  839           37,3263  55'316 0                TS      DELVY

0560  REF 145  LAST  838           37,3264  4 4772 0                CS      ZERO            ZERO X AND Y PIPS
0561  REF   9  LAST  838           37,3265  52 040 1                DXCH    PIPAX           L STILL ZERO FROM ABOVE

0562  REF   1                      37,3266  1 3215 0                TCF     REPIP3

0563  REF   1                      37,3267   02653 0  DONEADR       GENADR  PIPSDONE
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R0564   ********************************************************************************

R0566           ROUTINE CALCRVG INTEGRATES THE EQUATIONS OF MOTION BY AVERAGING THE THRUST AND GRAVITATIONAL
R0568   ACCELERATIONS OVER A TIME INTERVAL OF 2 SECONDS.

R0569           FOR THE EARTH-CENTERED GRAVITATIONAL FIELD, THE PERTURBATION DUE TO OBLATENESS IS COMPUTED TO THE FIRST
R0571   HARMONIC COEFFICIENT J.

R0572           ROUTINE CALCRVG REQUIRES...
R0573                   1) THRUST ACCELERATION INCREMENTS IN DELV SCALED SAME AS PIPAX,Y,Z IN STABLE MEMBER COORDS.
R0575                   2) VN SCALED 2(+7)M/CS IN REFERENCE COORDS.
R0576                   3) RN SCALED AT 2(+29) METERS IN REFERENCE COORDS.
R0577                   4) UNITW THE EARTH S UNIT ROTATIONAL VECTOR (SCALED AS A FULL UNIT VECTOR) IN REFERENCE COORDS.

R0579   IT LEAVES RN1 UPDATED (SCALED AT 2(+29)M, VN1 (SCALED AT 2(+7)M/CS), AND GDT1/2 (SCALED AT 2(+7)M/CS). ALSO HALF
R0581   UNIT VECTOR UNITR, RMAG IN 36D SCALED AT 2(+29)M, R MAG SQ. IN 34D SCALED AT 2(+58) M SQ.
R0583

 0584                           37,3270  41456 0  CALCGRAV UNIT    PUSH            ENTER WITH RN IN MPAC
 0585  REF   2 LAST   91       37,3271  01756 1                   STORE   UNITR
 0586                           37,3272  67340 1                   LXC,1   SLOAD
 0587  REF  15 LAST  730       37,3273  03746 1                   RTX2
 05871 REF  31 LAST  791       37,3274  00047 1                   X1
 0588                           37,3275  77240 1                   BMN     VLOAD
 05881 REF   1                  37,3276  77324 1                   ITISMOON
 0589                           37,3277  41441 0                   DOT     PUSH
 0590  REF   8 LAST  816       37,3300  01712 1                   UNITW
 0591                           37,3301  44316 0                   DSQ     BDSU
 0592  REF   1                  37,3302  37375 1                   DP1/2O
 0593                           37,3303  56325 0                   PDDL    DDV
 0594  REF   1                  37,3304  37377 0                   RESQ
 0595                           37,3305  00043 0                   34D             (RN)SQ
 0596                           37,3306  00041 1                   STORE   32D     TEMP FOR (RE/RN)SQ
 0597                           37,3307  41205 0                   DMP     DMP
 0598  REF   1                  37,3310  37401 0                   2OJ
 0599                           37,3311  65361 0                   VXSC    PDDL
 0600  REF   3 LAST  840       37,3312  01756 1                   UNITR
 0601                           37,3313  41205 0                   DMP     DMP
 0602  REF   1                  37,3314  37403 1                   2J
 0603                           37,3315  00041 1                   32D
 0604                           37,3316  53361 0                   VXSC    VAD
 0605  REF   9 LAST  840       37,3317  01712 1                   UNITW
 0606                           37,3320  77626 0                   STADR
 0607  REF   4 LAST  836       37,3321  76662 1                   STORE   GOBL1/2
 0608                           37,3322  41455 0                   VAD     PUSH
 0609  REF   4 LAST  840       37,3323  01756 1                   UNITR
 0610                           37,3324  63545 0  ITISMOON DLOAD   DSQ
 0611                           37,3325  00045 0                   36D
 06112                          37,3326  77701 1                   NORM
 0612  REF  18 LAST  726       37,3327  00050 1                   X2
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0612                                37,3330  53663 1          BDDV*   SLR*
0612  REF   1                     37,3331  37367 1                  -MUDT(E),1
0613                                37,3332  56623 0                  0 -21D,2
0614                                37,3333  45561 1          VXSC    STADR
0615  REF   2  LAST   79           37,3334  76670 1          STORE   GDT1/2        SCALED AT 2(+7) M/CS
0616                                37,3335  77616 0          RVQ

0622                                37,3336  74375 0  CALCRVG VLOAD   VXSC
0623  REF  12  LAST  833           37,3337  01315 1                  DELV
0624  REF   2  LAST  833           37,3340  37365 0                  KPIP1
0625                                37,3341  76505 0          VXM     VSL1
0626  REF  45  LAST  822           37,3342  01734 0                  REFSMMAT
0627  REF   7  LAST  740           37,3343  03432 1          STORE   DELVREF       DELV IN REF COORDS AT 2(+7)
0628                                37,3344  41562 0          VSR1    PUSH
0629                                37,3345  41455 0          VAD     PUSH         (DV-OLDGDT)/2 TO PD SCALED AT 2(+7)M/CS
0630  REF   4  LAST  836           37,3346  01046 1                  GDT/2
0631                                37,3347  74255 0          VAD     VXSC
0632  REF  12  LAST  808           37,3350  01036 0                  VN
0633  REF   1                     37,3351  37373 1                  2SEC(22)
0634                                37,3352  44055 1          VAD     STQ
0635  REF  16  LAST  836           37,3353  01030 0                  RN
0636                                37,3354  00037 0                  31D
0637  REF   6  LAST  836           37,3355  35071 1          STCALL  RN1          TEMP STORAGE OF RN SCALED 2(+29)M
0638  REF   3  LAST  836           37,3356  77270 1                  CALCGRAV

0639                                37,3357  53255 0          VAD     VAD
0640                                37,3360  77655 1          VAD
0641  REF  13  LAST  841           37,3361  01036 0                  VN
0642  REF   3  LAST  539           37,3362  35077 1          STCALL  VN1          TEMP STORAGE OF VN SCALED 2(+7)M/CS
0643                                37,3363  00037 0                  31D

0645                                37,3364  02312 0  KPIP1   2DEC    0.074880     207 DELV SCALING. 1 PULSE = 5.85 CM/SEC.
0645                                37,3365  32537 1
0646                                37,3366  61377 0  -MUDT(E) 2DEC*  -7.9720645 E+12 B-44*
0646                                37,3367  55754 1
0647                                37,3370  77644 1  -MUDT(M) 2DEC*  -9.805556 E+10 B-44*
0647                                37,3371  65556 1
0648                                37,3372  00000 1  2SEC(22) 2DEC   200 B-22
0648                                37,3373  31000 0

0649                                37,3374  01463 1  DP1/20   2DEC    0.05
0649                                37,3375  06315 0
0650                                37,3376  00001 0  RESQ     2DEC*   40.6809913 E12 B-59*
0650                                37,3377  05000 1
0651                                37,3400  02047 0  20J      2DEC*   3.24692010 E-2 B1*
0651                                37,3401  36332 0
0652                                37,3402  00152 1  2J       2DEC*   3.24692010 E-3 B1*
0652                                37,3403  14511 1
```

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		VARIABLE	DESCRIPTION	MAXIMUM VALUE *	COMPUTER NAME
R0001 R0003					
R0005		-			
R0006		URTO	INITIAL TARGET VECTOR	2 (UNIT VECTOR)	= RTINIT
R0008		-			
R0009		UZ	UNIT VECTOR NORTH	1	= UNITW
R0011		-			
R0012		V	VELOCITY VECTOR	2 VSAT	= VEL
R0014		-			
R0015		R	POSITION VECTOR	2 EXP 29 METERS	= RN
R0017		-			
R0018		VI	INERTIAL VELOCITY	128 M/CENTISEC	= VN
R0020		-			
R0021		RTE	VECTOR EAST AT INITIAL TARGET	2	= RTEAST
R0023		- - -			
R0024		UTR	NORMAL TO RTE AND UZ	2	= RTNORM
R0026		-			
R0027		URT	TARGET VECTOR	2	= RT
R0029		-			
R0030		UNI	UNIT NORMAL TO TRAJECTORY PLANE	2	
R0031		-			
R0032		DELV	INTEGRATED ACCEL. FROM PIPAS	5 85 16384 CM/S	
R0033		-			
R0034		G	GRAVITY VECTOR	128 M/CENTISEC	= GDT/2
R0036		A0	INITIAL DRAG FOR UPCONTRL	805 FPSS	FPSS=FT/SEC/SEC
R0038		AHOOKDV	TERM IN GAMMAL CALC. = AHOOK DVL	8	
R0039		A1	DRAG VALUE IN FACTOR CALCULATION	805 FPSS	
R0040		ALP	CONST FOR UPCONTRL	1	
R0041		ASKEP	KEPLER RANGE	21600 NM	NM = NAUTICAL MILE
R0043		ASP1	FINAL PHASE RANGE	21600 NM	
R0044		ASPUP	UP-RANGE	21600 NM	
R0045		ASP3	GAMMA CORRECTION	21600 NM	
R0046		ASPDWN	RANGE DOWN TO PULL-UP	21600 NM	
R0047		ASP	PREDICTED RANGE	21600 NM	NOT STORED
R0049		COSG	COSINE(GAMMAL)	2	= COSG/2
R0051	*	C/D0	RECIPROCAL DRAG, -4/D0 B-8	64/FPSS	AGC ONLY
R0053		D	TOTAL ACCELERATION	805 FPSS	
R0054		D0	CONTROLLED CONSTANT D	805 FPSS	
R0055		DHOOK	TERM IN GAMMAL COMPUTATION	805 FPSS	
R0056		DIFF	THETNM-ASP (RANGE DIFFERENCE)	21600 NM	
R0057		DIFFOLD	PREVIOUS VALUE OF DIFF	21600 NM	
R0058		DLEWD	CHANGE IN LEWD	1	
R0059		DR	REFERENCE DRAG FOR DOWNCONTROL	805 FPSS	NOT STORED
R0061		DREFR( )	REFERENCE DRAG (FINAL PHASE TABLE)	805 FPSS	NOT SAVED
R0063		DVL	VS1-VL	2 VSAT	
R0064		E	ECCENTRICITY	4	NOT STORED
R0066		F1( )	DRANGE/D DRAG (FINAL PHASE TABLE)	2700/805	= FX +5
R0068		F2( )	DRANGE/D RDOT (FINAL PHASE TABLE)	2700/2VS NM/FPS	= FX +4 /8

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R0070 F3( ) DRANGE/D (L/D) (FINAL PHASE TABLE) 2700 NM = FX
R0072 * MAXIMUM VALUE DENOTES UNSCALED
R0074 VARIABLE VALUE WHEN SCALED
R0076 FIGURE 7.0-2 COMPUTER VARIABLES VARIABLE HAS MAXIMUM VALUE OF ONE.

L ENTRY LEXICON USER'S PAGE NO. 3 EC S3

PC078 RC080	VARIABLE	DESCRIPTION	MAXIMUM VALUE	COMPUTER NAME
RC082	FACT1	CONST FOR UPCONTRL	2 VSAT	
RC083	FACT2	CONST FOR UPCONTRL	1/805 FPSS	
RC084	FACTOR	USED IN UPCONTRL	1	
RC085	GAMMAL	FLIGHT PATH ANGLE AT VL	1 RADIAN	
RC086	GAMMAL1	SIMPLE FORM OF GAMMAL	1 RADIAN	
RC087	HEADSUP	INDICATOR FOR INITIAL ROLL	1	
RC088	KA	DRAG TO LIFT UP IF DOWN	805 FPSS	= KAT
RC090	KLAT	LATERAL SWITCH GAIN	1	(NOM = .0125)
RC092	K2ROLL	INDICATOR FOR ROLL SWITCH		
RC093	LAD	MAX L/D (MIN ACTUAL VEHICLE L/D)	1	
RC094	LADPAD	NOMINAL VEHICLE L/D, SP PAD LOAD	1	(NOM = 0.3)
RC096	LATANG	LATERAL RANGE	4 RADIANS	
RC097	LAT(SPL)	GEODETIC LATITUDE OF TARGET	1 REVOLUTION	
RC098	LNG(SPL)	LONGITUDE OF TARGET	1 REVOLUTION	
RC099	LEQ	EXCESS C.F. OVER GRAV=(VSQ-1)GS	128.8 FPSS	
RC100	LEWD	UPCONTROL REFERENCE L/D	1	
RC101	LOD	FINAL PHASE L/D	1	(NOM = 0.18)
RC103	LODPAD	FINAL PHASE L/D, SP PAD LOAD	1	
RC104 RC105	L/D	DESIRED LIFT TO DRAG RATIO (VERTICAL PLANE)	1	
RC106	L/D1	TEMP STORAGE FOR L/D IN LATERAL	1	
RC107	L/DCMINR	LAD COS(15DEG)	1	(NOM = 0.2895)
RC109	PREDANGL	PREDICTED RANGE (FINAL PHASE)	2700 NM	= PREDANG
RC111	Q2	FINAL PHASE RANGE	21600 NM	
RC112	Q7	MINIMUM DRAG FOR UPCONTROL	805 FPSS	
RC113	RDOT	ALTITUDE RATE	2 VSAT	
RC114	RDOTREF	REFERENCE RDOT FOR UPCONTROL	2 VSAT	
RC115	RDOTREF( )	REFERENCE RDOT (FINAL PHASE TABLE)	2 VSAT	= FX +3 /8
RC117	RDTR	REFERENCE RDOT FOR DOWNCONT	2 VSAT	NOT SAVED
RC119	ROLLC	ROLL COMMAND	1 REVOLUTION	
RC120	RTOGO( )	RANGE TO GO (FINAL PHASE TABLE)	2700 NM	= FX +2
RC122	SL	SINE OF LATITUDE	1	NOT SAVED
RC124	T	TIME	8 28 CENTISEC	= PIPTIME-TIME/RTO
RC126	THETA	DESIRED RANGE (RADIANS)	2 PI RADIANS	= THETAH
RC128	THETNM	DESIRED RANGE (NM)	21600 NM	NON EXISTENT
RC130	V	VELOCITY MAGNITUDE	2 VSAT	
RC131	V1	INITIAL VELOCITY FOR UPCONTROL	2 VSAT	
RC132	VL	EXIT VELOCITY FOR UPCONTROL	2 VSAT	
RC133	VMAGI	INERTIAL VELOCITY MAGNITUDE,|V|	128 M/CENTISEC	
RC134	VREF	REFERENCE VELOCITY FOR UPCONTROL	2 VSAT	
RC135	VREF( )	REFERENCE V (FINAL PHASE TABLE)	2 VSAT	NOT STORED
RC137	VS1	VSAT OR V1, WHICHEVER IS SMALLER	2 VSAT	
RC138 RC139	VBARS	V_L^2/V_{SAT}^2	4	
RC140 RC141	VSQ	NORMALISED VEL. SQUARED = V^2/V_{SAT}^2	4	= VSQUARE
RC143	WT	EARTH RATE TIMES TIME	1 REVOLUTION	NOT SAVED

R0145				= WIE (DTEAROT)
R0147	X	INTERMEDIATE VARIABLE IN G-LIMITER	2 VSAT	NOT SAVED
R0149	Y	LATERAL MISS LIMIT	4 RADIANS	NOT SAVED

R0151 FIGURE 7.0-2A COMPUTER VARIABLES (CONTINUED)

EXTRA COMPUTER ERASABLE LOCATIONS NOT SHOWN ON FLOW CHARTS

	VARIABLE	DESCRIPTION	MAXIMUM VALUE
R0156	GOTOADDR	ADDRESS SELECTED BY SEQUENCER	
R0157	XPIPBUF	BUFFER TO STORE X PIPA COUNTS	
R0158	YPIPBUF	BUFFER TO STORE Y PIPA COUNTS	
R0159	ZPIPBUF	BUFFER TO STORE Z PIPA COUNTS	
R0160	PIPCTR	COUNTS PASSES THRU PIPA READ ROUTINE	
R0161	JJ	INDEX IN FINAL PHASE TABLE LOOK-UP	
R0162	MM	INDEX IN FINAL PHASE TABLE LOOK-UP	
R0163	GRAD	INTERPOLATION FACTOR IN FINAL PHASE	
R0164	FX	DRANGE/D L/D = F3	2700 NM
R0165	FX + 1	AREF	805 FPSS
R0166	FX + 2	RTOGO	2700 NM
R0167	FX + 3	RDOTREF	VSAT/4
R0168	FX + 4	DRANGE/D RDOT = F2	21600/2VS NM/FPS
R0169	FX + 5	DRANGE/D DRAG = F1	2700/805 NM/FPSS
R0170	TEM1B	TEMPORARY LOCATION	
R0171	TIME/RTO	TIME OF INITIAL TARGET RTINIT	B 28 CENTISEC
R0172	DTEAROT	EST TIME BETWEEN RTINIT AND RT	B 28 CENTISEC
R0173	-		
R0174	UNITV	UNIT V VECTOR	2
R0175	-		
R0176	UNITR	UNIT R VECTOR	2
R0177	-		
R0178	-VREL	NEGATIVE VELOCITY REL TO ATMOSP	2 VSAT

		COMPUTER SWITCHES		INITIAL STATE	CM/FLAGS = STATE +6
R0179					
R0181					
R0183	*	ENTRYDSP	DO ENTRY DISPLAY, IF SET	NON-BRANCH (1)	92D, BIT13
R0185		GONEPAST	INDICATES OVERSHOOT OF TARGET	BRANCH (1)	95D, BIT10
R0187		RELVELSW	RELATIVE VELOCITY SWITCH	NON-BRANCH (0)	96D, BIT 9
R0189		EGSW	FINAL PHASE SWITCH	NON-BRANCH (0)	97D, BIT 8
R0191		NOSWITCH	INHIBIT LATERAL SWITCH	NON-BRANCH (0)	98D, BIT 7
R0193		HIND	INDICATES ITERATION IN HUNTEST	NON-BRANCH (0)	99D, BIT 6
R0195		INRLSW	INDICATES INIT ROLL ATTITUDE SET	NON-BRANCH (0)	100D, BIT 5
R0197		LATSW	INHIBIT DOWNLIFT SWITCH IF NOT SET	BRANCH (1)	101D, BIT 4
R0199		.05GSW	INDICATES DRAG EXCEEDS .05 GS	NON-BRANCH (0)	102D, BIT 3
R0201		GONEBY	INDICATES GONE PAST TARGET (SET)	SELF-INITIALIZING	112D, BIT 8 IN STATE + 7

R0203 FIGURE 7.0-2B COMPUTER VARIABLES (CONTINUED)

P0204 BODY ATTITUDE QUANTITIES (CM/POSE)
R0205 ----------

	VARIABLE	DESCRIPTION	MAXIMUM VALUE
R0206 R0207			
R0208	-		
R0209	-VREL	NEGATIVE VELOCITY REL TO ATMOS.	2 VSAT
R0210	-	-	
R0211	OLDUYA	USED FOR UYA BELOW 1000 FPS	2
R0212	-		
R0213	UXA/2	UNIT VECTOR TRIAD	2
R0214	-		
R0215	UYA/2	BASED ON	2
R0216	-		
R0217	UZA/2	THE TRAJECTORY.	2
R0218	-		
R0219	UBX/2	UNIT VECTOR	2
R0220	-		
R0221	UBY/2	BODY TRIAD	2
R0222	-		
R0223	UBZ/2	FOR CM.	2

R0224 FIGURE 7.0-2C COMPUTER VARIABLES (CONTINUED)

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P0225 DISPLAY QUANTITIES (FOR USAGE,SEE SECTION 4: P 61 THROUGH P 67)
R0227 ----------

R0228 THIS TABLE PROVIDES THE READER WITH DISPLAY QUANTITY INFORMATION. THE VARIABLE NAMES REFLECT
R0230 SECTION 5 USAGE. EXCEPTING IMBEDDED BLANKS, THE SECTION 4 NAMES ARE PARENTHESIZED,IF DIFFERENT.
R0232 SIGN CONVENTIONS ARE FOUND IN SECTION 4. IF THE DISPLAY VARIABLE NAME DIFFERS FROM SECTION 5 USAGE,
R0234 SAY BECAUSE OF SCALE FACTOR, THE ALTERNATE SECTION 5 NAME IS ENCLOSED IN ANGULAR BRACKETS: < >.
R0236 DISPLAY QUANTITY INFORMATION APPEARING ELSEWHERE IN SECTION 5 OTHER THAN IN 5.7 MAY BE FOUND THUS:
R0238 N 60 & N 63 (ALL) FIGURE 6.10-4 IN 5.6.10.3
R0240 N 22 (ALL) FIGURE 6.10-11 IN 5.6.10.6
R0242 N 67 (LAT, LONG) FIGURE 5.3.1 IN 5.5.3

	VARIABLE	DESCRIPTION	MAXIMUM VALUE	DISPLAY NOUNS
R0244 R0246				
R0248	GMAX	PREDICTED MAXIMUM ENTRY ACCEL	163.84 GS	N 60
R0250	VPRED	PREDICTED VELOCITY AT ALTITUDE	128 M/CENTISEC	N 60
R0252 R0253	GAMMAEI	400K FT ABOVE FISCHER RADIUS. PREDICTED GAMMA AT ALTITUDE	1 REVOLUTION	N 60
R0255 R0256	RTGO	400K FT ABOVE FISCHER RADIUS. RANGE ANGLE TO SPLASH (RTOGO)	1 REVOLUTION	N 63
R0258 R0259		FROM EMSALT FT ABOVE FISCHER RADIUS. (IN NM)		
R0260 R0262	VIO	PREDICTED VELOCITY AT ALTITUDE EMSALT FT ABOVE FISCHER	128 M/CENTISEC	N 63
R0263 R0265	TTE	TIME OF FREE FALL (TFE) TO ALTITUDE EMSALT FT ABOVE FISCHER	8 28 CENTISEC	N 63
R0266		RADIUS.		
R0267	OGA	OUTER GIMBAL ANGLE (OG ROLL)	1 REVOLUTION	N 22
R0269	IGA	INNER GIMBAL ANGLE (IG PITCH)	1 REVOLUTION	N 22
R0271	MGA	MIDDLE GIMBAL ANGLE (MG YAW)	1 REVOLUTION	N 22
R0273		ALL ABOVE ANGLES FOR HYPERSONIC TRIM		
R0274	D	DRAG ACCELERATION (G)	805 FPSS	N 64, N 74
R0276	VMAGI	INERTIAL VELOCITY MAGNITUDE (VI)	128 M/CENTISEC	N 64, N 68, N 74
R0278	ROLLC	ROLL COMMAND (BETA)	1 REVOLUTION	N 66, N 68, N 69, N 74
R0280	XRNGERR	CROSS-RANGE ERROR <LATANG IN NM>	1 REVOLUTION	N 66
R0282	DNRNGERR	DOWN RANGE ERROR **	1 REVOLUTION	N 66
R0284 R0285		<PREDANG - THETAH IN NM> ** <DNRNGERR DISPLAYS 9999.9 IF GONEPAST =1 IN P 67>		
R0287	HDOT	ALTITUDE RATE <RDOT>	128 M/CENTISEC	N 68
R0289	Q7	EXIT DRAG LEVEL (DL)	805 FPSS	N 69
R0291	VL	EXIT VELOCITY FOR UP-CONTROL	2 VSAT	N 69
R0293 R0295	RTOGO	DESIRED RANGE ANGLE <THETAH> <-THETAH IF GONEBY =0, THETAH IF GONEBY =1>	1 REVOLUTION	N 67, N 64
R0296	LAT	GEODETIC LATITUDE OF VEHICLE	1 REVOLUTION	N 67
R0298	LONG	LONGITUDE OF VEHICLE	1 REVOLUTION	N 67
R0300	THE FOLLOWING IS A DATA INPUT NOUN (REFER TO SECTION 4,P 61 & P 62)			
R0302	HEADSUP	INDICATOR FOR INITIAL ROLL	1 REVOLUTION	N 61
R0304	LAT(SPL)	GEODETIC LATITUDE OF TARGET	1 REVOLUTION	N 61

R0306 (IMPACT LAT)
R0307 LNG(SPL) LONGITUDE OF TARGET (IMPACT LONG) 1 REVOLUTION N 61

R0309 FIGURE 7.0-2D COMPUTER VARIABLES (CONTINUED)

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P0310 R0312		CONSTANTS AND GAINS	VALUE		
R0314	C1	FACTOR IN ALP COMPUTATION	1.25		
R0316	C16	CONSTD GAIN ON DRAG	0.01		
R0318	C17	CONSTD GAIN ON RDOT	0.002		
R0320	C18	BIAS VEL. FOR FINAL PHASE START	500	FPS	
R0322	C20	MAX DRAG FOR DOWN-LIFT	21	FPSS	
R0324	C21	DRAG FOR NO LATERAL SWITCH	14	FPSS	
R0326	CHOOK	FACTOR IN AHOOK COMPUTATION	0.25		
R0328	CH1	FACTOR IN GAMMAL COMPUTATION	1.0		
R0330	COS15	COS(15 DEG)	0.965		
R0332	DLEWDO	INITIAL VARIATION IN LEWD	-0.05		
R0334	DT	COMPUTATION CYCLE TIME INTERVAL	2	SEC.	
R0336	GMAX	MAXIMUM ACCELERATION	257.6	FPSS	(8 G-S)
R0338	KA1	FACTOR IN KA CALC	1.3 GS		
R0340	KA2	FACTOR IN KA CALC	0.2 GS		
R0342	KA3	FACTOR IN DO CALC	90	FPSS	
R0344	KA4	FACTOR IN DO CALC	40	FPSS	
R0346	KB1	OPTIMIZED UPCONTROL GAIN	2.5		
R0348	KB2	OPTIMIZED UPCONTROL GAIN	0.0025		
R0350	KDMIN	INCREMENT ON Q7F TO DETECT END OF KEPLER PHASE	0.5	FPSS	
R0352	KTETA	TIME OF FLIGHT CONSTANT	1000		
R0354	KLAT1	FACTOR IN KLAT CALC	1/24		
R0356	K44	GAIN USED IN INITIAL ROLL SECTION	19749550	FPS	
R0358	LATBIAS	LATERAL SWITCH BIAS TERM	0.41252961	NM	
R0360	LEWD1	NOMINAL UPCONTROL L/D	0.15		
R0362	POINT1	FACTOR TO REDUCE UPCONTROL GAIN	0.1		
R0364	Q3	FINAL PHASE DRANGE/D V	0.07	NM/FPS	
R0366	Q5	FINAL PHASE DRANGE/ D GAMMA	7050	NM/RAD	
R0368	Q6	FINAL PHASE INITIAL FLIGHT PATH ANGLE	0.0349	RAD	
R0370	Q7F	MIN DRAG FOR UPCONTROL	6	FPSS	
R0372	Q7MIN	MIN VALUE FOR Q7 IN FACTOR CALCULATION	805	FPSS	(DISABLE FACTOR)
R0374	Q19	FACTOR IN GAMMALI CALCULATION	0.5		
R0376 *	Q21	FACTOR IN Q2 CALCULATION.	3500	NM	
R0378 *	Q22	FACTOR IN Q2 CALCULATION.	-1992	NM	
R0380	VFINAL1	VELOCITY TO START FINAL PHASE ON INITIAL ENTRY	27000	FPS	
R0382	VFINAL	FACTOR IN INITIAL UP-DOWN CALC	26600	FPS	
R0384	VLMIN	MINIMUM VL	18000	FPS	
R0386	VMIN	VELOCITY TO SWITCH TO RELATIVE VEL	VSAT/2		
R0388	VRCONTRL	RDOT TO START INTO HUNTEST	700	FPS	
R0390		VRCONT = COMPUTER NAME			
R0391	25NM	TOLERANCE TO STOP RANGE ITERATION	25	NM	
R0393	VQUIT	VELOCITY TO STOP STEERING	1000	FPS	

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P0395 CONVERSION FACTORS AND SCALING CONSTANTS
R0396 ---------- ------- --- ------- ---------

R0397		ATK	ANGLE IN RAD TO NM	3437.7468	NM/RAD
R0399		GS	NOMINAL G VALUE FOR SCALING	32.2	FPSS
R0401		HS	ATMOSPHERE SCALE HEIGHT	28500	FT
R0403		J	GRAVITY HARMONIC COEFFICIENT	0.00162346	
R0405		KWE	EQUATORIAL EARTH RATE	1546.70168	FPS
R0407		MUE	EARTH GRAVITATIONAL CONSTANT	3.986032233 E 14	CUBIC M/ SEC SEC
R0409		RE	EARTH RADIUS	21202900	FT
R0411		REQ	EARTH EQUATORIAL RADIUS	20925738.2	FT
R0413		VSAT	SATELLITE VELOCITY AT RE	25766.1973	FPS
R0415		WIE	EARTH RATE	0.0000729211505	RAD/SEC

R0417 FIGURE 7.0-3 CONSTANTS, GAINS AND CONVERSION FACTORS

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R0001 ENTRY INITIALIZATION ROUTINE
R0002 ----------

```
 0004   REF   1                25,2000                    SETLOC REENTRY
 0005                          25,2000                    BANK

 0006   REF   1                                           COUNT* $$/ENTRY
 0007   REF   7  LAST  799     E7,1451                    EBANK= RTINIT

 0011   REF  24  LAST  196       0102          CM/FLAGS EQUALS STATE +6

 0012                          25,2000   77776 1  STARTENT EXIT                    MM = 63
A0013                                                        COME HERE FROM  CM/POSE . RESTARTED IN CM/POSE.

 0014   REF   1                25,2001   4 2113 1           CS      ENTMASK       INITIALIZE ALL SWITCHES TO ZERO
A0015                                                                              EXCEPT LATSW, ENTRYDSP AND GONEPAST.
A0016                                                                              GONEBY 112D BIT8 FLAG7,SELF INITIALIZING
 0017                          25,2002   0 0004 0           INHINT
 0018   REF   5  LAST  828     25,2003   7 0102 0           MASK    CM/FLAGS
A0019                                                                              ENTRYDSP = 92D  B13
A0020                                                                              GONEPAST=95D B10,  RELVELSW=96D B9
A0021                                                                              EGSW = 97D  B8       NOSWITCH = 98D  B7
A0022                                                                              HIND=99D B6          INRLSW=100D B5
A0023                                                                              LATSW=101D B4        .05GSW=102D B3

 0024   REF   1                25,2004   6 2114 1           AD      ENTRYSW       SET ENTRYDSP, LATSW, GONEPAST.
 0025   REF   6  LAST  852     25,2005   54 102 0           TS      CM/FLAGS

 0026                          25,2006   0 0003 1           RELINT

 0027   REF 208  LAST  836     25,2007   0 6006 1           TC      INTPRET

 0028                          25,2010   77735 0            SLOAD
 0029   REF   1                25,2011   03011 1                    LODPAD
 0030   REF   2  LAST  122     25,2012   03626 0            STORE   LOD

 0031                          25,2013   77735 0            SLOAD
 0032   REF   1                25,2014   03010 0                    LADPAD
 0033   REF   2  LAST  122     25,2015   03624 1            STORE   LAD

 0034                          25,2016   77605 1            DMP                   L/DCMINR = LAD COS(15)
 0035   REF   1                25,2017   15324 0                    COS15
 0036   REF   2  LAST  122     25,2020   17630 1            STODL   L/DCMINR
 0037   REF   1                25,2021   15151 0                    LATSLOPE
 0038                          25,2022   70405 1            DMP     SR1           KLAT = LAD/24
 0039   REF   3  LAST  852     25,2023   03624 1                    LAD
 0040   REF   2  LAST  122     25,2024   17632 0            STODL   KLAT
 0041   REF   1                25,2025   15200 1                    Q7F
 0042   REF   2  LAST  293     25,2026   17175 1            STODL   Q7            Q7 = Q7F
 0043   REF   2  LAST  303     25,2027   15344 0                    NEARONE       1.0 -1BIT
```

```
0044   REF   2  LAST  122   25,2030   17614 1          STODL   FACTOR
0045   REF   4  LAST  852   25,2031   03624 1                  LAD
0046                       25,2032   57565 0          SIGN    DCOMP
0047   REF   6  LAST  796   25,2033   03327 1                  HEADSUP      MAY BE NOISE FOR DISPLAY P61
0048   REF   2  LAST  122   25,2034   37634 1          STCALL  L/D          L/D = - LAD SGN(HEADSUP)

0049   REF   2  LAST  793   25,2035   52063 0                  STARTEN1     RETURN VIA GOTOADDR
0050                       25,2036   47375 0          VLOAD   VXV
0051   REF  14  LAST  841   25,2037   01036 0                  VN           (-7) M/CS
0052   REF   5  LAST  840   25,2040   01756 1                  UNITR        .5 UNIT          REF COORDS
0053                       25,2041   50256 0          UNIT    DOT
0054   REF   4  LAST  820   25,2042   03474 0                  RT           RT/2  TARGET VECTOR      REF COORDS
0055   REF   5  LAST  187   25,2043   03676 0          STORE   LATANG       LATANG = UNI.RT /4
0056                       25,2044   47076 0          DCOMP   RTB
0057   REF  13  LAST  413   25,2045   45761 0                  SIGNMPAC
0058   REF   2  LAST  122   25,2046   17644 1          STODL   K2ROLL       K2ROLL = -SGN(LATANG)

0059   REF   5  LAST  853   25,2047   03624 1                  LAD
0060                       25,2050   43205 1          DMP     DAD
0061   REF   1              25,2051   15202 0                  Q21
0062   REF   1              25,2052   15204 0                  Q22
0063   REF   2  LAST  123   25,2053   03712 0          STORE   Q2           Q2 = -1992 + 3500 LAD
0064                       25,2054   66331 0          SSP     SSP
0065   REF   3  LAST  801   25,2055   03646 0                  GOTOADDR     SET SELECTOR FOR INITIAL PASS
0066   REF   1              25,2056   52260 1                  INITROLL
0067   REF   4  LAST  798   25,2057   03325 0                  POSEXIT
0068   REF   1              25,2060   52115 0                  SCALEPOP     SET CM/POSE TO CONTINUE AT SCALEPOP

0069                       25,2061   77634 0          RTB
0070   REF   2  LAST  806   25,2062   53607 0                  SERVNOUT     OMIT INITIAL DISPLAY, SINCE 1ST GUESSBAD

R0071  CALCULATE THE INITIAL TARGET VECTOR:  RTINIT,  ALSO RTEAST, RINORM  AND  RT.    ALL ARE .5 UNIT AND IN
R0073   REFERENCE COORDINATES.

0074                       25,2063   77220 1  STARTEN1 STQ     VLOAD
0075   REF   4  LAST  853   25,2064   03645 0                  GOTOADDR
0076   REF  10  LAST  647   25,2065   03401 1                  LAT(SPL)     TARGET COORDINATES
0077                       25,2066   43014 0          CLEAR   CLEAR        DO CALL USING PAD RADIUS. WILL UNIT IT.
0078   REF  10  LAST  806   25,2067   00662 0                  ERADFLAG     ANYWAY.
0079   REF  18  LAST  806   25,2070   01663 0                  LUNAFLAG
0080   REF   9  LAST  647   25,2071   14747 0          STODL   LAT
0081   REF   1              25,2072   15336 0                  3ZEROS

0082   REF  10  LAST  853   25,2073   14753 0          STODL   LAT +4        SET ALT=0.
0083   REF  15  LAST  833   25,2074   01044 0                  PIPTIME      ESTABLISH RTINIT AT TIME OF PRESENT
A0084                                                                       RN AND VN.
0085   REF   2  LAST  122   25,2075   37524 0          STCALL  TIME/RTO     SAVE TIME BASE OF RTINIT.
0086   REF   8  LAST  759   25,2076   26524 0                  LALOTORV     C(MPAC) =TIME   (PIPTIME)
0087                       25,2077   77656 1          UNIT                 ANSWER IN ALPHAV ALSO
```

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```
0088  REF  8  LAST  852   25,2100  17452 1          STODL  RTINIT     .5 UNIT TARGET          REF COORDS
0089  REF  1              25,2101  12112 0                 500SEC     NOMINAL ENTRY TIME FOR P63
AC090                                                                TIME/RTU = PIPTIME, STILL.
0091  REF  7  LAST  820   25,2102  37606 0          STCALL DTEARDT    INITIALIZE EARRDT
0092  REF  1              25,2103  46213 0                 EARRDT1    GET RT
0093                      25,2104  72441 0          DOT    SL1
0094  REF  6  LAST  853   25,2105  01756 1                 UNITR      RT/2 IN MPAC
0095                      25,2106  77726 1          ACOS
0096  REF  3  LAST  188   25,2107  37702 0          STCALL THETAH     RANGE ANGLE /360
0097  REF  5  LAST  853   25,2110  03645 0                 GOTOADDR   RETURN TO CALLER

0098                      25,2111  00003 1  500SEC  2DEC   50000 B-28  CS
0098                      25,2112  01520 1
0099                      25,2113  11774 0  ENTMASK OCT    11774
0100                      25,2114  11010 0  ENTRYSW OCT    11010      ENTRYDSP B13, GONEPAST B10, LATSW 84
```

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```
P0101
 0102                          25,2115   77624 1  SCALEPOP CALL
 0103  REF   1                 25,2116   52125 0                   TARGETNG

 0104                          25,2117   77776 1           EXIT

 0105  REF  89  LAST  834      25,2120   0 5402 1 REFAZE10 TC      PHASCHNG
 0106                          25,2121   10035 0           OCT     10035          SERVICER 5.3 RESTART AT REFAZE10

 01065 REF  16  LAST  834      01,2250             5P3SPT14 =      5.3SPOT
 0107  REF 209  LAST  852      25,2122   0 6006 1          TC      INTPRET

R0108           JUMP TO PARTICULAR RE-ENTRY PHASE:

A0109                                     SEQUENCE
 0110                          25,2123   77650 1           GOTO
 0111  REF   6  LAST  854      25,2124   03645 0                   GOTOADDR

R0112

R0113           GOTOADDR  CONTAINS THE ADDRESS OF THE ROLL COMMAND EQUATIONS APPROPRIATE TO THE CURRENT PHASE OF
R0115  RE-ENTRY.  SEQUENCING IS AS FOLLOWS:

R0116  INITROLL ADDRESS IS SET HERE INITIALLY. HOLDS INITIAL ROLL ATTITUDE UNTIL KAT  IS EXCEEDED. THEN HOLDS NEW ROLL
R0118           ATTITUDE UNTIL  VRTHRESH  IS EXCEEDED.  THEN BRANCHES TO

R0119  HUNTEST  THIS SECTION CHECKS TO SEE IF THE PREDICTED RANGE AT NOMINAL   L/D FROM PRESENT CONDITIONS IS LESS
R0121           THAN THE DESIRED RANGE.
R0122             IF NOT - A ROLL COMMAND IS GENERATED BY THE CONSTANT DRAG CONTROLLER.
R0124             IF SO -  CONTROL AND GOTOADDR ARE SET TO  UPCONTRL.
R0125           USUALLY NO ITERATION IS INVOLVED EXCEPT IF THE RANGE DESIRED IS TOO LONG ON THE FIRST PASS THROUGH
R0127           HUNTEST.

R0128  UPCONTRL CONTROLS ROLL DURING THE SUPER-CIRCULAR PHASE.  UPCONTRL IS TERMINATED EITHER
R0130             (A)  WHEN THE DRAG (AS MEASURED BY THE PIPAS) FALLS BELOW Q7 ,  OR
R0132             (B)  IF RDOT IS NEGATIVE AND REFERENCE VL EXCEEDS V.
R0133           IN CASE (A),  GOTOADDR  IS SET TO  KEP2  AND IN CASE (B), TO PREDICT3  SKIPPING THE KEPLER PHASE OF
R0135           ENTRY.

R0136  KEP2     GOTOADDR IS SET HERE DURING THE KEPLER PHASE TO MONITOR DRAG. THE SPACECRAFT IS INSTANTANEOUSLY
R0138           TRIMMED IN PITCH AND YAW TO THE COMPUTED RELATIVE VELOCITY. THE LAST COMPUTED ROLL ANGLE IS MAINTAINED.
R0140           WHEN THE MEASURED DRAG EXCEEDS Q7 +0.5,  GOTOADDR  IS SET TO

R0141  PREDICT3 THIS CONTROLS THE FINAL SUB-ORBITAL PHASE. ROLL COMMANDS CEASE
R0142           WHEN  V  IS LESS THAN VQUIT. AN EXIT IS MADE TO

R0143  P67.1    THE LAST COMPUTED ROLL ANGLE IS MAINTAINED. RATE DAMPING IS DONE IN PITCH AND YAW. PRESENT LATITUDE
R0145           AND LONGITUDE ARE COMPUTED FOR DISPLAY.
R0146           ENTRY IS TERMINATED WHEN DISKY RESPONSE IS MADE TO TO THIS FINAL FLASHING DISPLAY.
```

```
P0148    PROCESS AVERAGE G OUTPUT...SCALE IT AND GET INPUT DATA
R0149
R0150    * START  TARGETING ...
 0151    REF   9  LAST  854   E7,1451                    EBANK= RTINIT

A0152                                                   TARGETNG IS CALLED BY P61, FROM GROUP 4.
A0153                                                   TARGETNG IS CALLED BY ENTRY, FROM GROUP 5.

A0154                                                                ALL MM COME HERE.
 0155                          25,2125   77214 0  TARGETNG BOFF  VLOAD      ENTER WITH PROPER EB FROM CM/POSE(TEST)
 0156    REF   1               25,2126   03346 0                RELVELSW    RELVELSW = 96D  BIT9
 0157    REF   1               25,2127   52133 1                GETVEL      WANT INERTIAL VEL. GO GET IT.
 0158    REF   2  LAST  122    25,2130   03526 0                -VREL       NEW V  IS RELATIVE, CONTINUE

 0159                          25,2131   52076 1          VCOMP GOTO        (VREL) = (V) + KWE UNITR*UNITW
 0160    REF   1               25,2132   52136 1                GETUNITV -1 - VREL WAS LEFT BY CM/POSE

 0161                          25,2133   74375 0  GETVEL  VLOAD  VXSC       INERTIAL V WANTED
 0162    REF  15  LAST  853    25,2134   01036 0                VN          KVSCALE = (12800 / .3048) / 2VS
 0163    REF   1               25,2135   15232 0                KVSCALE     KVSCALE = .81491944
 0164    REF   2  LAST  122    25,2136   03516 0    -1    STORE  VEL         V/2 VS
 0165                          25,2137   44056 1  GETUNITV UNIT  STQ
 0166    REF   6  LAST  820    25,2140   03373 0                60GENRET
 0167    REF   2  LAST  122    25,2141   17510 0          STODL UNITV
 0168                          25,2142   00043 0                34D
 0169    REF   2  LAST  122    25,2143   03622 1          STORE  VSQUARE     VSQ/4

 0170                          25,2144   77625 0          DSU
 0171    REF   1               25,2145   15326 1                FOURTH      4 G-S FULL SCALE
 0172    REF   2  LAST  122    25,2146   17654 0          STODL  LEQ         LEQ/4

 0173                          25,2147   00045 0                36D
 0174    REF   2  LAST  123    25,2150   27674 1          STOVL  V           V/2 VS = VEL/2 VS

 0175    REF   3  LAST  856    25,2151   03516 0                VEL
 0176                          25,2152   72441 0          DOT    SL1         RDOT= V.UNITR
 0177    REF   7  LAST  854    25,2153   01756 1                UNITR
 0178    REF   5  LAST  293    25,2154   27700 0          STOVL  RDOT        RDOT / 2 VS

 0179    REF  13  LAST  841    25,2155   01315 1                DELV        PIPA COUNTS IN PLATFORM COORDS.
 0180                          25,2156   41246 1          ABVAL  DMP
 0181    REF   1               25,2157   15234 0                KASCALE
 0182                          25,2160   53152 1          SL1    BZE
 0183    REF   1               25,2161   55136 0                SETMIND
 0184    REF   4  LAST  293    25,2162   27640 0  DSTORE  STOVL  D           ACCELERATION USED TO APPROX DRAG
 0185    REF   4  LAST  856    25,2163   03516 0                VEL
 0186                          25,2164   53435 0          VXV    UNIT        UNI = UNIT(V*R)
 0187    REF   8  LAST  856    25,2165   01756 1                UNITR
```

```
 0188   REF   4  LAST  816   25,2166  03502 0          STORE  UNI          .5 UNI                  REF COORDS.

 0189                       25,2167  71214 0          BOFF   DLOAD
 0190   REF   2  LAST  856   25,2170  03346 0                 RELVELSW
 0191   REF   1              25,2171  55077 1                 GETETA
 0192   REF   2  LAST  853   25,2172  15336 0                 3ZEROS
 0193                       25,2173  43225 0  UPDATERT DSU   DAD          PIPTIME-TIME/RTO =ELAPSED TIME SINCE
A0194                                                                     RTINIT  WAS ESTABLISHED.
 0195   REF   3  LAST  853   25,2174  03524 1                 TIME/RTO
 0196   REF  16  LAST  853   25,2175  01044 0                 PIPTIME
 0197   REF   8  LAST  854   25,2176  37606 0          STCALL DTEAROT      GET PREDICTED TARGET VECTOR  RT

 0198   REF   3  LAST  820   25,2177  46223 0                 EARROT2
 0199                       25,2200  40241 1          DOT    SETPD        SINCE (RT) UNIT VECT, THIS IS 1/4 MAX
 0200   REF   5  LAST  857   25,2201  03502 0                 UNI          LATANG = RT.UNI
 0201                       25,2202  00001 0                 C
 0202   REF   6  LAST  853   25,2203  27676 0          STOVL  LATANG       LATANG = MAC LATANG / 4

 0203   REF   5  LAST  853   25,2204  03474 0                 RT
 0204                       25,2205  77614 1          CLEAR
 0205   REF   1              25,2206  03667 0                 GONEBY       SHOW HAVE NOT GONE PAST TARGET.
 0206                       25,2207  50235 0          VXV    DOT          IF RT*UNITR.UNI NEG, GONEBY=1
 0207   REF   9  LAST  856   25,2210  01756 1                 UNITR        GONEPAST IS CONDITIONAL SW SET IN
 0208   REF   6  LAST  857   25,2211  03502 0                 UNI          FINAL PHASE.
 0209                       25,2212  43044 0          BPL    SET
 0210                       25,2213  52215 0                 +2
 0211   REF   2  LAST  857   25,2214  03467 1                 GONEBY       SHOW HAVE     GONE PAST TARGET.

 0212                       25,2215  77775 1          VLOAD
 0213   REF   6  LAST  857   25,2216  03474 0                 RT
 0214                       25,2217  45241 1  GETANGLE DOT   DSU          THETA = ARCCOS(RT.UNITR)
 0215   REF  10  LAST  857   25,2220  01756 1                 UNITR
 0216   REF   1              25,2221  15164 0                 NEAR1/4      TO IMPROVE ACCURACY, CALC RANGE BY
 0217                       25,2222  43244 1          BPL    DAD          TINYTHET IF HIGH ORDER PART OF
 0218   REF   1              25,2223  55141 0                 TINYTHET     ARCCOS ARGUMENT IS ZERO
 0219   REF   2  LAST  857   25,2224  15164 0                 NEAR1/4
 0220                       25,2225  65552 0          SL1    ACOS
 0221   REF   4  LAST  854   25,2226  03702 1  THETDONE STORE  THETAH       THETAH/360
A0222                                                                     HI WORD, LO BIT =1.32 NM=360 60/16384

 0223                       25,2227  57414 1          BON    DCOMP
 0224   REF   3  LAST  857   25,2230  03707 1                 GONEBY       =1 IF HAVE GONE PAST TARGET.
A0225                                                                     (SIGN MAY BECOME ERRATIC VERY NEAR
A0226                                                                     TARGET DUE TO LOSS OF PRECISION.)
 0227                       25,2231  52232 0                 +1
 0228   REF   2  LAST  293   25,2232  17714 0          STODL  RTGON67      RANGE ERROR: NEG IF WILL FALL SHORT.

 0229   REF   5  LAST  856   25,2233  03640 0                 D
 0230                       25,2234  50025 0          DSU    BMN
 0231   REF   1              25,2235  15242 1                 .05G
```

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```
0232  REF  1                  25,2236  52255 1                NO.05G
0233                          25,2237  77214 0          SET   VLOAD
0234  REF  3  LAST  832       25,2240  03074 1                .05GSW
0235  REF  8  LAST  841       25,2241  03432 1                DELVREF
0236                          25,2242  50206 0          PUSH  DOT
0237  REF  5  LAST  822       25,2243  03542 1                UXA/2
0238                          25,2244  63552 0          SL1   DSQ
0239                          25,2245  47515 0          PDVL  VSQ          EXCHANGE WITH PDL.
0240                          25,2246  56225 1          DSU   DDV
0241                          25,2247  00001 0                0
0242                          25,2250  75400 1          BOV   SQRT
0243  REF  1                  25,2251  52253 1                NOLDCALC     OVFL LAST CLEARED IN EARROT2 ABOVE.
0244  REF  1                  25,2252  03727 0          STORE L/DCALC

0245                          25,2253  77650 1  NOLDCALC GOTO
0246  REF  7  LAST  856       25,2254  03373 0                60GENRET

0247                          25,2255  52014 0  NO.05G   CLEAR GOTO         THIS WAY FOR DAP.(MAY INTERRUPT)
0248  REF  4  LAST  858       25,2256  03274 0                .05GSW        .05GSW = 1020  83
0249  REF  2  LAST  858       25,2257  52253 1                NOLDCALC     KEEP SINGLE EXIT FOR TARGETNG
```

P0250 SUBROUTINES CALLED BY SCALEPOP (TARGETING):

```
 0252  REF  1                 26,2000                    SETLOC  REENTRY1
 0253                        26,3077                    BANK

 0254  REF  1                                            COUNT*  $$/ENTRY

 0255                        26,3077   56345 0  GETETA   DLOAD   DDV          D = D +D(-RDOT/HS -2D/V)  DT/2
A0256                                                                        DT/2  =  2/2  = 1
 0257  REF  6  LAST  856     26,3100   03700 0            RDOT
 0258  REF  1                 26,3101   15320 1            -HSCALED
 0259                        26,3102   41325 0  PDDL     DMP
 0260  REF  6  LAST  857     26,3103   03640 0            D
 0261  REF  1                 26,3104   15322 0            -KSCALE
 0262                        26,3105   43271 1  DDV      DAD
 0263  REF  3  LAST  856     26,3106   03674 1            V
A0264                                                                       -RDOT/HS FROM PDL.
 0265                        26,3107   43205 1  DMP      DAD
 0266  REF  7  LAST  859     26,3110   03640 0            D
 0267  REF  8  LAST  859     26,3111   03640 0            D
 0268  REF  9  LAST  859     26,3112   03640 0  STORE    D

 0269                        26,3113   71214 0  BON      DLOAD           EGSW INDICATES FINAL PHASE.
 0270  REF  2  LAST   59     26,3114   03307 0            EGSW
 0271  REF  1                 26,3115   55122 0            SUBETA
 0272  REF  5  LAST  857     26,3116   03702 1            THETAH
 0273                        26,3117   52005 0  DMP      GOTO
 0274  REF  1                 26,3120   15236 1            KTETA           = 1000X2PI/(2)E14 163.84
 0275  REF  1                 26,3121   52173 0            UPDATERT

 0276                        26,3122   45345 1  SUBETA   DLOAD   DSU          SWITCH FROM  INERTIAL TO RELATIVE VEL.
 0277  REF  4  LAST  859     26,3123   03674 1            V
 0278  REF  1                 26,3124   15326 1            VMIN
 0279                        26,3125   43044 0  BPL      SET
 0280  REF  1                 26,3126   55130 0            SUBETA2
 0281  REF  3  LAST  857     26,3127   03066 1            RELVELSW

 0282                        26,3130   41345 0  SUBETA2  DLOAD   DMP

 0283  REF  6  LAST  859     26,3131   03702 1            THETAH
 0284  REF  1                 26,3132   15240 0            KT1             KT1 = KT
 0285                        26,3133   52071 0  DDV      GOTO
 0286  REF  5  LAST  859     26,3134   03674 1            V               KT = RE(2 PI)/2 VS 16384 163.84/ 2 VSAT
 0287  REF  2  LAST  859     26,3135   52173 0            UPDATERT

 0288                        26,3136   52145 0  SETMIND  DLOAD   GOTO
 0289  REF  2  LAST  647     26,3137   16425 0            1BITDP
 0290  REF  1                 26,3140   52162 0            DSTORE

 0291                        26,3141   51425 0  TINYTHET DSU     ABS          ENTER WITH X-.249
```

```
0292   REF   3  LAST  859    26,3142   16426 0            1BITDP + 1     GET 1/4 - MPAC
0293                         26,3143   75461 0       SL   SQRT           SCALE UP BEFORE SQRT
0294                         26,3144   20216 0            13D            HAS FACTOR FOR UP SCALING
0295                         26,3145   52005 0       DMP  GOTO
0296   REF   1               26,3146   15250 1            KACOS
0297   REF   1               26,3147   52226 0            THETDONE
```

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```
P0298   * START   INITIAL ROLL ...

 0300   REF   2 LAST  852   25,2000                    SETLOC REENTRY
 0301                       25,2260                    BANK

 0302   REF   2 LAST  852 TO  859:   176   176*        COUNT* $$/ENTRY

A0303                                                                  MM = 63 , 64 ..
 0304                       25,2260   43014 0  INITROLL BON     BOFF   IF D- .05G NEG, GO TO LIMITL/D
 0305   REF   1            25,2261   03312 1            CLEAR   INRLSW
 0306   REF   1            25,2262   52362 1            CA      INITRL1
 0307   REF   5 LAST  858  25,2263   03354 0            CS      .05GSW
 0308   REF   1            25,2264   53524 1            AD      LIMITL/D

A0309                                                                  MM = 64, NOW

A0310                                                                                3
A0311                                                                  KA = KA1 LEQ  + KA2
 0312                       25,2265   63545 0            DLOAD   DSQ
 0313   REF   3 LAST  856  25,2266   03654 0            MP      LEQ
 0314                       25,2267   56205 0            DMP     DDV
 0315   REF   4 LAST  861  25,2270   03654 0            MP      LEQ
 0316   REF   1            25,2271   15306 0            DV      1/KA1       = 25 /(64  1.8)
 0317                       25,2272   47015 0            DAD     RTB
 0318   REF   1            25,2273   15310 1            SR      KA2         = .2
 0319   REF   1            25,2274   54432 0            BOV     P64         ROLLC      VI         RDOT
A0320                                                                        XXX.XX DEG XXXXX. FPS XXXXX. FPS
 0321   REF   2 LAST  123  25,2275   03720 1            STORE   KAT

 03211                      25,2276   50025 0            DSU     BMN
 03212  REF   1            25,2277   15316 1            BMN     KALIM
 03213                      25,2300   52304 1            CA      +4
 03214                      25,2301   77745 1            DLOAD
 03215  REF   2 LAST  861  25,2302   15316 1            DSU     KALIM
 03216  REF   3 LAST  861  25,2303   03720 1            STORE   KAT
 0322                       25,2304   45345 1            DLOAD   DSU         IF V-VFINALI NEG, GO TO FINAL PHASE.
 0323   REF   6 LAST  859  25,2305   03674 1            V       V
 0324   REF   1            25,2306   15304 1            DSU     VFINALI
 0325                       25,2307   51014 0            CLEAR   BPL         (CAN'T CLEAR INRLSW AFTER HERE:RESTARTS)
 0326   REF   1            25,2310   03265 0            CS      GONEPAST    GONEPAST WAS INITIALLY SET=1 TO FORCE
A0327                                                                       ROLLC TO REMAIN AS DEFINED BY HEADSUP
A0328                                                                       UNTIL START OF P64. (UNTIL D > .05G)
 0329   REF   1            25,2311   52316 1            DOEQ    CA      DOEQ
 0330                       25,2312   52131 0            SSP     GOTO
 0331   REF   7 LAST  855  25,2313   03646 0            CS      GOTOADDR
 0332   REF   1            25,2314   53316 0            BOV     KEPZ        AND IDLE UNTIL D>0.2 G.  (NO P66 HERE)
 0333   REF   1            25,2315   52351 1            CA      INROLOUT    GO TO LIMITL/D AFTER SETTING INRLSW.

 0334                       25,2316   41345 0  DOEQ      DLOAD   DMP         DO = KA3 LEQ + KA4
 0335   REF   5 LAST  861  25,2317   03654 0            MP      LEQ
```

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```
0336  REF  1                25,2320  15312 0                KA3
0337                        25,2321  77615 0        DAD
0338  REF  1                25,2322  15314 0                KA4
0339  REF  2  LAST  123     25,2323  03710 1        STORE   DD          DD/805
0340                        25,2324  40065 0        BDDV    BDV
0341  REF  1                25,2325  15270 0                C001        (-4/25 G)  8-8
0342                        25,2326  52327 0                +1          CLEAR OVFIND, IF ON.
0343  REF  2  LAST  123     25,2327  17706 0        STODL   C/DD        (-4/DD)  8-8
0344  REF  6  LAST  853     25,2330  03624 1                LAD         IF V-VFINAL +K(RDOT/V)CUBED POS,L/D=-LAD
0345  REF  3  LAST  853     25,2331  17634 0        STODL   L/D
0346  REF  7  LAST  859     25,2332  03700 0                RDOT
0347                        25,2333  41471 0        DDV     PUSH
0348  REF  7  LAST  861     25,2334  03674 1                V
0349                        25,2335  41316 0        DSQ     DMP
0350                        25,2336  45271 1        DDV     DSU
0351  REF  1                25,2337  15300 0                1/K44
0352  REF  1                25,2340  15302 1                VFINAL
A0353                                                                    3
A0354                                                       V-VFINAL +(RDOT/V)  / K44   OVFL $

0355                        25,2341  40015 1        DAD     BOV
0356  REF  8  LAST  862     25,2342  03674 1                V
0357  REF  2  LAST  861     25,2343  52351 1                INROLOUT    GO TO LIMITL/D AFTER SETTING INRLSW.
0358                        25,2344  71240 1        BMN     DLOAD
0359  REF  3  LAST  862     25,2345  52351 1                INROLOUT    GO TO LIMITL/D AFTER SETTING INRLSW.
0360  REF  7  LAST  862     25,2346  03624 1                LAD
0361                        25,2347  77676 0        DCOMP
0362  REF  4  LAST  862     25,2350  03634 0        STORE   L/D

A0363                                                       SET INRLSW AT END FOR RESTART PROTECTION
 0364                       25,2351  77614 1  INROLOUT BOFSET            END OF PRE .05G PATH OF INITROLL.
0365  REF  2  LAST  861     25,2352  03052 0                INRLSW      SWITCH IS ZERO INITIALLY.
0366  REF  2  LAST  861     25,2353  53524 1                LIMITL/D    (GO TO)

0367                        25,2354  45345 1  KATEST  DLOAD  DSU         IF KAT - D POS, GO TO CONSTD
0368  REF  4  LAST  861     25,2355  03720 1                KAT
0369  REF  10 LAST  859     25,2356  03640 0                D           IF POS, OUT WITH COMMAND VIA LIMITL/D
0370                        25,2357  52044 0        BPL     GOTO
0371  REF  3  LAST  862     25,2360  53524 1                LIMITL/D
0372  REF  1                25,2361  53231 1                CONSTD

0373                        25,2362  43345 1  INITRLI  DLOAD  DAD       IF RDOT + VRCONT POS, GO TO HUNTEST
0374  REF  8  LAST  862     25,2363  03700 0                RDOT
0375  REF  1                25,2364  15262 0                VRCONT
0376                        25,2365  45040 1        BMN     CALL        IF POSITIVE, FALL INTO HUNTEST.
0377  REF  1                25,2366  52354 1                KATEST

03771 REF  1                25,2367  53021 1                FOREHUNT    INITIALIZE HUNTEST.
```

```
P0378   * START   HUNT TEST   ..

A0379                                                                   MM = 64
 0380                       25,2370  77731 1          SSP                INITIALIZE HUNTEST ON FIRST PASS
 0381  REF   8 LAST  861   25,2371  03646 0                  GOTOADDR
 0382  REF   1             25,2372  52373 1                  HUNTEST    MUST GO AFTER FOREHUNT FOR RESTARTS.

 0389                       25,2373  77745 1  HUNTEST DLOAD
 0390  REF  11 LAST  862   25,2374  03640 0                  D
 0391  REF   2 LAST  123   25,2375  17664 0          STODL   A1         A1/80S  = A1/ 25G

 0392  REF   8 LAST  862   25,2376  03624 1                  LAD
 0393  REF   2 LAST  122   25,2377  17647 1          STODL   TEM1B
 0394  REF   9 LAST  862   25,2400  03700 0                  RDOT
 0395                       25,2401  71240 1          BMN     DLOAD      IF RDOT NEG,TEM1B=LAD, OTHERWISE = LEWD
 0396  REF   1             25,2402  52406 1                  AOCALC
 0397  REF   1             25,2403  03725 1                  LEWD
 0398  REF   3 LAST  863   25,2404  17647 1          STODL   TEM1B

 0399  REF  10 LAST  863   25,2405  03700 0                  RDOT
 0400                       25,2406  43271 1  AOCALC  DDV     DAD        V1 = V + RDOT/TEM1B
 0401  REF   4 LAST  863   25,2407  03647 1                  TEM1B
 0402  REF   9 LAST  862   25,2410  03674 1                  V
 0403  REF   2 LAST   73   25,2411  14326 0          STODL   V1         V1/2 VS

 0404  REF  11 LAST  863   25,2412  03700 0                  RDOT
 0405                       25,2413  56316 0          DSQ     DDV        A0=(V1/V)SQ(D+RDOT SQ/(TEM1B 2 C1 HS)
 0406  REF   5 LAST  863   25,2414  03647 1                  TEM1B
 0407                       25,2415  43271 1          DDV     DAD
 0408  REF   1             25,2416  15274 1                  2C1HS
 0409  REF  12 LAST  863   25,2417  03640 0                  D
 0410                       25,2420  41205 0          DMP     DMP
 0411  REF   3 LAST  863   25,2421  00326 0                  V1
 0412  REF   4 LAST  863   25,2422  00326 0                  V1
 0413                       25,2423  77671 1          DDV
 0414  REF   3 LAST  856   25,2424  03622 1                  VSQUARE
 0415  REF   1             25,2425  14330 1          STODL   A0         A0/80S  = A0/ 25G

 0416  REF  12 LAST  863   25,2426  03700 0                  RDOT
 0417                       25,2427  71244 0          BPL     DLOAD
 0418  REF   1             25,2430  52433 1                  V1LEAD
 0419  REF   2 LAST  863   25,2431  00330 1                  A0
 0420  REF   3 LAST  863   25,2432  03664 0          STORE   A1         A1/25G

 04202                      25,2433  51145 0  V1LEAD  DLOAD  BPL        IF L/D NEG, V1=V1 - 1000
 04203  REF   5 LAST  862   25,2434  03634 0                  L/D
 04204  REF   1             25,2435  52442 1                  HUNTEST1

 04205                      25,2436  45345 1          DLOAD   DSU
 04206  REF   5 LAST  863   25,2437  00326 0                  V1
```

```
 04207  REF  1                    25,2440  15216 0                 VQUIT
 04208  REF  6  LAST  863         25,2441  00326 0          STORE  V1

 0421                             25,2442  41345 0  HUNTEST1 DLOAD  DMP      ALP = 2 C1 HS AO/LEWD V1 V1
 0422   REF  3  LAST  863         25,2443  00330 1                 AO
 0423   REF  2  LAST  863         25,2444  15274 1                 2C1HS
 0424                             25,2445  40271 1          DDV    SETPD
 0425   REF  7  LAST  864         25,2446  00326 0                 V1
 0426                             25,2447  00001 0                 0
 0427                             25,2450  56271 0          DDV    DDV
 0428   REF  8  LAST  864         25,2451  00326 0                 V1
 0429   REF  2  LAST  863         25,2452  03725 1                 LEWD
 0430   REF  2  LAST  123         25,2453  03704 1          STORE  ALP

 0431                             25,2454  55221 0          BDSU   BDDV     FACT1 = V1 / (1 - ALP)
 0432   REF  1                    25,2455  15344 0                 BARELY1
 0433   REF  9  LAST  864         25,2456  00326 0                 V1
 0434   REF  2  LAST  122         25,2457  17616 0          STODL  FACT1    FACT1 / 2VS

 0435   REF  3  LAST  864         25,2460  03704 1                 ALP
 0436                             25,2461  41225 1          DSU    DMP      FACT2 = ALP(ALP - 1) / AO
 0437   REF  2  LAST  864         25,2462  15344 0                 BARELY1
 0438   REF  4  LAST  864         25,2463  03704 1                 ALP
 0439                             25,2464  77671 1          DDV
 0440   REF  4  LAST  864         25,2465  00330 1                 AO
 0441   REF  2  LAST  122         25,2466  03620 0          STORE  FACT2    FACT2  (25G)

 0442                             25,2467  43205 1          DMP    DAD
 0443   REF  3  LAST  852         25,2470  03175 1                 Q7      Q7 /805 = Q7 / 25G
 0444   REF  5  LAST  864         25,2471  03704 1                 ALP     VL=FACT1 (1-SQRT(Q7 FACT2 +ALP)  )
 0445                             25,2472  44366 1          SQRT   BDSU
 0446   REF  3  LAST  864         25,2473  15344 0                 BARELY1
 0447                             25,2474  77605 1          DMP
 0448   REF  3  LAST  864         25,2475  03616 0                 FACT1
 0449   REF  2  LAST  293         25,2476  03757 1          STORE  VL       VL / 2 VS

 0450                             25,2477  41221 0          BDSU   DMP      GAMMAL1 = LEWD (V1-VL)/VL
 0451   REF 10  LAST  864         25,2500  00326 0                 V1
 0452   REF  3  LAST  864         25,2501  03725 1                 LEWD
 0453                             25,2502  77671 1          DDV
 0454   REF  3  LAST  864         25,2503  03757 1                 VL
 0455   REF  1                    25,2504  14027 1          STODL  GAMMAL1  GAMMAL1 USED IN UPCONTROL

A0456                                                               GAMMAL1 = PDL 22D.
 0457   REF  4  LAST  864         25,2505  03757 1                 VL
 0458                             25,2506  50025 0          DSU    BMN      IF VL-VLMIN NEG, GO TO PREFINAL
 0459   REF  1                    25,2507  15206 1                 VLMIN
 0460   REF  1                    25,2510  53332 0                 PREFINAL

 0461                             25,2511  63545 0          DLOAD  DSQ
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0462   REF   5  LAST  864   25,2512   03757 1                    VL
0463   REF   2  LAST  123   25,2513   17666 1          STODL     VBARS          VBARS / 4 VS VS

0464   REF   1              25,2514   15334 1                    HALVE          IF VSAT-VL  NEG,  GO TO CONSTD
0465                        25,2515   50025 0          DSU       BMN
0466   REF   6  LAST  865   25,2516   03757 1                    VL
0467   REF   1              25,2517   53225 1                    BECONSTD       SET MODE=HUNTEST, CONTINUE IN CONSTD
0468   REF   2  LAST  123   25,2520   17662 0          STODL     DVL            DVL / 2VS

0469   REF   2  LAST  865   25,2521   15334 1                    HALVE
0470   REF   2  LAST  123   25,2522   03672 1          STORE     VS1            VS1 = VSAT

0471                        25,2523   50025 0          DSU       BMN            IF V1 GREATER THAN VSAT , GO ON
0472   REF  11  LAST  864   25,2524   00326 0                    V1
0473   REF   1              25,2525   52533 0                    GETDHOOK
0474                        25,2526   77621 1          BDSU
0475   REF   3  LAST  865   25,2527   03662 0                    DVL
0476   REF   4  LAST  865   25,2530   17662 0          STODL     DVL            DVL = DVL - (VSAT-V1) = V1 - VL
0477   REF  12  LAST  865   25,2531   00326 0                    V1
0478   REF   3  LAST  865   25,2532   03672 1          STORE     VS1            VS1 = V1,  IN THIS CASE

0479                        25,2533   45145 0  GETDHOOK DLOAD     CALL           DHOOK=((1-VS1/FACT1) SQ -ALP)/FACT2
0480   REF   4  LAST  865   25,2534   03672 1                    VS1            VS1 /2 VS
0481   REF   1              25,2535   53003 1                    DHOOKYQ7       GO CALC DHOOK
0482   REF   2  LAST  122   25,2536   03656 1          STORE     DHOOK          DHOOK /256

0483                        25,2537   56261 1          SR        DDV
0484                        25,2540   20607 1                    6              CHOOK
0485   REF   4  LAST  864   25,2541   03175 1                    Q7
0486                        25,2542   77625 0          DSU
0487   REF   1              25,2543   15252 0                    CHOOK          = .25/16 = (-6)
0488   REF   2  LAST  123   25,2544   03660 1          STORE     AHOOKDV

0489                        25,2545   41215 1          DAD       DMP            GAMMAL= GAMMAL1-CH1 DVL SQ(1+AHOOK DVL)
0490   REF   1              25,2546   31771 1                    1/16TH
0491   REF   1              25,2547   15256 1                    CH1
0492                        25,2550   41205 0          DMP       DMP
0493   REF   5  LAST  865   25,2551   03662 0                    DVL
0494   REF   6  LAST  865   25,2552   03662 0                    DVL
0495                        25,2553   56271 0          DDV       DDV
0496   REF   3  LAST  865   25,2554   03656 1                    DHOOK
0497   REF   3  LAST  865   25,2555   03666 1                    VBARS
0498                        25,2556   50021 1          BDSU      BMN
0499   REF   2  LAST  864   25,2557   00027 1                    GAMMAL1
0500   REF   1              25,2560   52750 1                    NEGAMA
0501   REF   1              25,2561   03761 1  HUNTEST3 STORE     GAMMAL

0502                        25,2562   77625 0          DSU                      GAMMAL1=GAMMAL1 +Q19 (GAMMAL-GAMMAL1)
0503   REF   3  LAST  865   25,2563   00027 1                    GAMMAL1
0504                        25,2564   43205 1          DMP       DAD
```

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```
0505   REF   1                    25,2565   15334 1                 Q19
0506   REF   4   LAST   865       25,2566   00027 1                 GAMMAL1
0507   REF   5   LAST   866       25,2567   14027 1          STODL  GAMMAL1
0508   REF   2   LAST   865       25,2570   03761 1                 GAMMAL
```

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P0509    *START    RANGE PREDICTION ...

A0510                                                                  C(MPAC) = GAMMAL
 0511                          25,2571  60516 0  RANGER  DSQ     SR2    COSG = 1-GAMMAL SQ/2, TRUNCATED SERIES
 0512                          25,2572  77621 1          BDSU
 0513  REF  3  LAST  865      25,2573  15334 1          HALVE
 0514  REF  2  LAST  123      25,2574  17670 0          STODL   COSG/2
 0515  REF  4  LAST  865      25,2575  03666 1          VBARS   E=SQRT(1+VBARS........

 0516                          25,2576  41225 1          DSU     DMP
 0517  REF  4  LAST  867      25,2577  15334 1          HALVE
 0518  REF  5  LAST  867      25,2600  03666 1          VBARS
 0519                          25,2601  41205 0          DMP     DMP
 0520  REF  3  LAST  867      25,2602  03670 0          COSG/2
 0521  REF  4  LAST  867      25,2603  03670 0          COSG/2
 0522                          25,2604  43312 0          SL2     DAD
 0523  REF  1                  25,2605  31771 1          C1/16   C1/16 = 1/16
 0524                          25,2606  65366 1          SQRT    PDDL    E/4 INTO PDL

 0525  REF  6  LAST  867      25,2607  03666 1          VBARS
 0526                          25,2610  41205 0          DMP     DMP     ASKEP/2 = ARCSIN(VBARS COSG SING/E)
 0527  REF  5  LAST  867      25,2611  03670 0          COSG/2
 0528  REF  3  LAST  866      25,2612  03761 1          GAMMAL
 0529                          25,2613  67471 1          DDV     ASIN
 0530                          25,2614  41552 0          SL1     PUSH    ASKEP TO PDL 0.
 0531  REF  1                  25,2615  17731 1          STODL   ASKEP    BALLISTIC RANGE      ASKEP/2PI

A0532                                                                  FOR TM, STORE RANGE COMPONENTS OVERLAPPING (SP)
 0533  REF  7  LAST  865      25,2616  03757 1          VL
 0534                          25,2617  43205 1          DMP     DAD     ASP1 = Q2 + Q3 VL
 0535  REF  1                  25,2620  15172 1          Q3
 0536  REF  3  LAST  853      25,2621  03712 0          Q2
 0537  REF  1                  25,2622  03732 1          STORE   ASP1    FINAL PHASE RANGE    ASP1/2 PI

 0538                          25,2623  63525 0          PDDL    DSQ     ASP1 TO PDL 2.
 0539  REF 13  LAST  865       25,2624  00326 0          VI
A0540                                                                                  2
A0541                                                                  ASPUP= -C12 LOG(V1 Q7/VBARS A0)/GAMMAL1
 0542                          25,2625  56205 0          DMP     DDV
 0543  REF  5  LAST  865      25,2626  03175 1          Q7
 0544  REF  7  LAST  867      25,2627  03666 1          VBARS
 0545                          25,2630  45071 0          DDV     CALL
 0546  REF  5  LAST  864      25,2631  00330 1          A0
 0547  REF  1                  25,2632  46155 1          LOG     RETURN WITH -LOG IN MPAC

 0548                          25,2633  56205 0          DMP     DDV
 0549  REF  1                  25,2634  15210 0          C12
 0550  REF  6  LAST  866      25,2635  00027 1          GAMMAL1
 0551  REF  1                  25,2636  03733 0          STORE   ASPUP   UP PHASE RANGE       ASPUP / 2 PI
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 0552                          25,2637  41325 0          PDDL    DMP             ASPUP TO PDL 4.
 0553  REF   1                 25,2640  15260 1                  KC3             KC3 =-4 VS VS/ 2 PI 805 RE
A0554                                                                            ASPDWN = KC3 RDOT V / A0
 0555  REF  13  LAST  863      25,2641  03700 0                  RDOT
 0556                          25,2642  56205 0          DMP     DDV
 0557  REF  10  LAST  863      25,2643  03674 1                  V
 0558  REF   6  LAST  867      25,2644  00330 1                  A0
 0559                          25,2645  41471 0          DDV     PUSH            ASPDWN TO PDL 6.
 0560  REF   9  LAST  863      25,2646  03624 1                  LAD
 0561  REF   1                 25,2647  17734 1          STODL   ASPDWN          RANGE TO PULL OUT       ASPDWN /2 PI

 0562  REF   1                 25,2650  15176 0                  Q6
 0563                          25,2651  41225 1          DSU     DMP             ASP3 = Q5(Q6-GAMMAL)
 0564  REF   4  LAST  867      25,2652  03761 1                  GAMMAL
 0565  REF   1                 25,2653  15174 1                  Q5
 0566  REF   1                 25,2654  27735 0          STOVL   ASP3            GAMMA CORRECTION        ASP3/2PI

 0567  REF   2  LAST  867      25,2655  03731 1                  ASKEP           GET HI-WD AND
 0568  REF   1                 25,2656  17126 1          STODL   ASPS(TM)        SAVE HI-WORD OF ASP'S FOR TM.

 0569  REF   2  LAST  868      25,2657  03735 0                  ASP3
 0570                          25,2660  43215 0          DAD     DAD
A0571                                                                            ASPDWN FROM PDL 6.
A0572                                                                            ASPUP FROM PDL 4.
 0573                          25,2661  43215 0          DAD     DAD
A0574                                                                            ASP1 FROM PDL 2.
A0575                                                                            ASKEP FROM PDL 0.
 0576                          25,2662  41025 0          DSU     BOVB            CLEAR OVFIND.
 0577  REF   7  LAST  859      25,2663  03702 1                  THETAH
 0578  REF   3  LAST  808      25,2664  57544 0                  TCDANZIG
 0579  REF   2  LAST  122      25,2665  03610 0          STORE   DIFF            DIFF = (ASP-THETAH) /2 PI
A0580                                                                                ASP=ASKEP+ASP1+ASPUP+ASP3+ASPDWN = TOTAL RANGE

 0581                          25,2666  45246 0          ABS     DSU             IF ABS(THETAH-ASP) -25NM NEG, GO TO UPSY
 0582  REF   1                 25,2667  15224 1                  25NM
 0583                          25,2670  43040 1          BMN     BON
 0584  REF   1                 25,2671  53032 0                  GOTOUPSY
 0585  REF   1                 25,2672  03311 1                  HIND
 0586  REF   1                 25,2673  52677 0                  GETDLEWD

 0587                          25,2674  51145 0          DLOAD   BPL
 0588  REF   3  LAST  868      25,2675  03610 0                  DIFF
 0589  REF   1                 25,2676  53220 1                  DCONSTD         EVENTUALLY SETS MODE = HUNTEST.
 0590                          25,2677  41345 0  GETDLEWD DLOAD   DMP
A0591                                                                            DLEWD = DLEWD (DIFF/(DIFFOLD-DIFF))
 0592  REF   2  LAST  122      25,2700  03642 1                  DLEWD
 0593  REF   4  LAST  868      25,2701  03610 0                  DIFF
 0594                          25,2702  45325 1          PDDL    DSU
 0595  REF   2  LAST  122      25,2703  03612 1                  DIFFOLD
 0596  REF   5  LAST  868      25,2704  03610 0                  DIFF
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0597                          25,2705   77665 1          BDDV
05971                         25,2706   77626 0  LWDSTORE STADR
0598   REF   3  LAST  868     25,2707   74135 0          STORE   DLEWD
0599                          25,2710   50015 0          DAD     BMN       IF LEWD+DLEWD NEG,DLEWD=-LEWD/2
0600   REF   4  LAST  864     25,2711   03725 1                  LEWD
06002  REF   1                25,2712   52744 1                  LEWDPTR
06004                         25,2713   77600 1          BDV
0601   REF   1                25,2714   52740 0                  LEWDOVFL
0602   REF   5  LAST  869     25,2715   03725 1          STORE   LEWD

0603                          25,2716   77776 1  SIDETRAK EXIT

0604   REF  13  LAST  808     25,2717   0 4606 0         TC      E7SETTER

06051  REF   8  LAST  570     25,2720   3 5055 1         CA      PRIO16    DROP GRP 5 RESTART PRIO TO 1 LESS THAN
06052  REF   1                25,2721   55'270 1         TS      PHSPRDT5  GRP 4.

0606   REF  90  LAST  855     25,2722   0 5402 1         TC      PHASCHNG
0607                          25,2723    00474 0         OCT     00474     RESTART GRP 4 AT PRE-HUNT.
A06071                                                                     FORCE RESTART TO PICK UP IN GRP 4:
A06072                                                                     USE PRIO 17 FOR GRP 4( < SERVICER PRIO)
06073  REF   1                01,2212             4P47SPT1 =      4.47SPOT
0608   REF   9  LAST  869     25,2724   3 5055 1         CA      PRIO16    CONTINUE GRP 5 AT LOWER PRIO THAN EITHER
A06081                                                                     GRP 4 OR SERVICER.
0609   REF  13  LAST  741     25,2725   0 5176 1         TC      PRIOCHNG

0610   REF   1                25,2726   3 3031 0         CAF     ADENDEXT  SIDETRACK NEXT PASS UNTIL THIS ONE DONE.
0611   REF   9  LAST  863     25,2727   55'645 0         TS      GOTOADDR  ONLY AFTER RESTART IS LEFT AFTER DETOUR.

0612   REF 210  LAST  855     25,2730   0 6006 1         TC      INTPRET

0613                          25,2731   43145 0          DLOAD   SET
0614   REF   6  LAST  868     25,2732   03610 0                  DIFF
0615   REF   2  LAST  868     25,2733   03071 1                  RIND
0616   REF   3  LAST  868     25,2734   17612 1          STODL   DIFFOLD   DIFFOLD / 2 PI

0617   REF   2  LAST  852     25,2735   15200 1                  Q7F
0621   REF   6  LAST  867     25,2736   37175 0          STCALL  Q7        Q7 / 805 FPSS
0622   REF   2  LAST  863     25,2737   52373 1                  HUNTEST    (GO TO )

0623                          25,2740   77745 1  LEWDOVFL DLOAD
0624   REF   3  LAST  852     25,2741   15344 0                  NEARONE
0625   REF   6  LAST  869     25,2742   37725 0          STCALL  LEWD
0626   REF   2  LAST  868     25,2743   53220 1                  DCONSTD   (GO TO)  ALSO WILL SET MODE = HUNTEST

06262                         25,2744   70545 1  LEWDPTR DLOAD   SR1
06264  REF   7  LAST  869     25,2745   03725 1                  LEWD
06266                         25,2746   52076 1          DCOMP   GOTO
06268  REF   1                25,2747   52706 1                  LWDSTORE
```

L REENTRY CONTROL

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R0627   NEGAMA IS PART OF HUNTEST ...

 0628                          25,2750  41205 0  NEGAMA   DMP     DMP          ENTER WITH GAMMAL IN MPAC
 0629   REF   8  LAST  867     25,2751  03757 1                    VL
 0630   REF   1                25,2752  15152 0                    1/3RD
 0631                          25,2753  41325 0           PDDL     DMP          PUSH GAMMAL VL/3
 0632   REF   8  LAST  869     25,2754  03725 1                    LEWD
 0633   REF   2  LAST  870     25,2755  15152 0                    1/3RD
 0634                          25,2756  43325 1           PDDL     DAD          PUSH LEWD/3
 0635   REF   3  LAST  865     25,2757  03660 1                    AHOOKDV
 0636   REF   1                25,2760  15254 0                    1/24TH
 0637                          25,2761  41205 0           DMP      DMP          DEL VL =(GAMMAL VL/3)/(LEWD/3-DVL
 0638   REF   7  LAST  865     25,2762  03662 0                    DVL          (2/3 + AHOOKDV)(CH1 GS/DHOOK VL))
 0639   REF   2  LAST  865     25,2763  15256 1                    CH1
 0640                          25,2764  56271 0           DDV      DDV
 0641   REF   4  LAST  865     25,2765  03656 1                    DHOOK
 0642   REF   9  LAST  870     25,2766  03757 1                    VL
 0643                          25,2767  55221 0           BDSU     BDDV
A0644                                                              LEWD/3
A0645                                                              GAMMAL VL /3
 0646                          25,2770  77615 0           DAD
 0647   REF  10  LAST  870     25,2771  03757 1                    VL
 0648   REF  11  LAST  870     25,2772  37757 0           STCALL   VL           VL/2 VS

 0649   REF   2  LAST  865     25,2773  53003 1                    DHOOKYQ7     GO CALC Q7
A0650                                                              Q7=((1-VL/FACT1)SQ - ALP)/FACT2
 0651   REF   7  LAST  869     25,2774  17175 1           STODL    Q7           Q7 / 25G

 0652   REF  12  LAST  870     25,2775  03757 1                    VL
 0653                          25,2776  77716 1           DSQ
 0654   REF   8  LAST  867     25,2777  17666 1           STODL    VBARS        VBARS / 4 VS VS

 0655   REF   3  LAST  857     25,3000  15336 0                    3ZEROS
 0656                          25,3001  77650 1           GOTO                  SET GAMMAL = 0
 0657   REF   1                25,3002  52561 1                    HUNTEST3

 0658                          25,3003  56342 1  DHOOKYQ7 SR1      DDV          SUBROUTINE TO CALC DHOOK OR Q7)
 0659   REF   4  LAST  864     25,3004  03616 0                    FACT1
 0660                          25,3005  72421 0           BDSU     SL1
 0661   REF   5  LAST  867     25,3006  15334 1                    HALVE
 0662                          25,3007  45316 1           DSQ      DSU
 0663   REF   6  LAST  864     25,3010  03704 1                    ALP
 0664                          25,3011  43471 1           DDV      RVQ
 0665   REF   3  LAST  864     25,3012  03620 0                    FACT2
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PC6651

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AC666                                                  COME TO PRE-HUNT WHEN RESTART OCCURS AFTER
AC667                                                  HUNTEST IS SIDE-TRACKED AT SIDETRAK.
AC668                                                  PICK UP IN GROUP 4.

 0669   REF 211  LAST  869   25,3013  0 6006 1  PRE-HUNT TC      INTPRET
 0670                        25,3014   45014 0            CLEAR   CALL
 0671   REF   3  LAST  869   25,3015   03271 0                    HIND          HIND      99D  BIT 6  FLAG 6
 0672   REF   2  LAST  862   25,3016   53021 1                    FOREHUNT      RE-INITIALIZE HUNTEST AFTER RE-START.
 0673                        25,3017   77650 1            GOTO
 0675   REF   3  LAST  869   25,3020   52373 1                    HUNTEST


 0676                        25,3021   77745 1  FOREHUNT  DLOAD                 INITIALIZE HUNTEST.
 0677   REF   4  LAST  870   25,3022   15336 0                    3ZEROS
 0678   REF   4  LAST  869   25,3023   17612 1            STODL   DIFFOLD
 0679   REF   1               25,3024   15160 1                    DLEWDO
 0680   REF   4  LAST  869   25,3025   17642 1            STODL   DLEWD
 0681   REF   1               25,3026   15154 0                    LEWD1
 0682   REF   9  LAST  870   25,3027   03725 1            STORE   LEWD
 0683                        25,3030   77616 0            RVQ

AC684
 0685   REF   2  LAST  797   25,3031   53574 1  ADENDEXT CADR    ENDEXIT
```

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P0686   * START  UP CONTROL  ...

A0687                                                          MM = 65
 0688                    25,3032  77634 0  GOTOUPSY RTB                 END OF HUNTEST
 0689   REF   1          25,3033  54440 0                  P65          HUNTEST USE OF GRP4 IS DISABLED BY P65
A0690                                                          USE FOR DISPLAY.
A0691                                                          SET MODE = UPCONTRL.
A0692                                                          RETURN FROM P65 DIRECTLY TO UPCONTRL
A0693                                                          VIA THE GOTOADDR AT REFAZE10.

 0694                    25,3034  45345 1  UPCONTRL DLOAD  DSU          IF D-140 POS, NOSWITCH =1
 0694   REF  13  LAST 863 25,3035  03640 0                  D            (SUPPRESS LATERAL SWITCH)
 0694   REF   1          25,3036  15222 1                  C21
 0694                    25,3037  43040 1           BMN    SET
 0694                    25,3040  53042 1                  +2
 0694   REF   1          25,3041  03070 0                  NOSWITCH

 0694                    25,3042  45345 1           DLOAD  DSU          IF  V-V1  POS, GO TO DOWN CONTROL.
 0695   REF  11  LAST 868 25,3043  03674 1                  V
 0696   REF  14  LAST 867 25,3044  00326 0                  V1
 0697                    25,3045  71244 0           BPL    DLOAD
 0698   REF   1          25,3046  53257 1                  DOWNCNTL
 0699   REF  14  LAST 872 25,3047  03640 0                  D
 0700                    25,3050  50025 0           DSU    BMN          IF D- Q7 NEG, GO TO KEP
 0701   REF   8  LAST 870 25,3051  03175 1                  Q7
 0702   REF   1          25,3052  53312 1                  KEP
 0703                    25,3053  51145 0           DLOAD  BPL          IF RDOT NEG, DO VLTEST
 0704   REF  14  LAST 868 25,3054  03700 0                  RDOT
 0705   REF   1          25,3055  53064 0                  CONT1

 0706                    25,3056  45345 1  VLTEST   DLOAD  DSU          IF V-VL-C18 NEG,EGSW=1,MODE=PREDICT3
 0707   REF  12  LAST 872 25,3057  03674 1                  V
 0708   REF  13  LAST 870 25,3060  03757 1                  VL
 0709                    25,3061  50025 0           DSU    BMN
 0710   REF   1          25,3062  15166 1                  C18
 0711   REF   2  LAST 864 25,3063  53332 0                  PREFINAL

 0712                    25,3064  77745 1  CONT1    DLOAD                IF D-AC POS, L/D = LAD, GO TO LIMITL/D
 0713   REF  15  LAST 872 25,3065  03640 0                  D
 0714                    25,3066  50025 0           DSU    BMN
 0715   REF   7  LAST 868 25,3067  00330 1                  AC
 0716   REF   1          25,3070  53074 1                  CONT3
 0717                    25,3071  52145 0           DLOAD  GOTO
 0718   REF  10  LAST 868 25,3072  03624 1                  LAD
 0719   REF   1          25,3073  53523 0                  STOREL/D
A0720

 0721                    25,3074  41345 0  CONT3    DLOAD  DMP          VREF=FACT1(1-SQRT(FACT2 D + ALP))
 0722   REF  16  LAST 872 25,3075  03640 0                  D
 0723   REF   4  LAST 870 25,3076  03620 0                  FACT2
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0724                          25,3077  75415 0        DAD     SQRT
0725  REF   7  LAST  870      25,3100  03704 1                ALP
0726                          25,3101  41221 0        BDSU    DMP
0727  REF   4  LAST  864      25,3102  15344 0                BARELY1
0728  REF   5  LAST  870      25,3103  03616 0                FACT1
0729  REF   1                 25,3104  01312 0        STORE   VREF          VREF / 2VS

0730                          25,3105  41221 0        BDSU    DMP           RDOTREF = LEWD(V1-VREF)
0731  REF  15  LAST  872      25,3106  00326 0                V1
0732  REF  10  LAST  871      25,3107  03725 1                LEWD
0733  REF   2  LAST   84      25,3110  15310 1        STODL   RDOTREF       RDOTREF / 2VS

0734  REF   5  LAST  865      25,3111  03672 1                VS1
0735                          25,3112  50025 0        DSU     BMN           IF VSAT-VREF NEG, GO TO CONTINU2
0736  REF   2  LAST  873      25,3113  01312 0                VREF
0737  REF   1                 25,3114  53133 0                CONTINU2

0738                          25,3115  41406 0        PUSH    PUSH          VS1-VREF  TO PDL TWICE
0739                          25,3116  56205 0        DMP     DDV           RDHOOK=CH1(1+DV AHOOKDV/DVL) DV DV
0740  REF   4  LAST  870      25,3117  03660 1                AHOOKDV          /DHOOK VREF
0741  REF   8  LAST  870      25,3120  03662 0                DVL           WHERE  DV = (VS1-VREF)
0742                          25,3121  41215 1        DAD     DMP
0743  REF   2  LAST  865      25,3122  31771 1                1/16TH
0744  REF   3  LAST  870      25,3123  15256 1                CH1
0745                          25,3124  41205 0        DMP     DMP
A0746                                                         VS1-VREF  FROM PDL TWICE.
0747                          25,3125  77671 1        DDV
0748  REF   5  LAST  870      25,3126  03656 1                DHOOK
0749                          25,3127  44271 0        DDV     BDSU
0750  REF   3  LAST  873      25,3130  01312 0                VREF
0751  REF   3  LAST  873      25,3131  01310 1                RDOTREF       C(RDOTREF)= LEWD (V1-VREF)
0752  REF   4  LAST  873      25,3132  01310 1        STORE   RDOTREF       RDOTREF = RDOTREF - RDHOOK

0753                          25,3133  45345 1 CONTINU2 DLOAD  DSU
0754  REF  17  LAST  872      25,3134  03640 0                D
0755  REF   1                 25,3135  15344 0                Q7MIN
0756                          25,3136  50004 0        BOVB    BMN
0757  REF   4  LAST  868      25,3137  57544 0                TCDANZIG      CLEAR OVFL IND, IF ON
0758  REF   1                 25,3140  53151 1                UPCNTRL3
0759                          25,3141  45345 1        DLOAD   DSU
0760  REF   4  LAST  863      25,3142  03664 0                A1
0761  REF   9  LAST  872      25,3143  03175 1                Q7
0762                          25,3144  45325 1        PDDL    DSU
0763  REF  18  LAST  873      25,3145  03640 0                D
0764  REF  10  LAST  873      25,3146  03175 1                Q7
0765                          25,3147  45471 1        DDV     STADR
0766  REF   3  LAST  853      25,3150  74163 0        STORE   FACTOR        FACTOR / 25G
```

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P0767 SKIPPER

A0768 DELTA L/D=-((RDOT-RDOTREF)F1 KB1+V-VREF)F1 KB2
A0769 WHERE F1 = FACTOR

```
 0770                          25,3151  77745 1  LPCNTRL3 DLOAD
 0771  REF  15 LAST  872      25,3152  03700 0           RDOT
 0772                          25,3153  41225 1       DSU DMP          L/D = LEWD
 0773  REF   5 LAST  873      25,3154  01310 1           RDOTREF        -((RDOT-RDOTREF)F1/KB1+V-VREF)F1/KB2
 0774  REF   4 LAST  873      25,3155  03614 1           FACTOR
 0775                          25,3156  43271 1       DDV DAD
 0776  REF   1                25,3157  15212 1           1/KB1
 0777  REF  13 LAST  872      25,3160  03674 1           V
 0778                          25,3161  41225 1       DSU DMP
 0779  REF   4 LAST  873      25,3162  01312 0           VREF
 0780  REF   5 LAST  874      25,3163  03614 1           FACTOR
 0781                          25,3164  41471 0       DDV PUSH

 0782  REF   1                25,3165  15214 1           -1/KB2         DELTA L/D INTO PDL
 0783                          25,3166  51400 1       BOV ABS          NONLINEAR CIRCUIT FOR REDUCING HIGH GAIN
 0784  REF   1                25,3167  53470 1           GOMAXL/D
 0785                          25,3170  50025 0       DSU BMN
 0786  REF   1                25,3171  15276 0           PT1/16
 0787  REF   1                25,3172  53177 0           NEXT1
 0788                          25,3173  43205 1       DMP DAD
 0789  REF   1                25,3174  15156 1           POINT1
 0790  REF   2 LAST  874      25,3175  15276 0           PT1/16
 0791                          25,3176  41565 1       SIGN PUSH        ATTACH SIGN OF PUSH TO MPAC THEN PUSH

 0792                          25,3177  42545 0  NEXT1 DLOAD SL4
A0793                                                                  DELTA L/D FROM PDL.
 0794                          25,3200  77615 0       DAD
 0795  REF  11 LAST  873      25,3201  03725 1           LEWD
 0796                          25,3202  41400 0  NEGTESTS BOV PUSH      L/D TO PDL FOR USE IN NEGTESTS.
 0797  REF   2 LAST  874      25,3203  53470 1           GOMAXL/D
 0798  REF   6 LAST  863      25,3204  17634 0       STODL L/D
A0799                                                                  IF D-C20 POS, LATSW =0
A0800                                                                  AND IF L/D NEG, L/D = 0
 0801  REF  19 LAST  873      25,3205  03640 0           D
 0802                          25,3206  50025 0       DSU BMN
 0803  REF   1                25,3207  15220 0           C20
 0804  REF   4 LAST  862      25,3210  53524 1           LIMITL/D
 0805                          25,3211  71214 0       CLEAR DLOAD
 0806  REF   1                25,3212  03273 1           LATSW          =210.  ROLL OVER TOP, REGARDLESS.
A0807                                                                  L/D FROM PDL.
 0808                          25,3213  71244 0       BPL DLOAD
 0809  REF   5 LAST  874      25,3214  53524 1           LIMITL/D
 0810  REF   5 LAST  871      25,3215  15336 0           3ZEROS
 0811  REF   7 LAST  874      25,3216  37634 1       STCALL L/D
 0812  REF   6 LAST  874      25,3217  53524 1           LIMITL/D       (GO TO)
```

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```
0813                          25,3220  77745 1  DCONSTD  DLOAD            TWO RANGER ENTRIES TO CONSTD HERE
0814  REF  7  LAST  869       25,3221  03610 0                    DIFF
AC815                                                             SAVE OLD VALUE OF DIFF FOR NEXT PASS.
0817  REF  5  LAST  871       25,3222  17612 1           STODL    DIFFOLD  DIFFOLD / 2 PI

0818  REF  3  LAST  869       25,3223  15200 1                    Q7F
0819  REF 11  LAST  873       25,3224  03175 1           STORE    Q7

0820                          25,3225  47131 1  BECONSTD SSP      RTB      A HUNTEST ENTRY INTO CONSTD.
0821  REF 10  LAST  869       25,3226  03646 0                    GOTOADDR RESET MODE TO HUNTEST
0822  REF  4  LAST  871       25,3227  52373 1                    HUNTEST
0823  REF  1                   25,3230  54505 0                    KILLGRP4 DEACTIVATE GRP4 FROM HUNTEST.

0824                          25,3231  77604 0  CONSTD   BOVB
0825  REF  5  LAST  873       25,3232  57544 0                    TCDANZIG CLEAR OVF IND IF ON.

0826                          25,3233  41345 0           DLOAD    DMP
0827  REF  6  LAST  861       25,3234  03654 0                    LEQ
0828  REF  3  LAST  862       25,3235  03706 0                    C/DO     C/DO = -4/DO  B-8
0829                          25,3236  41325 0           PDDL     DMP      LEQ C/DO  INTO PDL
0830  REF  1                   25,3237  15264 0                    2HS      2HS / 4 VS VS
0831  REF  3  LAST  862       25,3240  03710 1                    DO
0832                          25,3241  43271 1           DDV      DAD      RDOTREF = - 2 HS DO/V
0833  REF 14  LAST  874       25,3242  03674 1                    V
0834  REF 16  LAST  874       25,3243  03700 0                    RDOT
0835                          25,3244  43205 1           DMP      DAD
0836  REF  1                   25,3245  15230 1                    K2D      C/DO LEQ + K2D(RDOT-RDOTREF) INTO PD
0837                          25,3246  77725 1           PDDL
0838  REF  4  LAST  875       25,3247  03710 1                    DO       DO /805

0839                          25,3250  77621 1  CONSTD1  BDSU               ENTER WITH  DREF  IN MPAC
0840  REF 20  LAST  874       25,3251  03640 0                    D
0841                          25,3252  43205 1           DMP      DAD
0842  REF  1                   25,3253  15226 0                    K1D      K2D TERM FROM PUSH
0843                          25,3254  52061 1           SL       GOTO
0844                          25,3255  20211 1                    BD
0845  REF  1                   25,3256  53202 1                    NEGTESTS (GO TO)


0846                          25,3257  77604 0  DOWNCNTL BOVB               INITIAL PART OF UPCONTROL.
0847  REF  6  LAST  875       25,3260  57544 0                    TCDANZIG CLEAR OVFIND , IF ON.

0848                          25,3261  54345 1           DLOAD    SR
0849  REF 11  LAST  872       25,3262  03624 1                    LAD
0850                          25,3263  20611 0                    BD
0851                          25,3264  45325 1           PDDL     DSU      RDTR = LAD(V1-V)
0852  REF 15  LAST  875       25,3265  03674 1                    V
0853  REF 16  LAST  873       25,3266  00326 0                    V1
0854                          25,3267  43205 1           DMP      DAD
0855  REF 12  LAST  875       25,3270  03624 1                    LAD
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```
 0856   REF  17  LAST  875   25,3271  03700 0          RDOT
 0857                        25,3272  43205 1   DMP    DAD
 0858   REF   2  LAST  875   25,3273  15230 1          K2D
AC859                                                 PUSH UP LAD.
 0860                        25,3274  45325 1   PDDL   DSU        LAD + K2D(RDOT-RDTR) INTO PD
 0861   REF  17  LAST  875   25,3275  00326 0          V1
 0862   REF  16  LAST  875   25,3276  03674 1          V
 0863                        25,3277  41316 0   DSQ    DMP
 0864   REF  13  LAST  875   25,3300  03624 1          LAD
 0865                        25,3301  65271 0   DDV    PDDL       (V1-V)SQ LAD/(2 C1 HS) INTO PD
 0866   REF   3  LAST  864   25,3302  15274 1          2C1HS
 0867   REF  18  LAST  876   25,3303  00326 0          V1
 0868                        25,3304  56316 0   DSQ    DDV
 0869   REF   4  LAST  863   25,3305  03622 1          VSQUARE
 0870                        25,3306  45265 1   BDDV   DSU        DREF = (V/V1)SQ AD - PD
 0871   REF   8  LAST  872   25,3307  00330 1          AD
A0872                                                 PUSH UP HERE
 0873                        25,3310  77650 1   GOTO               C(MPAC) = DREF
 0874   REF   1              25,3311  53250 0          CONSTD1

A0875
A0876                                                 DREF = (V/V1)^2 AD -(V-V1)^2 LAD/2 C1 HS
```

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```
P0877   * START  BALLISTIC PHASE  ...

A0878                                                          MM = 66     UPCONTRL ENTRY INTO KEP2.
 0879                          25,3312   66234 1  KEP     RTB    SSP
 0880   REF   1                25,3313   54473 0                P66          DISPLAY TRIM GIMBAL ANGLE VALUES.
 0881   REF  11  LAST  875     25,3314   03646 0                GOTOADDR     SET GOTOADDR TO KEPLER PHASE.
 0882   REF   2  LAST  861     25,3315   53316 0                KEP2

A0883                                                          KEP2 CAN ALSO BE STARTED UP DIRECTLY FROM INITROLL
A0884                                                          IN P64. PROGRAM WILL IDLE IN P64 UNTIL D EXCEEDS
A0885                                                          .2 G BEFORE GOING ON TO P67.

 0886                          25,3316   45345 1  KEP2    DLOAD  DSU          IF Q7F+KDMIN -D NEG,GO TO FINAL PHASE.
 0887   REF   1                25,3317   15170 0                Q7FKDMIN     (Q7F + KDMIN)/805
 0888   REF  21  LAST  875     25,3320   03640 0                D
 0889                          25,3321   72240 1         BMN    TLOAD
 0891   REF   3  LAST  872     25,3322   53332 0                PREFINAL


A0892                                                          SET ROLLHOLD = ROLLC, IN CASE CMDAPMOD
 0893   REF  11  LAST  822     25,3323   03316 0                ROLLC        = +1 EVER ENTERED.
 0895                          25,3324   72214 0         BON    TLOAD        IF D > .05G, KEEP PRESENT ROLL COMMAND.
 0896   REF   6  LAST  861     25,3325   03314 1                .05GSW       IF D < .05G, SET ROLL COMMAND = 0.
 0897                          25,3326   53330 1                +2
 0898   REF   6  LAST  874     25,3327   15336 0                3ZEROS       SET ROLLC & ROLLHOLD =0.
 0899   REF  12  LAST  877     25,3330   37316 1  +2     STCALL ROLLC        (SP ROLLHOLD FOLLOWS DP ROLLC)
 0900   REF   2  LAST  795     25,3331   54402 0                P62.3        CALC DESIRED GIMBAL ANGLES AT PRESENT
A0901                                                          RN, VN  TO YIELD TRIM ATTITUDE.
A0902                                                          AVAILABLE IN CPHI'S FOR N22.
```

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P0903 START FINAL PHASE ..

```
A0904                                                                   MM = 67
 0905                          25,3332  47131 1  PREFINAL SSP    RTB
 0906  REF  12  LAST  877     25,3333  03646 0                   GOTOADDR      RESTART PROTECT: RESET GOTOADDR IF CAME
 0907  REF   4  LAST  877     25,3334  53332 0                   PREFINAL      FROM HUNTEST.
 0908  REF   1                25,3335  54477 1                   P67           DISABLES GRP4. FINE IF FROM HUNTEST.BUT
A0909                                                                   MAY ALSO REMOVE RESTART PROTECTION OF
A0910                                                                   N69 (P65).
A0911                                                                   ROLLC         XRNGERR       DNRNGERR
A0912                                                                   XXX.XX DEG    XXXX.X NM     XXXX.X NM

 0913                          25,3336  66214 0            SET    SSP
 0914  REF   3  LAST  859     25,3337  03067 0                   EGSW
 0915  REF  13  LAST  878     25,3340  03646 0                   GOTOADDR
 0916  REF   1                25,3341  53342 1                   PREDICT3

 0917                          25,3342  45345 1  PREDICT3 DLOAD  DSU           IF V-VQUIT NEG, STOP STEERING
 0918  REF  17  LAST  876     25,3343  03674 1                   V
 0919  REF   2  LAST  864     25,3344  15216 0                   VQUIT
 0920                          25,3345  77440 1            BMN    EXIT
 0921  REF   1                25,3346  53611 1                   STEEROFF

 0922  REF  14  LAST  869     25,3347  0 4606 0           TC     E7SETTER      PRECAUTIONARY

 0924  REF   2  LAST  223     25,3350  3 5775 1           CA     TWELVE
 0925  REF   1                25,3351  55'761 1  BACK     TS     JJ

 0926  REF  18  LAST  878     25,3352  4 1673 0           CS     V
 0927  REF   2  LAST  878     25,3353  51'761 0           INDEX  JJ
 0928  REF   1                25,3354  6 3634 0           AD     VREFER        VREF - V, HIGHEST VREF AT END OF TABLE.
 0929  REF 187  LAST  834     25,3355  10 000 0           CCS    A             IF VREF-V POS LOOP BACK
 0930  REF   3  LAST  878     25,3356  11'761 1           CCS    JJ            DECREMENT JJ , JJ CANNOT BE ZERO
 0931  REF   1                25,3357  1 3351 1           TCF    BACK
 0932  REF  90  LAST  828     25,3360  6 4770 0           AD     ONE
 0933  REF   6  LAST  863     25,3361  55'646 0           TS     TEM1B         V-VREF IN TEM1B (MUST BE POSITIVE NUM)

 0934  REF   4  LAST  878     25,3362  51'761 0           INDEX  JJ
 0935  REF   2  LAST  878     25,3363  4 3634 1           CS     VREFER
 0936  REF   5  LAST  878     25,3364  51'761 0           INDEX  JJ
 0937  REF   3  LAST  878     25,3365  6 3635 1           AD     VREFER + 1    V(K+1) - V(K)     (POS NUM)
 0938  REF   7  LAST  878     25,3366  57'646 1           XCH    TEM1B
 0939                          25,3367  22 007 0           ZL
 0940                          25,3370  0 0006 1           EXTEND
 0941  REF   8  LAST  878     25,3371  11'646 0           DV     TEM1B
 0942  REF   2  LAST  122     25,3372  55'651 0           TS     GRAD          GRAD = (V-VREF)/(VK+1 - VK)   (POS NUM

 0943  REF  20  LAST  829     25,3373  3 4773 0           CAF    FIVE
 0944  REF   5  LAST  812     25,3374  55'650 1  BACK2    TS     MM
```

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```
0945   REF   2  LAST  836   25,3375  3 4776 0          CAF     THIRTEEN
0946   REF   6  LAST  878   25,3376  27'761 1          ADS     JJ
0947   REF 188  LAST  878   25,3377  50 000 1          INDEX   A
0948   REF   4  LAST  878   25,3400  4 3634 1          CS      VREFER
0949   REF   7  LAST  879   25,3401  51'761 0          INDEX   JJ
0950   REF   5  LAST  879   25,3402  6 3635 1          AD      VREFER + 1      X(K+1) - X(K)
0951                        25,3403  0 0006 1          EXTEND
0952   REF   3  LAST  878   25,3404  7 1651 0          MP      GRAD
0953   REF   8  LAST  879   25,3405  51'761 0          INDEX   JJ
0954   REF   6  LAST  879   25,3406  6 3634 0          AD      VREFER
0955   REF   6  LAST  878   25,3407  51'650 0          INDEX   MM
0956   REF   2  LAST  122   25,3410  55'652 0          TS      FX              FX = AK + GRAD (AK+1 - AK)
0957   REF   7  LAST  879   25,3411  11'650 1          CCS     MM
0958   REF   1               25,3412  1 3374 0          TCF     BACK2
0959   REF   3  LAST  879   25,3413  57'653 0          XCH     FX +1           ZERO FX +1  AND GET DREFR
0960   REF  22  LAST  877   25,3414  6 1637 1          AD      D
0961                        25,3415  0 0006 1          EXTEND
0962   REF   4  LAST  879   25,3416  7 1657 0          MP      FX + 5           F1
0963   REF 280  LAST  833   25,3417  52 155 1          DXCH    MPAC            MPAC = F1(D-DREF)

0964                        25,3420  0 0006 1          EXTEND
0965   REF  18  LAST  876   25,3421  4 1700 0          DCS     RDOT            FORM RDOTREF - RDOT
0966                        25,3422  20 001 1          DDOUBL
0967                        25,3423  20 001 1          DDOUBL
0968                        25,3424  20 001 1          DDOUBL                  SCALE UP BY 8 FOR THIS PHASE.
0969   REF   5  LAST  879   25,3425  6 1655 0          AD      FX + 3           RDOTREF
0970                        25,3426  0 0006 1          EXTEND
0971   REF   6  LAST  879   25,3427  7 1656 1          MP      FX + 4           F2
0972   REF   7  LAST  879   25,3430  6 1654 1          AD      FX +2           RTOGO
0973   REF 281  LAST  879   25,3431  20 155 1          DAS     MPAC            ADD F2(DADVI-DADVR)
0974   REF 282  LAST  879   25,3432  3 0154 1          CA      MPAC
0975   REF   2  LAST  123   25,3433  55'760 0          TS      PREDANG
AC976                                                                        L/D = LOD +(THETA- PREDANG)/ Y
0977   REF 212  LAST  871   25,3434  0 6006 1          TC      INTPRET

0978                        25,3435   45242 1          SR3     DSU
0979   REF   8  LAST  868   25,3436   03702 1                  THETAH
0980                        25,3437   43014 0          BON     BOFF
0981   REF   2  LAST  861   25,3440   03305 1                  GONEPAST
0982   REF   1               25,3441   53466 0                  GONEGLAD
0983   REF   4  LAST  857   25,3442   03747 0                  GONEBY
0984   REF   1               25,3443   53451 1                  HAVDNRNG
0985                        25,3444   43145 0          DLOAD   SET             SET GONEPAST IF GONEBY SET & LATCH IN -
0986   REF   1               25,3445   13770 0                  MAXRNG          DISPLAY = 9999.9 IF GONEBY          PLACE
0987   REF   3  LAST  879   25,3446   03065 1                  GONEPAST
0988   REF   3  LAST  293   25,3447   37716 0          STCALL  DNRNGERR
0989   REF   2  LAST  879   25,3450   53466 0                  GONEGLAD

0990   REF   4  LAST  879   25,3451   03716 1 HAVDNRNG STORE   DNRNGERR       = (PREDANG - THETA) /360
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```
0991                        25,3452  77676 0          DCOMP                    FALL SHORT IF NEG, OVERSHOOT IF POS
0993                        25,3453  56204 1          BOVB     DDV
0994  REF   7  LAST  875    25,3454  57544 0                   TCDANZIG        CLEAR OVFIND IF ON.
0995  REF   8  LAST  879    25,3455  03653 1                   FX              FX= DRANGE/D L/D = Y
0996                        25,3456  40061 1          SL       BOV
0997                        25,3457  20206 1                   5
0998  REF   3  LAST  874    25,3460  53470 1                   GOMAXL/D
0999                        25,3461  40015 1          DAD      BOV
1000  REF   3  LAST  852    25,3462  03626 0                   LOD
1001  REF   4  LAST  880    25,3463  53470 1                   GOMAXL/D
1002  REF   8  LAST  874    25,3464  37634 1          STCALL   L/D
1003  REF   1                25,3465  53474 0                   GLIMITER        (GO TO)

R1004 GONEGLAD AND GOPOSMAX ENTRY POINTS FOR GLIMITER ...

1005                        25,3466  77745 1  GONEGLAD DLOAD                   SET L/D = -LAD
1006  REF   3  LAST  879    25,3467  13467 0                   GONEGLAD        (ANY NEGATIVE NUMBER WILL DO)

1007                        25,3470  41234 1  GOMAXL/D RTB     DMP             L/D = LAD SIGN(MPAC)
1008  REF  14  LAST  853    25,3471  45761 0                   SIGNMPAC
1009  REF  14  LAST  876    25,3472  03624 1                   LAD
1010  REF   9  LAST  880    25,3473  03634 0          STORE    L/D             AND FALL INTO GLIMITER SECTION

1011                        25,3474  45345 1  GLIMITER DLOAD   DSU             IF GMAX/2-D POS, GO TO LIMITL/D
1012  REF   1                25,3475  15162 0                   GMAX/2
1013  REF  23  LAST  879    25,3476  03640 0                   D
1014                        25,3477  43244 1          BPL      DAD             IF GMAX  -D NEG, GO TO GOPOSLAD
1015  REF   7  LAST  874    25,3500  53524 1                   LIMITL/D
1016  REF   2  LAST  880    25,3501  15162 0                   GMAX/2
1017                        25,3502  41240 1          BMN      DMP
1018  REF   1                25,3503  53521 1                   GOPOSLAD
1019  REF   2  LAST  875    25,3504  15264 0                   2HS
1020                        25,3505  41325 0          PDDL     DMP             2HS(GMAX-D) INTO PD
1021  REF   7  LAST  875    25,3506  03654 0                   LEQ
1022  REF   1                25,3507  15334 1                   1/GMAX
1023                        25,3510  41215 1          DAD      DMP
1024  REF  15  LAST  880    25,3511  03624 1                   LAD
1025                        25,3512  56325 0          PDDL     DDV             2HS(GMAX-D) (LEQ/GMAX+LAD) INTO PD
1026  REF   1                25,3513  15266 1                   2HSGMXSQ
1027  REF   5  LAST  876    25,3514  03622 1                   VSQUARE
1028                        25,3515  75415 0          DAD      SQRT            XLIM = SQRT(PD+(2HSGMAX/V)SQ)
1029                        25,3516  51015 1          DAD      BPL             IF RDOT+XLIM POS, GO TO LIMITL/D
1030  REF  19  LAST  879    25,3517  03700 0                   RDOT
1031  REF   8  LAST  880    25,3520  53524 1                   LIMITL/D

1032                        25,3521  77745 1  GOPOSLAD DLOAD
1033  REF  16  LAST  880    25,3522  03624 1                   LAD
1034  REF  10  LAST  880    25,3523  03634 0  STOREL/D STORE   L/D
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```
1035                                25,3524  77745 1  LIMITL/D DLOAD
1036  REF  11 LAST 880              25,3525  03634 0           L/D
1037  REF   3 LAST 187              25,3526  17636 1           STODL  L/D1
1038  REF   6 LAST 880              25,3527  03622 1           VSQUARE

1039                                25,3530  77614 1           BON                NO LATERAL CONTROL IF PAST TARGET
1040  REF   4 LAST 879              25,3531  03305 1           GONEPAST
1041  REF   1                       25,3532  53564 0           L355
1042                                25,3533  43205 1           DMP    DAD         Y= KLAT VSQUARE + LATBIAS
1043  REF   3 LAST 852              25,3534  03632 0           KLAT
1044  REF   1                       25,3535  15244 1           LATBIAS            Y INTO PD
1045                                25,3536  51525 1  L350     PDDL   ABS         IF ABS(L/D)-L/DCMINR NEG, GO TO L353
1046  REF  12 LAST 881              25,3537  03634 0           L/D
1047                                25,3540  50025 0           DSU    BMN
1048  REF   3 LAST 852              25,3541  03630 1           L/DCMINR
1049  REF   1                       25,3542  53551 0           L353
1050                                25,3543  75345 1           DLOAD  SIGN        IF K2ROLL LATANG NEG, GO TO L357
1051  REF   7 LAST 857              25,3544  03676 0           LATANG
1052  REF   3 LAST 853              25,3545  03644 1           K2ROLL
1053                                25,3546  71240 1           BMN    DLOAD
1054  REF   1                       25,3547  53627 1           L357
1055                                25,3550  41542 1           SR1    PUSH        Y = Y/2
1056                                25,3551  75345 1  L353     DLOAD  SIGN        IF LATANG SIGN(K2ROLL)-Y POS, SWITCH
1057  REF   8 LAST 881              25,3552  03676 0           LATANG
1058  REF   4 LAST 881              25,3553  03644 1           K2ROLL
1059                                25,3554  77625 0           DSU
1060                                25,3555  71240 1           BMN    DLOAD
1061  REF   2 LAST 881              25,3556  53564 0           L355
1062  REF   5 LAST 881              25,3557  03644 1           K2ROLL
1063                                25,3560  57414 1           BONCLR DCOMP       IF NOSWITCH =1, K2ROLL= K2ROLL
10631 REF   2 LAST 872              25,3561  03210 1           NOSWITCH
10632 REF   3 LAST 881              25,3562  53564 0           L355
1064  REF   6 LAST 881              25,3563  03644 1           STORE  K2ROLL      K2ROLL = - K2ROLL

1065                                25,3564  56345 0  L355     DLOAD  DDV         ROLLC = ACOS(  (L/D1) / LAD)
1066  REF   4 LAST 881              25,3565  03636 1           L/D1
1067  REF  17 LAST 880              25,3566  03624 1           LAD                MPAC SET TO +-1 IF OVERFLOW***
1068                                25,3567  65542 1           SR1    ACOS
1069                                25,3570  43165 1           SIGN   CLEAR
1070  REF   7 LAST 881              25,3571  03644 1           K2ROLL
10701 REF   3 LAST 881              25,3572  03270 1           NOSWITCH
1071  REF  13 LAST 877              25,3573  03316 0           STORE  ROLLC

1072                                25,3574  77776 1  ENDEXIT  EXIT

1073  REF   1                       25,3575  3 4754 0 OVERNOUT CAF    ENDSPBIT   ENTRYDSP = 92D BIT13
1074  REF   7 LAST 852              25,3576  7 0102 0          MASK   CM/FLAGS
1075                                25,3577  0 0006 1          EXTEND
1076  REF   1                       25,3600  1 3604 1          BZF    NODISKY     OMIT DISPLAY.
```

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```
1077  REF   6  LAST  804   25,3601  3 1122 1            CA     ENTRYVN    ALL ENTRY DISPLAYS ARE DONE HERE.
1078  REF 207  LAST  834   25,3602  0 4636 0            TC     BANKCALL
1079  REF   1                25,3603   20724 1          CADR   REGODSPR    NO ABORT IF DISKY IN USE

1080                         25,3604  0 0004 0  NODISKY  INHINT
1081  REF   5  LAST  521   25,3605  10 067 1            CCS    NEWJOB     PROTECT READACCS GRP 5, IF SIDETRACKED.
1082  REF   3  LAST  521   25,3606  0 5152 1            TC     CHANG1
1083  REF  49  LAST  834   25,3607  0 4655 0  SERVNOUT  TC     POSTJUMP   ( COME HERE FROM P67.3)
1084  REF   4  LAST  809   25,3610   77143 1            CADR   SERVEXIT   AND END AVERAGEG JOB VIA  ENDOFJOB.
```

```
P1085           DISPLAY WHEN V IS LESS THAN VQUIT.

 1086                                25,3611   77776 1  STEEROFF EXIT
 1087   REF  15  LAST  878           25,3612   0 4606 0           TC     E7SETTER

 1089   REF  10  LAST  869           25,3613   3 5055 1           CA     PRIO16      2 LESS THAN NTRYPRIO.
 1090   REF  18  LAST  826           25,3614   0 5121 0           TC     NOVAC
 1091   REF  22  LAST  838           E6,1661                      EBANK= ADG         ANY EB HERE
 1092   REF   3  LAST  804           25,3615    02511 0           2CADR  P67.1       START UP REMAINDER OF P67
 1092                                25,3616    54066 0
A1093                                                                  RTOGO        LAT          LONG
A1094                                                                  XXXX.X NM    XXX.XX DEG   XXX.XX DEG

 1095   REF  34  LAST  834           25,3617   0 5362 0           TC     2PHSCHNG    INHINT/RELINT DONE.
 1096                                25,3620    00414 0           OCT    00414       4.41 RESTART FOR P67.1 DISPLAY JOB.
 1097                                25,3621    10035 0           OCT    10035       SERVICER 5.3 RESTART.

10972   REF   1                     01,2201              4P41SPT1 =      4.41SPOT
10974   REF  17  LAST  855           01,2250              5P3SPT15 =      5.3SPOT
 1098   REF   1                     25,3622   3 3626 0           CA     P67.2CAD    HEREAFTER, DO LAT, LONG.
 1099   REF  14  LAST  878           25,3623   55'645 0           TS     GOTOADDR

 1100   REF 213  LAST  879           25,3624   0 6006 1           TC     INTPRET
 1101                                25,3625    77650 1           GOTO
 1102   REF   1                     25,3626    54532 1  P67.2CAD         P67.2       CONTINUE FOR LAT, LONG THIS TIME.

 1103                                25,3627    75345 1  L357      DLOAD  SIGN        L/D = L/DCMINR SIGN(L/D)
 1104   REF   4  LAST  881           25,3630    03630 1                    L/DCMINR
 1105   REF  13  LAST  881           25,3631    03634 0                    L/D
 1106   REF   5  LAST  881           25,3632    37636 0           STCALL   L/D1
 1107   REF   4  LAST  881           25,3633    53564 0                    L355        (GO TO )
```

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P1108 TABLE USED FOR SUB-ORBITAL REFERENCE TRAJECTORY CONTROL.

1109	25,3634	00474 0	VREFER	DEC	.019288		REFERENCE VELOCITY SCALED V/51532.3946
1110	25,3635	01235 1		DEC	.040809		13 POINTS ARE STORED AS THE INDEPENDENT
1111	25,3636	02337 1		DEC	.076107		VARIABLE AND THEN SIX 13 POINT FUNCTIONS
1112	25,3637	03721 0		DEC	.122156		OF V ARE STORED CONSECUTIVELY
1113	25,3640	05230 0		DEC	.165546		
1114	25,3641	06213 1		DEC	.196012		
1115	25,3642	10550 0		DEC	.271945		
1116	25,3643	11717 0		DEC	.309533		
1117	25,3644	13314 0		DEC	.356222		
1118	25,3645	14736 0		DEC	.404192		
1119	25,3646	16255 1		DEC	.448067		
1120	25,3647	16457 0		DEC	.456023		
1121	25,3650	25570 1		DEC	.67918		HIGH VELOCITY FOR SAFETY
1122	25,3651	77526 0		DEC	-.010337		DRANGE/DA SCALED DRDA/(2700/805)
1123	25,3652	77360 1		DEC	-.016550		
1124	25,3653	77106 0		DEC	-.026935		
1125	25,3654	76516 1		DEC	-.042039		
1126	25,3655	76071 0		DEC	-.058974		
1127	25,3656	75570 1		DEC	-.070721		
1128	25,3657	74661 0		DEC	-.098538		
1129	25,3660	70657 1		DEC	-.223611		
1130	25,3661	66352 0		DEC	-.298148		
1131	25,3662	66352 0		DEC	-.298148		
1132	25,3663	54557 1		DEC	-.602557		
1133	25,3664	40000 0		DEC	-.99999		
1134	25,3665	40000 0		DEC	-.99999		
1135	25,3666	77635 1		DEC	-.0478599	B-3	-DRANGE/DRDOT
1136	25,3667	77563 1		DEC	-.0683663	B-3	SCALED((2VS/8 2700) DR/DRDOT)
1137	25,3670	77354 0		DEC	-.1343468	B-3	
1138	25,3671	76712 1		DEC	-.2759846	B-3	
1139	25,3672	76066 0		DEC	-.4731437	B-3	
1140	25,3673	75322 0		DEC	-.6472087	B-3	
1141	25,3674	73237 0		DEC	-1.171693	B-3	
1142	25,3675	72104 1		DEC	-1.466382	B-3	
1143	25,3676	70301 1		DEC	-1.905171	B-3	
1144	25,3677	65635 1		DEC	-2.547990	B-3	
1145	25,3700	57311 0		DEC	-4.151220	B-3	
1146	25,3701	50575 0		DEC	-5.813617	B-3	
1147	25,3702	50575 0		DEC	-5.813617	B-3	

P1148

1149	25,3703	74443 1	DEC	-.0134001	B3	RDOTREF	SCALED (8 RDT/2VS)
1150	25,3704	74333 1	DEC	-.013947	B3		
1151	25,3705	74433 0	DEC	-.013462	B3		
1152	25,3706	74763 0	DEC	-.011813	B3		
1153	25,3707	75432 0	DEC	-.0095631	B3		
1154	25,3710	75735 1	DEC	-.00806946	B3		
1155	25,3711	76200 1	DEC	-.006828	B3		
1156	25,3712	75735 1	DEC	-.00806946	B3		
1157	25,3713	75140 0	DEC	-.0109791	B3		
1158	25,3714	74075 0	DEC	-.0151496	B3		
1159	25,3715	73312 0	DEC	-.0179817	B3		
1160	25,3716	73732 0	DEC	-.0159061	B3		
1161	25,3717	73732 0	DEC	-.0159061	B3		
1162	25,3720	00026 0	DEC	.00137037		3.7	RTOGO SCALED RTOGO/2700
1163	25,3721	00077 1	DEC	.00385185		10.4	
1164	25,3722	00217 0	DEC	.00874074		23.6	
1165	25,3723	00431 1	DEC	.017148			
1166	25,3724	00712 0	DEC	.027926			
1167	25,3725	01136 1	DEC	.037			
1168	25,3726	02015 1	DEC	.063296			
1169	25,3727	02374 0	DEC	.077889			
1170	25,3730	03123 1	DEC	.098815			
1171	25,3731	04051 1	DEC	.127519			
1172	25,3732	05767 1	DEC	.186963			
1173	25,3733	07476 0	DEC	.238148			
1174	25,3734	11324 1	DEC	.294185185			
1175	25,3735	76272 1	DEC	-.051099		-AREF/805	
1176	25,3736	75472 1	DEC	-.074534			
1177	25,3737	74604 0	DEC	-.101242			
1178	25,3740	74210 1	DEC	-.116646			
1179	25,3741	74052 0	DEC	-.122360			
1180	25,3742	73735 1	DEC	-.127081			
1181	25,3743	73217 1	DEC	-.147453			
1182	25,3744	73013 1	DEC	-.155528			
1183	25,3745	73155 1	DEC	-.149565			
1184	25,3746	74151 1	DEC	-.118509			
1185	25,3747	76703 1	DEC	-.034907			
1186	25,3750	77575 0	DEC	-.007950			
1187	25,3751	77575 0	DEC	-.007950			

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P1188

1189	25,3752	00112 0	DEC	.004491	DRANGE/D L/D SCALED Y/2700
1190	25,3753	00204 1	DEC	.008081	
1191	25,3754	00407 1	DEC	.016030	
1192	25,3755	01113 0	DEC	.035815	
1193	25,3756	02161 0	DEC	.069422	
1194	25,3757	03260 0	DEC	.104519	
1195	25,3760	03717 0	DEC	.122	
1196	25,3761	05411 0	DEC	.172407	
1197	25,3762	10057 1	DEC	.252852	
1198	25,3763	13476 0	DEC	.363148	
1199	25,3764	20324 0	DEC	.512963	
1200	25,3765	21677 1	DEC	.558519	
1201	25,3766	21677 1	DEC	.558519	END OF STORED REFERENCE

L REENTRY CONTROL

P1202 REENTRY CONSTANTS.

R1203 DEFINED BY EQUALS

```
 1204  REF  3 LAST  589      4777            DEC15    =      LOW4
A1205                                        GAMMAL1  =      22D

 12055                    25,3767  16631 1  MAXRNG   2OCT   16631 06755     DNRNGERR = 9999.9 IF GONEPAST=1
 12055                    25,3770  06755 0

 1207  REF  2 LAST  859   26,2000                   SETLOC REENTRY1
 1208                     26,3150                   BANK

 1209  REF  2 LAST  859 TO  861:    41     41*      COUNT* $$/ENTRY

 1210  REF  4 LAST  869   26,3343            BARELY1  =      NEARONE          COMMON TO BOTH DISK,DANCE. DEFND IN TFF
A1211                                        1BITDP                COMMON TO BOTH DISK AND DANCE. DEFND IN VECPOINT.

 1212                     26,3150  02525 1  1/12TH   DEC    .083333          DP 1/12 USES HI WORD IN 1/3 BELOW
 1213                     26,3151  12525 0  1/3RD    2DEC   .3333333333     DP 1/3
 1213                     26,3152  12525 0
 12131 REF  3 LAST  813   34,3770            1/16TH   =      DP2(-4)

R1214

R1215  BELOW:  VS   =   VSAT  = 25766.1973  FT/SEC

R1216          RE   =  21,202,900   FEET

 1217                     26,3153  04631 1  LEWD1    2DEC   .15
 1217                     26,3154  23146 0
 1218                     26,3155  03146 1  POINT1   2DEC   .1
 1218                     26,3156  14632 0
 1220                     26,3157  76314 0  DLEWDO   2DEC   - .05            -.05
 1220                     26,3160  71462 1
 1221                     26,3161  05075 0  GMAX/2   2DEC   .16             8 GS / 2
 1221                     26,3162  16051 1
 1222  REF 24 LAST  814   26,3335            3ZEROS   EQUALS HI6ZEROS
 1223                     26,3163  07777 1  NEAR1/4  2OCT   07777 00000     1/4 LESS 1 BIT IN UPPER PART.
 1223                     26,3164  00000 1
 1224                     26,3165  00236 0  C18      2DEC   .0097026346     500/2VS
 1224                     26,3166  36763 0
 1225                     26,3167  00204 1  Q7FKDMIN 2DEC   .0080745342     6.5/805  (Q7F +KDMIN) = 6 + .5)
 1225                     26,3170  11303 1
 1226  REF  4 LAST  887   34,3770            C1/16    =      DP2(-4)

 1227                     26,3171  05260 0  Q3       2DEC   .167003132      .07 2VS/21600
 1227                     26,3172  05572 1
 1228                     26,3173  12343 0  Q5       2DEC   .326388889      .3 23500/21600
 1228                     26,3174  21616 0
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1229                    26,3175  01073 1  Q6       2DEC   .0349              2 DEG, APPROX 820/23500
1229                    26,3176  31515 1
1230                    26,3177  00172 0  Q7F      2DEC   .0074534161         6/805     (VALUE OF Q7 IN FIXED MEM.)
1230                    26,3200  03571 1
1231  REF  6 LAST 870   26,3333           Q19      =      HALVE              Q19 = .5

1232                    26,3201  05136 0  Q21      2DEC   .1620370370        3500/21600
1232                    26,3202  32046 1
1233                    26,3203  75031 1  Q22      2DEC   -.092222222        -1992/21600
1233                    26,3204  40775 0
1234                    26,3205  13132 0  VLMIN    2DEC   .34929485          18000/2 VS
1234                    26,3206  33062 0
1235  REF  2 LAST 856   26,3325           VMIN     =      FOURTH             (VS/2) / 2VS
1236                    26,3207  00160 0  C12      2DEC   .00684572901       32 28500/(21202900 2 PI)
1236                    26,3210  05104 1
1237                    26,3211  14631 0  1/KB1    2DEC   .4                 1/ 2.5
1237                    26,3212  23146 0
1238                    26,3213  74015 0  -1/KB2   2DEC   -.0077621078 84    -1/( .0025  2 VS) EXP +4
1238                    26,3214  46560 0
1239                    26,3215  00475 1  VQUIT    2DEC   .019405269         1000 /2VS
1239                    26,3216  35746 1
1240                    26,3217  10262 0  C20      2DEC   .26086957          210/805  90 DEG MAX ROLL IF ABOVE C20
1240                    26,3220  02622 0
12405                   26,3221  05441 0  C21      2DEC   .17391304          140/805
12405                   26,3222  14412 0
1241                    26,3223  00022 1  25NM     2DEC   .0011574074        25/21600          (25 NAUT MILES)
1241                    26,3224  36641 1
1242                    26,3225  01003 0  K1D      2DEC   .0314453125        =C16 805/256 = .01 805/256
1242                    26,3226  06315 0
1243                    26,3227  63073 0  K2D      2DEC   -.02596836         -C17 2VS/256  = -.002 2VS/256
1243                    26,3230  73236 1
1244                    26,3231  32047 0  KVSCALE  2DEC   .81491944           12800/(2 VS .3048)
1244                    26,3232  24367 0
1245                    26,3233  37200 1  KASCALE  2DEC   .97657358           5.85 16384/(4 .3048 100 805)
1245                    26,3234  05636 1
1246                    26,3235  00046 0  KTETA    2DEC*  .383495203 E2 B-14*        1000 2PI/16384(163.84)
1246                    26,3236  13137 0
1247                    26,3237  00017 1  KT1      2DEC*  .157788327 E 2 B-14*     RE(2PI)/2 VS(16384) 163.84
1247                    26,3240  30730 0
1248                    26,3241  00040 0  .05G     2DEC   .002                .05/25
1248                    26,3242  30447 0
1249                    26,3243  00000 1  LATBIAS  2DEC   .00003              APPRX .5 NM/ 4(21600/2 PI)
1249                    26,3244  17565 1
1250                    26,3245  01727 1  KWE      2DEC   .120056652 B-1
1250                    26,3246  20103 1
1251                    26,3247  00121 0  KACOS    2DEC   .004973592          1/32(2PI)
1251                    26,3250  17460 0
1252                    26,3251  00400 0  CHOOK    2DEC   1 B-6              .25/16
1252                    26,3252  00000 1
1253                    26,3253  01252 0  1/24TH   2DEC   .0833333333 B-1
1253                    26,3254  25253 1
```

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1254                        26,3255  24365 1  CH1      2DEC   .32 81          16 CH1/25 = 16 (1) /25
1254                        26,3256  30244 0
1255                        26,3257  77152 1  KC3      2DEC   -.0247622232     -(4 VS VS/ 2 PI 805 RE)
1255                        26,3260  51354 1
1256                        26,3261  00336 1  VRCONT   2DEC   .0135836886      700/2 VSAT
1256                        26,3262  21610 0
1257  REF  10 LAST 819      26,3333           HALVE    EQUALS HIDPHALF
1258  REF   2 LAST 820      26,3325           FOURTH   EQUALS HIDP1/4

1259  REF   7 LAST 888      26,3333           1/GMAX   EQUALS HALVE           4/GMAX = 4 / 8
1260                        26,3263  00433 0  2HS      2DEC   .0172786611      2 28500 25 32.2/(4 VS VS)
1260                        26,3264  02775 0
1261                        26,3265  00000 1  2HSGMXSQ 2DEC   .0000305717      (2 28500 8 32.2/ 4 VS VS)SQ
1261                        26,3266  20017 0
1262                        26,3267  77765 0  C001     2DEC   -.000625         -(4/25)/256    LEQ/DO CONST
1262                        26,3270  70243 0
1263                        26,3271  31463 1  POINT8   2DEC   .8
1263                        26,3272  06315 0
1264                        26,3273  00541 1  2C1HS    2DEC   .0215983264      2 1.25 28500 805/(2 VS)SQ
1264                        26,3274  33575 0
1265                        26,3275  00146 1  PT1/16   2DEC   .1 B-4
1265                        26,3276  14632 0
1266                        26,3277  00052 0  1/K44    2DEC   .00260929464     2 VS/19749550
1266                        26,3300  30013 0
1267                        26,3301  20411 1  VFINAL   2DEC   .51618016        26600/2 VS
1267                        26,3302  03041 1
1268                        26,3303  20610 1  VFINAL1  2DEC   .523942273       = 27000 / 2 VS
1268                        26,3304  10513 1
1269                        26,3305  11473 1  1/KA1    2DEC   .30048077        25/(1.3 64)
1269                        26,3306  02355 0
1270                        26,3307  00203 0  KA2      2DEC   .008             .2 / 25
1270                        26,3310  02234 0
1271                        26,3311  16237 0  KA3      2DEC   .44720497        = 90  4/805
1271                        26,3312  00146 1
1272                        26,3313  01456 1  KA4      2DEC    049689441       40/805
1272                        26,3314  03450 0
12725                       26,3315  01727 1  KALIM    2DEC   .06              1.5/25
12725                       26,3316  01217 1
1273  REF   5 LAST 887      26,3343           Q7MIN    =      NEARONE          805/805      (DISABLE FACTOR CALC)
1274                        26,3317  56232 1  -HSCALED 2DEC   -.55305018       -28500/2 VS
1274                        26,3320  72332 0
1275                        26,3321  77000 1  -KSCALE  2DEC   -.0312424837     -805/VS
1275                        26,3322  43741 1
1276                        26,3323  36702 1  COS15    2DEC   .965
1276                        26,3324  21727 0
1277  REF   1               26,3150           LATSLOPE EQUALS 1/12TH
R1278       ... END OF RE-ENTRY CONSTANTS ...
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L CM BODY ATTITUDE USER'S PAGE NO. 1 EO S3

```
P0001

 0011   REF   1              37,2000                    SETLOC BODYATT
 0012                        37,3404                    BANK

 0013   REF   1                                         COUNT* $$/CMBAT
A0014                                                  PDL 12D - 15D SAFE.

R0015     VALUES OF GIMBAL AND BODY ANGLES VALID AT PIP TIME ARE SAVED DURING    READACCS.

 0017   REF  10  LAST  856   E7,1451                    EBANK= RTINIT          LET INTERPRETER SET EB

 0018   REF 214  LAST  883   37,3404  0 6006 1 CM/POSE  TC     INTPRET      COME HERE VIA AVEGEXIT.

 0019                        37,3405  77201 1           SETPD  VLOAD
 0020                        37,3406  00001 0                  0
 0021   REF  16  LAST  856   37,3407  01036 0                  VN           KVSCALE = (12800/ .3048) /2VS
 0022                        37,3410  63361 0           VXSC   PDVL
 0023   REF   1              37,3411  37700 1                  -KVSCALE     KVSCALE = .81491944
 0024   REF  10  LAST  840   37,3412  01712 1                  UNITW        FULL UNIT VECTOR
 0025                        37,3413  74235 0           VXV    VXSC         VREL = V - WE*R
 0026   REF  11  LAST  857   37,3414  01756 1                  UNITR
 0027   REF   1              37,3415  15246 0                  KWE
 0028                        37,3416  45455 1           VAD    STADR
 0029   REF   3  LAST  856   37,3417  74251 1           STORE  -VREL        SAVE FOR ENTRY GUIDANCE.  REF COORDS

 0030                        37,3420  72056 1           UNIT   LXA,1
 0031                        37,3421  00044 1                  36D          ABVAL( -VREL) TO X1
 0032   REF   6  LAST  858   37,3422  03542 1           STORE  UXA/2        -UVREL                    REF COORDS

 0033                        37,3423  57435 1           VXV    VCOMP
 0034   REF  12  LAST  890   37,3424  01756 1                  UNITR        .5 UNIT                   REF COORDS
 0035                        37,3425  66256 0           UNIT   SSP          THE FOLLOWING IS TO PROVIDE A STABLE
 0036   REF  80  LAST  791   37,3426  00051 0                  S1           ON FOR THE END OF THE TERMINAL PHASE.
 0037                        37,3427  00476 1 SPVQUIT   DEC    .019405      1000/ 2 VS
 0038                        37,3430  77300 1           TIX,1  VLOAD        IF V-VQUIT POS, BRANCH.
 0039   REF   1              37,3431  77433 0                  CM/POSE2     SAVE UYA IN OLDUYA
 0040   REF   2  LAST  122   37,3432  03534 0                  OLDUYA       OTHERWISE CONTINUE TO USE OLDUYA.
 0041   REF   3  LAST  822   37,3433  03550 1 CM/POSE2  STORE  UYA/2                              REF COORDS

 0042   REF   3  LAST  890   37,3434  03534 0           STORE  OLDUYA       RESTORE, OR SAVE AS CASE MAY BE.

 0043                        37,3435  57435 1           VXV    VCOMP
 0044   REF   7  LAST  890   37,3436  03542 1                  UXA/2        FINISH OBTAINING TRAJECTORY TRIAD.
 0045                        37,3437  77772 0           VSL1
 0046   REF   3  LAST  822   37,3440  03556 1           STORE  UZA/2                              REF COORDS

 0047                        37,3441  77751 1           TLOAD                PICK UP CDUX, CDUY, CDUZ CORRESPONDING
 0048   REF   3  LAST  828   37,3442  03270 1                  AOG/PIP      TO PIPUP TIME IN 2S,C  AND SAVE.
 0049                        37,3443  14031 0 CM/TRIO   STODL  240
```

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```
0050                          37,3444  00032 0                 25D             AIG/PIP

0051                          37,3445  41434 1        RTB      PUSH            TO PDL0
0052  REF   6  LAST  453      37,3446  51754 0                 CDULOGIC
0053                          37,3447  77746 1        COS
0054  REF   2  LAST  122      37,3450  17564 0        STODL    UBX/2           CI /2
A0055                                                                         AIG/PIP FROM PDL 0
0056                          37,3451  57556 0        SIN      DCOMP
0057  REF   3  LAST  891      37,3452  17570 0        STODL    UBX/2 +4        -SI /2
0058                          37,3453  00033 1                 26D             AMG/PIP
0059                          37,3454  41434 1        RTB      PUSH            TO PDL 0
0060  REF   7  LAST  891      37,3455  51754 0                 CDULOGIC
0061                          37,3456  65356 1        SIN      PDDL            XCH PDL 0. SAVE SM /2
0062                          37,3457  65346 0        COS      PDDL            CM /2 TO PDL 2
0063                          37,3460  00001 0                 0               SM /2
0064                          37,3461  74276 1        DCOMP    VXSC
0065  REF   4  LAST  891      37,3462  03564 0                 UBX/2
0066                          37,3463  77772 0        VSL1                     NOISE WONT OVFL.
0067  REF   2  LAST  122      37,3464  17572 1        STODL    UBY/2           =(-SMCI, NOISE, SMSI) /2
0068                          37,3465  00003 1                 2               CM /2  REPLACES NOISE
0069  REF   3  LAST  891      37,3466  17574 1        STODL    UBY/2 +2        UBY/2=(-SMCI, CM, SMSI)/2
0070                          37,3467  00031 0                 24D             AOG/PIP
0071                          37,3470  41434 1        RTB      PUSH            TO PDL 4
0072  REF   8  LAST  891      37,3471  51754 0                 CDULOGIC
0073                          37,3472  65356 1        SIN      PDDL            XCH PDL 4. SAVE SO /2
0074                          37,3473  74346 0        COS      VXSC            CO /2
0075  REF   4  LAST  891      37,3474  03572 1                 UBY/2
0076  REF   5  LAST  891      37,3475  17572 1        STODL    UBY/2           UBY/2=(-COSMCI, COCM, COSMSI)/4
0077                          37,3476  00005 1                 4D              SO /2
0078                          37,3477  57405 1        DMP      DCOMP
0079  REF   5  LAST  891      37,3500  03570 0                 UBX/2 +4        -SI /2
0080                          37,3501  77615 0        DAD
0081  REF   6  LAST  891      37,3502  03572 1                 UBY/2            INCREMENT BY (SOSI /4)
0082  REF   7  LAST  891      37,3503  17572 1        STODL    UBY/2
A0083                                                                         SO /2 FROM PDL 4
0084                          37,3504  43205 1        DMP      DAD
0085  REF   6  LAST  891      37,3505  03564 0                 UBX/2           CI /2
0086  REF   8  LAST  891      37,3506  03576 0                 UBY/2 +4
0087  REF   9  LAST  891      37,3507  27576 0        STOVL    UBY/2 +4        YB/4                    PLATFORM COORDS

A0088                                                                  YB = (-COSMCI + SOSI , COCM , COSMSI + SOCI )

0089  REF  10  LAST  891      37,3510  03572 1                 UBY/2
0090                          37,3511  72505 1        VXM      VSL2
0091  REF  46  LAST  841      37,3512  01734 0                 REFSMMAT        .5 UNIT
0092  REF  11  LAST  891      37,3513  17572 1        STODL    UBY/2           YB/2  DONE                REF COORDS

A0093                                                                         CM /2 FROM PDL 2
0094                          37,3514  76561 1        VXSC     VSL1
0095  REF   7  LAST  891      37,3515  03564 0                 UBX/2
```

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```
0096  REF   8  LAST  891   37,3516  17564 0    STODL  UBX/2          =( CMCI, NOISE, -CMSI)/2
0097                       37,3517  77626 0    STADR                 SM /2 FROM PDL 0
0098  REF   9  LAST  892   37,3520  50211 0    STOVL  UBX/2 +2       SM /2 REPLACES NOISE
0099  REF  10  LAST  892   37,3521  03564 0           UBX/2          XB/2                    PLATFORM COORDS

AC100                                                 XB = ( CMCI , SM , -CMSI )

C101                       37,3522  76505 0    VXM    VSL1
0102  REF  47  LAST  891   37,3523  01734 0           REFSMMAT       .5 UNIT
0103  REF  11  LAST  892   37,3524  03564 0    STORE  UBX/2          XB/2  DONE              REF COORDS

0104                       37,3525  76435 1    VXV    VSL1
0105  REF  12  LAST  891   37,3526  03572 1           UBY/2
0106  REF   2  LAST  122   37,3527  27600 1    STOVL  UBZ/2          ZB/2  DONE              REF COORDS

AC107                                                 EQUIVALENT TO
AC108                                                 ZB = ( SOSMCI + COSI , -SOCM , -SOSMSI + COCI)

0109  REF   8  LAST  890   37,3530  03542 1           UXA/2          -UVREL/2 = -UVA/2
0110                       37,3531  53435 0    VXV    UNIT           GET UNIT(-UVREL*UBY)/2  = UL/2
0111  REF  13  LAST  892   37,3532  03572 1           UBY/2          YB/2
0112                       37,3533  50206 0    PUSH   DOT            UL/2  TO PDL 0,5
0113  REF   4  LAST  890   37,3534  03556 1           UZA/2          UNA/2
0114  REF   5  LAST  606   37,3535  24021 1    STOVL  COSTH          COS(ROLL)/4
0115                       37,3536  00001 0           0              UL/2

0116                       37,3537  77641 1    DOT
0117  REF   4  LAST  890   37,3540  03550 1           UYA/2
0118  REF   5  LAST  607   37,3541  34023 1    STCALL SINTH          -SIN(ROLL)/4
0119  REF   5  LAST  607   37,3542  47311 1           ARCTRIG
0120                       37,3543  24007 0    STOVL  6D             -(ROLL/180) /2
0121  REF  14  LAST  892   37,3544  03572 1           UBY/2
0122                       37,3545  72441 0    DOT    SL1            -UVA.UBY = -SIN(BETA)
0123  REF   9  LAST  892   37,3546  03542 1           UXA/2          -UVREL/2
0124                       37,3547  77736 0    ARCSIN
0125                       37,3550  24010 0    STOVL  7D             -(BETA/180) /2
0126  REF  12  LAST  892   37,3551  03564 0           UBX/2          XB/2
0127                       37,3552  77641 1    DOT                   UL.UBX = -SIN(ALFA)
0128                       37,3553  00001 0           0              UL/2
0129  REF   6  LAST  892   37,3554  24023 0    STOVL  SINTH          -SIN(ALFA)/4
0130                       37,3555  77641 1    DOT                   UL/2 FROM PDL 0
0131  REF   3  LAST  892   37,3556  03600 1           UBZ/2
0132  REF   6  LAST  892   37,3557  34021 0    STCALL COSTH          COS(ALFA)/4
0133  REF   6  LAST  892   37,3560  47311 1           ARCTRIG
0134                       37,3561  24011 1    STOVL  8D             -(ALFA/180) /2
0135  REF  13  LAST  890   37,3562  01756 1           UNITR          UR/2                    REF COORDS
0136                       37,3563  72441 0    DOT    SL1
0137  REF   5  LAST  892   37,3564  03556 1           UZA/2          MORE ACCURATE AT LARGE ARG.
0138                       37,3565  77726 1    ARCCOS
0139                       37,3566  00013 0    STORE  10D            (-GAMA/180)/2
```

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```
 0140                  37,3567   77551 0          TLOAD  EXIT          ANGLES IN MPAC IN THE ORDER
A0141                                                                  -( (ROLL, BETA, ALFA) /180)/2
 0142                  37,3570   00007 0                  6D          THESE VALUES CORRECT AT PIPUP TIME.
R0143  SPACER
```

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PC144 BASIC SUBROUTINE TO UPDATE ATTITUDE ANGLES

```
 C145   REF  23  LAST  883   E6,1661                          EBANK= AOG

 C146   REF  12  LAST  710   37,3571  0 4611 0   CM/ATUP     TC     E6SETTER

 C148   REF  15  LAST  787   37,3572  50 120 1   CMTR1       INDEX  FIXLOC
 C149                        37,3573  4 0012 0               CS     TOD          (GAMA/180)/2
 C150   REF   2  LAST  116   37,3574  57'722 1               XCH    GAMA
 C151   REF  81  LAST  829   37,3575  54 001 1               TS     L

 C152                        37,3576  0 0004 0               INHINT
AC153                                                                MUST REMAIN INHINTED UNTIL UPDATE OF BODY
AC154                                                                ANGLES, SO THAT GAMDIFSW IS VALID FIRST PASS
AC155                                                                INDICATOR.

 C156   REF   8  LAST  881   37,3577  4 0102 0               CS     CM/FLAGS
 C157   REF   1              37,3600  7 4756 0               MASK   GMDIFBIT     GAMDIFSW = 94D BIT11 INITLY=
 C158                        37,3601  0 0006 1               EXTEND               DONT CALC GAMA DOT UNTIL HAVE FORMD
AC159                                                                ONE DIFFERENCE.
 C160   REF   1              37,3602  1 3605 0               BZF    DOGAMDOT     IS OK, GO ON.
 C161   REF   9  LAST  894   37,3603  26 102 0               ADS    CM/FLAGS     KNOW BIT IS 0
 C162   REF   1              37,3604  0 3620 0               TC     NOGAMDOT     SET GAMDOT = 0

 C163   REF  82  LAST  894   37,3605  4 0001 1   DOGAMDOT    CS     L
 C164   REF   3  LAST  894   37,3606  6 1722 1               AD     GAMA         DEL GAMA/360= T GAMDOT/360
 C165                        37,3607  0 0006 1               EXTEND
 C166   REF   1              37,3610  7 3701 0               MP     TCDU         TCDU = .1 SEC,   T = 2 SEC
 C167   REF   2  LAST  116   37,3611  55'723 1               TS     GAMDOT       GAMA DOT TCDU / 180

 C168                        37,3612  0 0006 1               EXTEND               IGNORE GAMDOT IF LEQ   5 DEG/SEC
 C169                        37,3613  6 3615 0               BZMF   +2
 C170                        37,3614  4 0000 0               COM
 C171   REF  21  LAST  878   37,3615  6 4773 0               AD     FIVE
 C172                        37,3616  0 0006 1               EXTEND
 C173                        37,3617  6 3622 1               BZMF   +3           SET GAMDOT=+  AS TAG IF TOO SMALL.

 C174   REF 146  LAST  839   37,3620  3 4772 1   NOGAMDOT    CA     ZERO         COME HERE INHINTED.
 C175   REF   3  LAST  894   37,3621  55'723 1               TS     GAMDOT
AC176                                                                FOR NOW LEAVE IN 2S,C
AC177                                                                UPDATE ANGLES BY CORRECTING EUILER ANG
AC178                                                                FOR ACCRUED INCREMENT SINCE PIPUP
AC179                                                                R = R EUIL + R(NOW) -R(PIPUP)
 C180   REF 283  LAST  879   37,3622  4 0154 0               CS     MPAC         GET (R EUL/180) /2
 C181                        37,3623  6 0000 1               DOUBLE               POSSIBLE OVERFLOW
 C182   REF   1              37,3624  0 3671 1               TC     CORANGOV     CORRECT FOR OVFL IF ANY
 C183                        37,3625  0 0006 1               EXTEND
 C184   REF   3  LAST  828   37,3626  61'672 0               SU     ROLL/PIP     GET INCR SINCE PIPUP
 C185   REF   3  LAST  828   37,3627  6 1664 1               AD     ROLL/180     ONLY SINGLE OVFL POSSIBLE.
 C186   REF   2  LAST  894   37,3630  0 3671 1               TC     CORANGOV     CORRECT FOR OVFL IF ANY
```

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```
0187   REF   2  LAST  119   37,3631  55'770 1          TS      TEMPROLL

0188   REF 284  LAST  894   37,3632  4 0156 1          CS      MPAC +2        GET (ALFA EUL/180) /2
0189                        37,3633  6 0000 1          DOUBLE                 SAME AS FOR ROLL. NEEDED FOR EXT ATM DAP
0190   REF   3  LAST  894   37,3634  0 3671 1          TC      CORANGOV       CORRECT FOR OVFL IF ANY
0191                        37,3635  0 0006 1          EXTEND
0192   REF   2  LAST  115   37,3636  61'673 1          SU      ALFA/PIP
0193   REF   4  LAST  187   37,3637  6 1665 0          AD      ALFA/180
0194   REF   4  LAST  895   37,3640  0 3671 1          TC      CORANGOV       CORRECT FOR OVFL IF ANY
0195   REF   2  LAST  119   37,3641  55'771 0          TS      TEMPALFA

0196   REF 285  LAST  895   37,3642  4 0155 1          CS      MPAC +1        GET (BETA EUL/180) /2
0197                        37,3643  6 0000 1  CMTR2   DOUBLE
0198                        37,3644  0 0006 1          EXTEND
0199   REF   3  LAST  828   37,3645  61'674 0          SU      BETA/PIP
0200   REF   4  LAST  828   37,3646  6 1666 0          AD      BETA/180
0201   REF   2  LAST  119   37,3647  57'772 1          XCH     TEMPBETA       OVFL NOT EXPECTED.

0202   REF   5  LAST  536   37,3650  3 5024 1          CA      EBANK3
0203   REF  24  LAST  786   37,3651  54 003 0          TS      EBANK

0204   REF   1               E3,1446                   EBANK=  PHSNAME5
0205                        37,3652  0 0006 1          EXTEND
0206   REF   1               37,3653  3 3703 0          DCA     REPOSADR       THIS ASSUMES THAT THE   TC   PHASCHNG
0207   REF   2  LAST  895   37,3654  53'447 0          DXCH    PHSNAME5       IS NOT CHANGED IN       OCT  10035
A0208                                                                         SERVICER.

0209   REF  13  LAST  894   37,3655  0 4611 0          TC      E6SETTER

0211   REF  24  LAST  894   E6,1661                   EBANK=  AOG
0212                        37,3656  0 0006 1  REDOPOSE EXTEND                RE-STARTS COME HERE
0213   REF   3  LAST  895   37,3657  3 1771 1          DCA     TEMPROLL
0214   REF   4  LAST  894   37,3660  53'665 1          DXCH    ROLL/180
0215   REF   3  LAST  895   37,3661  3 1772 1          CA      TEMPBETA
0216   REF   5  LAST  895   37,3662  55'666 1          TS      BETA/180

0218   REF 215  LAST  890   37,3663  0 6006 1          TC      INTPRET        CANT TC DANZIG AFTER PHASCHNG.
0219                        37,3664  51575 1  CM/POSE3 VLOAD   ABVAL          RETURN FROM CM/ATUP.  (RESTART)
0220   REF  17  LAST  890   37,3665  01036 0           VN      2(-7)  M/CS
0221   REF  11  LAST  547   37,3666  03723 1           STORE   VMAGI          FOR DISPLAY ON CALL.

0222                        37,3667  77650 1           GOTO
0223   REF   5  LAST  853   37,3670  03324 1                   POSEXIT        ENDEXIT, STARTENT, OR SCALEPOP.

0224   REF  83  LAST  894   37,3671  54 001 1  CORANGOV TS      L
0225   REF 153  LAST  839   37,3672  0 0002 0          TC      Q
0226   REF 189  LAST  879   37,3673  50 000 1          INDEX   A
0227   REF   1               37,3674  3 4751 0          CA      LIMITS
0228   REF  84  LAST  895   37,3675  26 001 1          ADS     L
0229   REF 154  LAST  895   37,3676  0 0002 0          TC      Q              COSTS 2 MCT TO USE.  SEE ANGOVCOR.
```

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```
0230                    37,3677   45730 1  -KVSCALE 2DEC    -.81491944      -12800/(2 VS .3048)
0230                    37,3700   53410 1
0231                    37,3701   03146 1  TCDU     DEC     .1              TCDU = .1 SEC.

0232  REF  25  LAST 895  E6,1661                            EBANK= AOG
0233  REF   1            37,3702   03656 1  REPOSADR 2CADR  REDOPOSE
0233  REF   1            37,3703   76066 0
```

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```
 00012  REF   1                36,2000                 SETLOC RTE1
 00014                         36,2476                 BANK

 0002   REF   3  LAST  292     E7,1631                 EBANK= RTEDVD
 0003   REF   1                                        COUNT* $$/P37
R0050   PROGRAM DESCRIPTION - P37, RETURN TO EARTH

R0051   DESCRIPTION
R0052     A RETURN TO EARTH TRAJECTORY IS COMPUTED PROVIDED THE CSM IS OUTSIDE THE LUNAR SPHERE OF INFLUENCE AT THE
R0054   TIME OF IGNITION. INITIALLY A CONIC TRAJECTORY IS DETERMINED AND RESULTING IGNITION AND REENTRY PARAMETERS ARE
R0056   DISPLAYED TO THE ASTRONAUT. THEN IF THE ASTRONAUT SO DESIRES, A PRECISION TRAJECTORY IS DETERMINED WITH THE
R0058   RESULTING IGNITION AND REENTRY PARAMETERS DISPLAYED. UPON FINAL ACCEPTANCE BY THE ASTRONAUT, THE PROGRAM
R0060   COMPUTES AND STORES THE TARGET PARAMETERS FOR RETURN TO EARTH FOR USE BYSPS PROGRAM (P40) OR RCS PROGRAM (P41).

R0080   CALLING SEQUENCE
R0081     L       TC      P37

R0100   SUBROUTINES CALLED
R0101     PREC100
R0102       V2T100
R0103       RTENCK2
R0104       RTENCK3
R0105       TIMERAD
R0106       PARAM
R0107     V2T100
R0108       GAMDV10
R0109       XT1LIM
R0110       DVCALC
R0111     RTENCK1
R0112       INTSTALL
R0113       INTEGRVS
R0114     RTEVN
R0115       RTEDISP
R0116       TMRAD100
R0117       AUGEKUGL
R0118       LAT-LONG
R0119     TMRAD100
R0120       TIMERAD
R0121     INVC100
R0122       CSMPREC
R0123     GETERAD
R01235    TIMETHET
R0124     P37CALRM
R0125     VN1645
R0126     POLY

R0150   ERASABLE INITIALIZATION REQUIRED
R0151     CSM STATE VECTOR
R0152     NJETSFLG      NUMBER OF JETS IF THE RCS PROPULSION SYSTEM SELECTED    STATE FLAG      0=4 JETS  1=2 JETS
```

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```
R0160   ASTRONAUT INPUT
R0161     SPRTETIG      TIME OF IGNITION (OVERLAYS TIG)                          DP       B28     CS
R0163     VPRED         DESIRED CHANGE IN VELOCITY AT TIG(PROGRM COMPUTED IF 0)  DP       B7      METERS/CS
R0165     GAMMAEI       DESIRED FLIGHT PATH ANGLE AT REENTRY (COMPUTED IF 0)     DP       B0      REVS  + ABOVE HORIZ.
R0167     OPTION2       PROPULSION SYSTEM OPTION                                 SP       B14     1=SPS, 2=RCS

R0180   OUTPUT
R0181     CONIC OR PRECISION TRAJECTORY DISPLAY
R0182       VPREC       VELOCITY MAGNITUDE AT 400,000 FT. ENTRY ALTITUDE         DP       B7      METERS/CS
R0184       T3TOT4      TRANSIT TIME TO 400,000 FT. ENTRY ALTITUDE               DP       B28     CS
R0186       GAMMAEI     FLIGHT PATH ANGLE AT 400,000 FT. ENTRY ALTITUDE          DP       B0      REVS  + ABOVE HORIZON
R0188       DELVLVC     INITIAL VELOCITY CHANGE VECTOR IN LOCAL VERTICAL COORD.   VECTOR   B7      METERS/CS
R0190       LAT(SPL)    LATITUDE OF THE LANDING SITE                             DP       B0      REVS
R0192       LNG(SPL)    LONGITUDE OF THE LANDING SITE                            DP       B0      REVS
R0194     TARGETING COMPUTATION DISPLAY
R0195       TIG         RECOMPUTED TIG BASED ON THRUST OPTION                    DP       B28     CS
R0197       TTOGO       TIME FROM TIG                                            DP       B28     CS
R0199       +MGA        POSITIVE MIDDLE GIMBAL ANGLE                             DP       B0      REVS  -.02 IF REFSMFLG=0
R0201     THRUST PROGRAM COMMUNICATION
R0202       XDELVFLG    EXTERNAL DELTA V FLAG                                    STATE FLAG       SET 0 FOR LAMBERT AIMPT
R0204       NORMSW      LAMBERT AIMPT ROTATION SWITCH                            STATE FLAG       SET 0 FOR NO ROTATION
R0206       ECSTEER     CROSS PRODUCT STEERING CONSTANT                          SP       B2      SET 1
R0208       RTARG       CONICALLY INTEGRATED REENTRY POSITION VECTOR             VECTOR   B29     METERS
R0210       TPASS4      REENTRY TIME                                             DP       B28     CS
```

```
0243   REF  91  LAST  869   36,2476  0 5402 1  P37      TC      PHASCHNG        P37 IS NOT RESTARTABLE.
0244                        36,2477   00004 0             OCT     4

0245   REF 216  LAST  895   36,2500  0 6006 1            TC      INTPRET
0246                        36,2501   66170 1             AXT,1   SXA,1
0247                        36,2502   04000 0             OCT     04000
0248   REF   5  LAST  693   36,2503   03424 0                     ECSTEER
02481                       36,2504   77745 1             DLOAD
02482  REF  35  LAST  682   36,2505   15336 0                     ZEROVECS
02483  REF   9  LAST  814   36,2506   03757 1             STORE   VPRED
02484  REF  11  LAST  814   36,2507   03761 1             STORE   GAMMAEI
0249                        36,2510   77776 1             EXIT
0250   REF   1              36,2511  3 5026 0             CAF     V6N33RTE        INPUT TIG   STORED IN SPRTETIG
0251   REF   1              36,2512  0 3246 1             TCR     P37OGOF                     OVERLAYED WITH TIG
0252                        36,2513  1 2511 1             TCF     -2              DESPLAY NEW DATA
0253   REF   1              36,2514  3 5033 1             CAF     V6N60RTE        INPUT REENTRY ANGLE IN GAMMAEI
0254   REF   1              36,2515  0 3222 0             TCR     P37GFRB1          AND DESIRED DELTA V IN RTEDVD
0255                        36,2516  1 2514 1             TCF     -2              DISPLAY NEW DATA
0500   REF 217  LAST  898   36,2517  0 6006 1  RTE299     TC      INTPRET
0501                        36,2520   71331 0             SSP     DLOAD
0502   REF   1              36,2521   00122 0                     CVFIND
05025                       36,2522   00000 1                     0
0503   REF  10  LAST  898   36,2523   03757 1                     VPRED
0504   REF   4  LAST  897   36,2524   17632 0             STODL   RTEDVD
0505   REF  12  LAST  898   36,2525   03761 1                     GAMMAEI
```

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```
0506   REF   3  LAST  292   36,2526   17634 0          STODL  RTEGAM2D
0509   REF   1              36,2527   33572 1                 1RTEB13
0510   REF   2  LAST  131   36,2530   17551 0          STODL  CONICX1
0511   REF   1              36,2531   33662 0                 C4RTE
0512   REF   2  LAST  131   36,2532   37652 1          STCALL MAMAX1
0513   REF   1              36,2533   64455 1                 INVC100      GET R(T1)/,V(T1)/,UR1/,UH/
051304                      36,2534   71214 0          CLEAR  DLOAD
051308 REF   1              36,2535   02662 1                 SLOWFLG
051312 REF   5  LAST  898   36,2536   03632 0                 RTEDVD
051316                      36,2537   51444 1          BPL    ABS
05132  REF   1              36,2540   74550 1                 RTE317
051324 REF   6  LAST  899   36,2541   03632 0          STORE  RTEDVD
051328                      36,2542   45345 1          DLOAD  DSU
051332 REF   2  LAST  131   36,2543   03646 0                 R(T1)
051336 REF   1              36,2544   33664 0                 K1RTE
05134                       36,2545   43040 1          BMN    SET
051344 REF   2  LAST  899   36,2546   74550 1                 RTE317
051348 REF   2  LAST  899   36,2547   02462 0                 SLOWFLG
0514                        36,2550   77545 0  RTE317  DLOAD  EXIT
05145  REF   3  LAST  899   36,2551   03646 0                 R(T1)
0515   REF   2  LAST  303   36,2552   0 7171 1         TC     POLY
0516                        36,2553   00002 0          DEC    2
0517                        36,2554   02544 0          2DEC   181000434.8-31
0517                        36,2555   35436 0
0518                        36,2556   14040 0          2DEC   1.507851458-2
0518                        36,2557   05066 1
0519                        36,2560   44052 0          2DEC*  -6.49993057E-9827*
0519                        36,2561   60030 1
0520                        36,2562   26415 0          2DEC*  9.76938926E-18856*
0520                        36,2563   25057 1
0521   REF 218  LAST  898   36,2564   0 6006 1         TC     INTPRET
0522                        36,2565   77752 1          SL1
0525   REF   2  LAST  131   36,2566   17654 0          STODL  MAMAX2       CO+C1*R+C2*R**2+C3*R**3=MAMAX2 B30
0526   REF   1              36,2567   33614 1                 M9RTEB28
0527   REF   1              36,2570   17730 0          STODL  NN1A
0528   REF   1              36,2571   33666 1                 K2RTE
0529   REF   2  LAST  131   36,2572   17636 1  RTE320  STODL  RCON         RCON=K2
0530   REF   4  LAST  899   36,2573   03634 0                 RTEGAM2D
0531                        36,2574   44254 1          BZE    BDSU
0532   REF   1              36,2575   74604 0                 RTE340       GOTORTE340 IF REENTRY ANGLE NOT INPUT
0533   REF   2  LAST  674   36,2576   15326 1                 1RTEB2
05335                       36,2577   71406 0          PUSH   COS                                        PL02D
0534                        36,2600   73525 1          PDDL   SIN
0535                        36,2601   45465 1          BDDV   STADR                                      PL00D
0536   REF   1              36,2602   40051 1          STCALL X(T2)        X(T2)=COT(GAM2D)                 B0
0537   REF   1              36,2603   74617 1                 RTE360
0538                        36,2604   45345 1  RTE340  DLOAD  DSU
0539   REF   4  LAST  899   36,2605   03646 0                 R(T1)
0540   REF   2  LAST  899   36,2606   33664 0                 K1RTE
0541                        36,2607   71240 1          BMN    DLOAD
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0542   REF   1                    36,2610   74614 1                  RTE350
0543   REF   1                    36,2611   33672 1                  K4RTE
0544   REF   2  LAST  899         36,2612   37726 0          STCALL  X(T2)          X(T2)=K4
0545   REF   2  LAST  899         36,2613   74617 1                  RTE360
0546                               36,2614   77745 1  RTE350  DLOAD
0547   REF   1                    36,2615   33670 0                  K3RTE
0548   REF   3  LAST  900         36,2616   03726 1          STORE   X(T2)          X(T2)=K3
0549                               36,2617   77624 1  RTE360  CALL
0550   REF   1                    36,2620   65102 1                  V2T100
0551                               36,2621   52054 1          BZE     GOTO
0552   REF   1                    36,2622   74624 1                  RTE367
0553   REF   1                    36,2623   64272 1                  RTEALRM
0554                               36,2624   77775 1  RTE367  VLOAD
0555   REF   2  LAST  131         36,2625   03640 0                  R(T1)/
0556   REF   8  LAST  688         36,2626   16657 1          STODL   RVEC
0557   REF   3  LAST  899         36,2627   03636 1                  RCON
0558   REF   2  LAST  100         36,2630   26760 1          STOVL   RDESIRED
0559   REF   2  LAST  131         36,2631   03700 0                  V2(T1)/
0560   REF  10  LAST  688         36,2632   36746 1          STCALL  VVEC
0561   REF   1                    36,2633   64304 1                  TMRAD100
0562                               36,2634   77615 0          DAD
0563   REF   2  LAST  131         36,2635   03716 1                  T1
0570   REF   2  LAST  131         36,2636   17552 0          STODL   T2
0571   REF   5  LAST  899         36,2637   03634 0                  RTEGAM2D
0572                               36,2640   52054 1          BZE     GOTO
05725  REF   1                    36,2641   74643 0                  RTE369
057251 REF   1                    36,2642   74665 1                  RTE372
0573                               36,2643   51575 1  RTE369  VLOAD   ABVAL
0574   REF   2  LAST  131         36,2644   03710 1                  V(T2)/
0575                               36,2645   77776 1          EXIT
0576   REF   3  LAST  899         36,2646   0 7171 1         TC      POLY
0577                               36,2647   00002 0          DEC     2
0578                               36,2650   00000 1          2DEC    0
0578                               36,2651   00000 1
0579                               36,2652   47021 1          2DEC    -4.8760771E-2B4
0579                               36,2653   65002 0
0580                               36,2654   35610 0          2DEC    4.5419476E-4B11
0580                               36,2655   07722 1
0581                               36,2656   63772 0          2DEC    -1.4317675E-6B18
0581                               36,2657   63276 1
0582   REF 219  LAST  899         36,2660   0 6006 1         TC      INTPRET
05825                              36,2661   77615 0          DAD
058251 REF   1                    36,2662   01343 1                  RTED1
0583                               36,2663   52052 1          SL3     GOTO           X(T2),=D1+D2V2+D3V2**2+D4V2**3
0587   REF   1                    36,2664   74667 0                  RTE373
0588                               36,2665   77745 1  RTE372  DLOAD                  X(T2),=X(T2)
0589   REF   4  LAST  900         36,2666   03726 1                  X(T2)
05895                              36,2667   41425 1  RTE373  DSU     PUSH           X(T2)ERR                    BO PL02D
058951 REF   5  LAST  900         36,2670   03726 1                  X(T2)
0590                               36,2671   53575 0          VLOAD   UNIT
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0591   REF   2  LAST  131   36,2672  03656 1                R(T2)/                                          858
0592   REF  16  LAST  816   36,2673  36152 1          STCALL ALPHAV
0593   REF   3  LAST  816   36,2674  26570 1                 GETERAD
0594                        36,2675  77615 0          DAD
0606   REF   1              36,2676  33676 0                 E3RTE
0607                        36,2677  45206 1          PUSH   DSU          RCON,=(E1/(1+E2BETA11)**.5)+E3 B29 PL04D
0608   REF   4  LAST  900   36,2700  03636 1                 RCON
0609                        36,2701  45246 0          ABS    DSU
0610   REF   1              36,2702  33646 0                 EPC2RTE
0611                        36,2703  52040 1          BMN    GOTO
0612   REF   1              36,2704  74706 0                 RTE374
0613   REF   1              36,2705  74713 1                 RTE375
0614                        36,2706  51545 1  RTE374  DLOAD  ABS
0615                        36,2707  00001 0                 OCD
0617                        36,2710  50025 0          DSU    BMN
0618   REF   1              36,2711  33650 1                 EPC3RTE
0620   REF   1              36,2712  74763 0                 P37E
0621                        36,2713  43345 1  RTE375  DLOAD  DAD
0622   REF   2  LAST  899   36,2714  03730 0                 NN1A
0623   REF   1              36,2715  33600 1                 1RTEB28
0624                        36,2716  67240 0          BMN    SLOAD
0625   REF   1              36,2717  74723 1                 RTE380
0626   REF   1              36,2720  33630 1                 OCT605
0627                        36,2721  77650 1          GOTO
0628   REF   2  LAST  900   36,2722  64272 1                 RTEALRM         TOO MANY ITERATIONS
0629   REF   3  LAST  901   36,2723  03730 0  RTE380  STORE  NN1A
0630                        36,2724  53025 0          DSU    BZE
0631   REF   1              36,2725  33616 0                 M8RTEB28
0632   REF   1              36,2726  74744 0                 RTE385
0633                        36,2727  45345 1          DLOAD  DSU
0634                        36,2730  00001 0                 OCD
0635   REF   2  LAST  131   36,2731  03666 1                 DRCON
0636                        36,2732  65301 0          NORM   PDDL         X(T2)ERR-X(T2)ERR,=Z1                   PL06D
0637   REF  32  LAST  840   36,2733  00047 1                 X1
0638   REF   2  LAST  131   36,2734  03670 0                 RPRE,
0639                        36,2735  56225 1          DSU    DDV         X(T2)PRI-X(T2)=Z2                       PL04D
0640   REF   6  LAST  900   36,2736  03726 1                 X(T2)
0640S                       36,2737  53605 1          DMP    SL*         DX(T2)=X(T2)ERR(Z2/Z1)
0641                        36,2740  00001 0                 OCD
0641S                       36,2741  20201 0                 0,1
0642                        36,2742  77650 1          GOTO
0642S  REF   1              36,2743  74746 1                 RTE390
0643                        36,2744  77745 1  RTE385  DLOAD              DX(T2)=X(T2)ERR
0643S                       36,2745  00001 0                 OCD
0644                        36,2746  14021 1  RTE390  STODL  16D         DX(T2)                                  PL02D
0644S                       36,2747  77626 0          STADR
0645   REF   5  LAST  901   36,2750  60141 0          STODL  RCON         RCON=RCON,
0645S                       36,2751  77600 1          BOV
0645S1 REF   3  LAST  900   36,2752  74617 1                 RTE360
0646   REF   3  LAST  901   36,2753  17666 1          STODL  DRCON        X(T2)ERR,=X(T2)ERR
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06465  REF   7  LAST  901   36,2754  03726 1                    X(T2)
0647   REF   3  LAST  901   36,2755  17670 0          STODL     RPRE,          X(T2)PRI=X(T2)
06475                       36,2756  00021 1                    16D
0648                        36,2757  77615 0          DAD
06485  REF   8  LAST  902   36,2760  03726 1                    X(T2)
0649   REF   9  LAST  902   36,2761  37726 0          STCALL    X(T2)          X(T2)=X(T2)+DX(T2)
06495  REF   4  LAST  901   36,2762  74617 1                    RTE360         REITERATE
0650                        36,2763  77624 1  P37E     CALL                     DISPLAY CONIC SOLUTION
0651   REF   1              36,2764  75007 1                    RTEVN
0800                        36,2765  41345 0  RTE505   DLOAD     DMP
0801   REF   2  LAST  131   36,2766  03720 1                    PCON
0802   REF   2  LAST  131   36,2767  03744 0                    BETA1
0803                        36,2770  53021 1          BDSU      BZE
0804   REF   6  LAST  901   36,2771  03636 1                    RCON
0805   REF   1              36,2772  75000 0                    RTE510
0806                        36,2773  71240 1          BMN       DLOAD
0807   REF   2  LAST  902   36,2774  75000 0                    RTE510
0808   REF   3  LAST  899   36,2775  15326 1                    IRTEB2
0809                        36,2776  77650 1          GOTO                     ENTRY NEAR APOGEE
0810   REF   1              36,2777  75002 1                    RTE515
0811                        36,3000  57545 1  RTE510   DLOAD     DCOMP          ENTRY NEAR PERIGEE
0812   REF   4  LAST  902   36,3001  15326 1                    IRTEB2
0813   REF   2  LAST  131   36,3002  37751 0  RTE515   STCALL    PHI2
0814   REF   1              36,3003  64546 1                    PREC100        PRECISION TRAJECTORY COMPUTATION
0815                        36,3004  52054 1  RTE625   BZE       GOTO
0816   REF   1              36,3005  75035 0                    P37G
0817   REF   3  LAST  901   36,3006  64272 1                    RTEALRM
R0824
R0825                                  RETURN TO EARTH DISPLAY SUBROUTINE

0826                        36,3007  45020 1  RTEVN    STQ       CALL
0829   REF   2  LAST  132   36,3010  03753 0                    VNSTORE
0830   REF   1              36,3011  64323 1                    RTEDISP        DISPLAY PREPARATION
0831                        36,3012  77776 1          EXIT
0832   REF   1              36,3013  3 5034 0         CAF       V6N61RTE       LATITUDE,LONGITUDE,BLANK
0833   REF   1              36,3014  0 3232 1         TCR       P37GGOFR         IN LAT(SPL),LNG(SPL),-
0834   REF  10  LAST  829   36,3015  3 4766 1         CAF       FOUR
0835   REF   1              36,3016  0 3226 1         TCR       37BLANK +1
0836                        36,3017  1 3024 0         TCF       +5
0837   REF   2  LAST  225   36,3020  1 2476 1         TCF       P37            RECYCLE
0841   REF   1              36,3021  3 3257 1         CAF       V6N39RTE       T21 HRS,MIN,SEC IN T3TOT4
0844   REF   2  LAST  898   36,3022  0 3246 1         TCR       P37GGOF
0845   REF   3  LAST  902   36,3023  1 2476 1         TCF       P37            RECYCLE
0847   REF   2  LAST  898   36,3024  3 5033 1         CAF       V6N60RTE       DISPLAY BLANK,V(T2),FPA2
0848   REF   2  LAST  898   36,3025  0 3222 0         TCR       P37GFRB1         IN -,VPRED,GAMMAEI
0849   REF   4  LAST  902   36,3026  1 2476 1         TCF       P37            RECYCLE
0856   REF   1              36,3027  3 4535 0         CAF       V6N81RTE       DISPLAY DELTA V (LV) IN DELVLVC
0859   REF   3  LAST  902   36,3030  0 3246 1         TCR       P37GGOF
0860   REF   5  LAST  902   36,3031  1 2476 1         TCF       P37            RECYCLE
08615  REF 220  LAST  900   36,3032  0 6006 1         TCR       INTPRET
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0862                                36,3033   77650 1          GOTO
0863   REF   3  LAST  902           36,3034   03753 0                   VNSTORE

R0864  PRECISION DISPLY,TARGETING COMPUTATION AND RTE END PROCESSING

0865                                36,3035   77624 1  P37G     CALL
0866   REF   2  LAST  902           36,3036   75007 1                   RTEVN
0867                                36,3037   77776 1          EXIT
0868   REF  13  LAST  614           36,3040  3 4774 1  P37N     CAF     SEVEN
0869   REF   5  LAST  283           36,3041  54 775 0           TS      OPTION1
0870   REF  91  LAST  878           36,3042  3 4770 0           CAF     ONE
0871   REF  13  LAST  744           36,3043  54 776 0           TS      OPTION2
0872   REF   1                     36,3044  3 4537 1           CAF     V4N06RTE        DISPLAY RCS OR SPS OPTION  SPS ASSUMED
0873   REF   4  LAST  902           36,3045  0 3246 1           TCR     P37OGOF
0874                                36,3046  1 3044 0           TCF     -2              RECYCLE
0875   REF 221  LAST  902           36,3047  0 6006 1           TC      INTPRET         PROCEED
0876                                36,3050   67201 0           SETPD   SLOAD
0877                                36,3051   00001 0                   00D
0878   REF  14  LAST  903           36,3052   00777 0                   OPTION2
0879                                36,3053   53025 0           DSU     BZE
0880   REF   2  LAST  899           36,3054   33572 1                   1RTEB13
0881   REF   1                     36,3055   75064 1                   P37Q
0882                                36,3056   60335 1           SLOAD   NORM            SPS
0883   REF   2  LAST  725           36,3057   01351 1                   EMDOT
0884   REF  33  LAST  901           36,3060   00047 1                   X1
0885                                36,3061   52125 0           PDDL    GOTO
0886   REF   1                     36,3062   33622 1                   VCSPS
0887   REF   1                     36,3063   75075 1                   P37T
0888                                36,3064   43145 0  P37Q     DLOAD   BON             RCS
0889   REF   1                     36,3065   33626 0                   MDOTRCS
0890   REF   3  LAST  737           36,3066   00700 0                   NJETSFLG
0891   REF   1                     36,3067   75071 0                   P37R
0892                                36,3070   77752 1           SL1
0893                                36,3071   77752 1  P37R     SL1
0894                                36,3072   65301 0           NORM    PDDL
0895   REF  34  LAST  903           36,3073   00047 1                   X1
0896   REF   1                     36,3074   33624 1                   VCRCS
0897                                36,3075   56325 0  P37T     PDDL    DDV             DV/VC                  B7 -B5 = B2 PL02D
0898   REF   2  LAST  131           36,3076   03706 0                   DV
0899                                36,3077   77776 1          EXIT
0900   REF   4  LAST  900           36,3100  0 7171 1           TC      POLY
0901                                36,3101   00001 0           DEC     1
0902                                36,3102   00001 0           2DEC    5.66240507E-48-3
0902                                36,3103   05070 0
0903                                36,3104   17527 1           2DEC    9.79487897E-18-1
0903                                36,3105   36700 0
0904                                36,3106   47114 0           2DEC    -.38828195581
0904                                36,3107   70670 1
0905   REF 222  LAST  903           36,3110  0 6006 1           TC      INTPRET
0906                                36,3111   67206 1           PUSH    SLOAD           (1-E)**(-DV/VC)=A              B3 PL04D
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0907   REF   5  LAST  732   36,3112   03076 0                WEIGHT/G
0908                       36,3113   56205 0        DMP     DDV          DTB=(MC/MDOT)A        B16+B3-B3=B16 PLOOD
0909                       36,3114   41257 1        SL*     DMP
0910                       36,3115   20165 1                -12D,1
0911   REF   1             36,3116   15334 1                CSUBT
0912                       36,3117   77621 1        BDSU
0913   REF   3  LAST  900   36,3120   03716 1                T1
0914   REF  78  LAST  740   36,3121   03413 1        STORE   TIG          TIG=T1-CT*DTB                      B28
0915                       36,3122   77776 1        EXIT
0916   REF   2  LAST  898   36,3123   3 5026 0       CAF     V6N33RTE     DISPLAY BIASED TIG
0917   REF   5  LAST  903   36,3124   0 3246 1       TCR     P37GOF
0918                       36,3125   1 3123 0       TCF     -2
09184  REF 147  LAST  894   36,3126   3 4772 1       CAF     ZERO
09185  REF   9  LAST  584   36,3127   54 771 1       TS      VHFCNT
09186  REF   5  LAST  584   36,3130   54 772 1       TS      TRKMKCNT
0919   REF 223  LAST  903   36,3131   0 6006 1       TC      INTPRET
09195                      36,3132    77624 1        CALL                 CONICALLY INTEGRATE FROM R1,V1 OVER T12
091951 REF   1             36,3133    63624 1                RTENCK1
0920                       36,3134    53575 0        VLOAD   UNIT                                        PLOOD
092001 REF   3  LAST  901   36,3135    03656 1                R(T2)/
092005                     36,3136    74315 0        PDVL    VXSC         UR2                       B1 PL06D
09201  REF   2  LAST  131   36,3137    03554 0                UR1/
092015 REF   1             36,3140    33632 0                MCOS7.5
09202                      36,3141    74315 0        PDVL    VXSC         -UR1(COS7.5)              B1 PL12D
092025 REF   1             36,3142    03562 0                UH/
09203  REF   1             36,3143    33634 0                MSIN7.5
092035                     36,3144    50255 0        VAD     DOT          K/=-UR1(COS7.5)-UH(SIN7.5)     B2 PLOOD
09204                      36,3145    50015 0        DAD     BMN
092045 REF   1             36,3146    33636 1                MCOS22.5
09205  REF   1             36,3147    75174 1                P37W
092055                     36,3150    50375 0        VLOAD   DOT          K/ . UR2 GR COS22.5
09206  REF   2  LAST  904   36,3151    03562 0                UH/
092065 REF   4  LAST  904   36,3152    03656 1                R(T2)/
09207                      36,3153    71240 1        BMN     DLOAD
092075 REF   1             36,3154    75160 1                P37U
09208  REF   1             36,3155    33640 0                THETA165
092085                     36,3156    52006 0        PUSH    GOTO
09209  REF   1             36,3157    75162 0                P37V
092095                     36,3160    41545 0  P37U  DLOAD   PUSH
0921   REF   1             36,3161    33642 1                THETA210
092105                     36,3162    77756 0  P37V  SIN
09211  REF   8  LAST  688   36,3163    16732 0        STODL   SNTH
092115                     36,3164    43146 0        COS     CLEAR
09212  REF   7  LAST  688   36,3165    03666 1                RVSW
092125 REF   6  LAST  688   36,3166    26734 0        STOVL   CSTH
09213  REF   3  LAST  900   36,3167    03640 0                R(T1)/
092135 REF   9  LAST  900   36,3170    26657 1        STOVL   RVEC
09214  REF   3  LAST  900   36,3171    03700 0                V2(T1)/
092145 REF  11  LAST  900   36,3172    36746 1        STCALL  VVEC
09215  REF   7  LAST  688   36,3173    25002 1                TIMETHET
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 0922                          36,3174   43014 0  P37W     CLEAR   CLEAR
 0923   REF   8  LAST  728     36,3175   01267 0                   XDELVFLG
 0924   REF   5  LAST  729     36,3176   03665 1                   NORMSW
 0925                          36,3177   77214 0           SET     VLOAD
 0926   REF  10  LAST  668     36,3200   01071 0                   FINALFLG
 0927                          36,3201   77626 0           STADR
 0928   REF  11  LAST  494     36,3202   60362 0           STODL   RTARG
 0929   REF   3  LAST  468     36,3203   00037 0                   T
 0933                          36,3204   77615 0           DAD
 0934   REF   4  LAST  904     36,3205   03716 1                   T1
 0936   REF  11  LAST  723     36,3206   27656 1           STOVL   TPASS4
 0937   REF   4  LAST  904     36,3207   03700 0                   V2(T1)/
 0938                          36,3210   77451 1           VSU     EXIT
 0939   REF   2  LAST  131     36,3211   03672 1                   V(T1)/
 09391  REF   3  LAST  652     36,3212  3 4756 1           CAF     EBANK4
 09392  REF  25  LAST  895     36,3213  54 003 0           TS      EBANK
 09393  REF 224  LAST  904     36,3214  0 6006 1           TC      INTPRET
 0940   REF  12  LAST  695     36,3215   03646 0           STORE   DELVSIN
 09401                         36,3216   77624 1  P37WW    CALL
 0941   REF   9  LAST  669     36,3217   73027 0                   VN1645
 0942                          36,3220   77650 1           GOTO
 0943   REF   1                36,3221   75216 0                   P37WW
R0948
R0949   SUBROUTINE TO GO TO GOFLASHR AND BLANK R1

 0950                          36,3222   0 0006 1  P37GFRB1 EXTEND
 0951   REF   2  LAST  132     36,3223   23'752 0          QXCH    SPRTEX
 0952   REF   2  LAST  902     36,3224   0 3232 1          TCR     P37GOFR
 0953   REF  92  LAST  903     36,3225   3 4770 0  37BLANK CAF     CNE
 0954   REF  11  LAST  756     36,3226   0 5516 0    +1    TCR     BLANKET
 0955   REF  84  LAST  834     36,3227   1 5205 1          TCF     ENDOFJOB
 0956   REF   3  LAST  905     36,3230   0 1752 0          TC      SPRTEX          RECYCLE
 0957   REF   1                36,3231   1 3255 1          TCF     P37PROC         PROCEED
R0958
R0959   SUBROUTINE TO GO TO GOFLASHR

 0960                          36,3232   0 0006 1  P37GOFR EXTEND
 0961   REF   2  LAST  131     36,3233   23'547 0          QXCH    RTENCKEX
 0962   REF 208  LAST  882     36,3234   0 4636 0          TCR     BANKCALL
 0963   REF   5  LAST  801     36,3235    21101 1          CADR    GOFLASHR
 0964   REF  51  LAST  805     36,3236   1 4103 0          TCF     GOTOPOOH        TERMINATE
 0965                          36,3237   1 3242 1          TCF     +3
 0966                          36,3240   1 3244 1          TCF     +4
 0967   REF   3  LAST  905     36,3241   0 1547 0          TC      RTENCKEX        IMMEDIATE RETURN
 0968   REF   4  LAST  905     36,3242   51'547 0          INDEX   RTENCKEX        PROCEED
 0969                          36,3243   1 0004 1          TCF     0 +4
 0970   REF   5  LAST  905     36,3244   51'547 0          INDEX   RTENCKEX        RECYCLE
 0971                          36,3245   1 0003 0          TCF     0 +3
R0973
R0974   SUBROUTINE TO GO TO GOFLASH
```

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```
C0975                          36,3246  0 0006 1  P37GOF   EXTEND
C0976  REF   4  LAST  905       36,3247  23'752 0          QXCH    SPRTEX
C0977  REF 209  LAST  905       36,3250  0 4636 0          TCR     BANKCALL
C0978  REF  25  LAST  804       36,3251   20743 0          CADR    GOFLASH
C0979  REF  52  LAST  905       36,3252  1 4103 0          TCF     GOTOPOOH
C0980                          36,3253  1 3255 1          TCF     +2
C0981  REF   5  LAST  906       36,3254  0 1752 0          TC      SPRTEX
C0982  REF   6  LAST  906       36,3255  51'752 0  P37PROC  INDEX   SPRTEX
C0983                          36,3256  1 0001 1          TCF     0 +1
C0985  REF   6  LAST  655          5026                   V6N33RTE =      V06N33
C0986  REF   1                     4537                   V4N06RTE =      V04N06
C0987  REF   3  LAST  796          5034                   V6N61RTE =      V06N61
C0988                          36,3257   01447 1          V6N39RTE VN     0639
C0989  REF   2  LAST  793          5033                   V6N60RTE =      V06N60
C0990  REF   4  LAST  685          4535                   V6N81RTE =      V06N81
C0997  REF   1                 32,2000                                   SETLOC  RTE
C0998                          32,2272                                   BANK
C0999  REF   1                                                           COUNT*  $$/P37
```

P1000 ALARM DISPLAY SUBROUTINE

```
1051                                32,2272   77776 1  RTEALRM  EXIT
1055   REF 286  LAST  895    32,2273  3 0154 1           CA      MPAC
1056   REF   3  LAST  661    32,2274  0 5770 1           TC      VARALARM
1057   REF   1                32,2275  3 5023 0           CAF     V5N09RTE
1058   REF 210  LAST  906    32,2276  0 4636 0           TC      BANKCALL
1059   REF  26  LAST  906    32,2277   20743 0           CADR    GOFLASH
1060   REF  53  LAST  906    32,2300  1 4103 0           TCF     GOTOPOOH
1061                          32,2301  1 2275 1           TCF     -4
1062   REF  50  LAST  882    32,2302  0 4655 0           TC      POSTJUMP
1063   REF   6  LAST  902    32,2303   74476 1           CADR    P37
1065   REF   6  LAST  809       5023             V5N09RTE =      V05N09
```

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P2000 TIME RADIUS CALLING SUBROUTINE

R2001 INPUT

R2002	RVEC	INITIAL POSITION VECTOR	VECTOR	B29	METERS
R2004	VVEC	INITIAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2006	RDESIRED	FINAL RADIUS FOR WHICH TRANSFER TIME IS TO BE COMPUTED	DP	B29	METERS
R2008	CONICX1	X1 SETTING FOR CONIC SUBROUTINES -2 = EARTH	SP	B14	

R2010 OUTPUT

R2011	R(T2)/	FINAL POSITION VECTOR	VECTOR	B29	METERS
R2013	V(T2)/	FINAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2015	T12	TRANSFER TIME TO FINAL RADIUS	DP	B28	CS

```
2100                          32,2304  43020 1  TMRAD100 STQ     CLEAR
2101  REF  6  LAST  905       32,2305  03547 1           RTENCKEX
2102  REF  8  LAST  904       32,2306  03666 1           RVSW
2103                          32,2307  67164 0           AXC,2   SXA,2
2104                          32,2310  20000 0           OCT     20000
2105  REF  2  LAST  100       32,2311  02756 1           SGNRDOT
2106                          32,2312  45140 0           LXC,1   CALL
2107  REF  3  LAST  899       32,2313  03550 1           CONICX1
2108  REF  1                  32,2314  25607 1           TIMERAD
2109  REF  3  LAST  900       32,2315  27710 1           STOVL   V(T2)/                    PLOOD
2110                          32,2316  77626 0           STADR
2111  REF  5  LAST  904       32,2317  60121 0           STODL   R(T2)/
2112  REF  4  LAST  905       32,2320  00037 0           1
2113  REF  3  LAST  132       32,2321  37724 1           STCALL  T12
2114  REF  7  LAST  908       32,2322  03547 1           RTENCKEX
```

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P2200 DISPLAY CALCULATION SUBROUTINE

R2201 DESCRIPTION
R2202 OUTPUT FOR DISPLAY IS CONVERTED TO PROPER UNITS AND PLACED IN OUTPUT STORAGE REGISTERS. LANDING SITE
R2204 COMPUTATION FOR DETERMINING LANDING SITE LATITUDE AND LONGITUDE IS INCLUDED IN THE ROUTINE.

R2206 CALLING SEQUENCE
R2207 L CALL
R2208 L+1 RTEDISP

R2209 SUBROUTINES CALLED
R2210 TMRAD100
R2211 AUGEKUGL
R2212 LAT-LONG

R2213 ERASABLE INITIALIZATION REQUIRED
R2214 PUSHLIST
R2215 NONE
R2216 MPAC
R2217 NONE
R2218 OTHER

R2219	R(T2)/	FINAL POSITION VECTOR	VECTOR	B29	METERS
R2221	V(T2)/	FINAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2223	T2	FINAL TIME	DP	B28	CS
R2225	V2(T1)/	POST IMPULSE INITIAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2227	V(T1)/	INITIAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2229	UR1/	UNIT INITIAL VECTOR	VECTOR	B1	
R2231	UH/	UNIT HORIZONTAL VECTOR	VECTOR	B1	

R2233 OUTPUT

R2234	VPRED	VELOCITY MAGNITUDE AT 400,000 FT. ENTRY ALTITUDE	DP	B7	METERS/CS
R2236	T3TOT4	TRANSIT TIME TO 400,000 FT. ENTRY ALTITUDE	DP	B28	CS
R2238	GAMMAEI	FLIGHT PATH ANGLE AT 400,000 FT. ENTRY ALTITUDE	DP	B0	REVS + ABOVE HORIZ
R2240	DELVLVC	INITIAL VELOCITY CHANGE VECTOR IN LOCAL VERTICAL COORD.	VECTOR	B7	METERS/CS
R2242	LAT(SPL)	LATITUDE OF THE LANDING SITE	DP	B0	REVS
R2244	LNG(SPL)	LONGITUDE OF THE LANDING SITE	DP	B0	REVS

```
 2275                          32,2323  77220 1  RTEDISP  STQ     VLOAD          DISPLAY
 2276  REF   7  LAST  906     32,2324  03752 1            SPRTEX
 2277  REF   4  LAST  908     32,2325  03710 1            V(T2)/
 2278                          32,2326  65256 0            UNIT    PDDL
 2279                          32,2327  00045 0            36D
 2280  REF  11  LAST  898     32,2330  17757 1            STODL   VPRED          V(T2)
 2281  REF   3  LAST  900     32,2331  03552 0            T2
 2282                          32,2332  77625 0            DSU
 2283  REF   1                32,2333  03413 1            SPRTETIG
 2284  REF   2  LAST  284     32,2334  26641 0            STOVL   T3TOT4         T21
 2285  REF   6  LAST  908     32,2335  03656 1            R(T2)/
 2286                          32,2336  50256 0            UNIT    DOT
22865                          32,2337  77752 1            SL1
```

```
2287                          32,2340  44326 0          ARCCOS BDSU
2288   REF   5  LAST  902     32,2341  15326 1                 1RTEB2
2289   REF  13  LAST  898     32,2342  27761 1          STOVL  GAMMAEI        FLIGHT PATH ANGLE T2
2290   REF   5  LAST  905     32,2343  03700 0                 V2(T1)/
2291                          32,2344  41451 1          VSU    PUSH
2292   REF   3  LAST  905     32,2345  03672 1                 V(T1)/
2293                          32,2346  57441 1          DOT    DCOMP
2294   REF   3  LAST  904     32,2347  03554 0                 UR1/
2295                          32,2350  41515 0          PDVL   PUSH
2296                          32,2351  63345 0          DLOAD  PDVL
2297   REF   1                32,2352  15330 0                 ZERORTE
2298                          32,2353  55441 0          DOT    VDEF
2299   REF   3  LAST  904     32,2354  03562 0                 UH/
22995                         32,2355  77772 0          VSL1
2300   REF  23  LAST  685     32,2356  17405 0          STODL  DELVLVC
230004 REF  24  LAST  910     32,2357  03405 0                 DELVLVC
230010                        32,2360  57414 1          BOFF   DCOMP
230012 REF   1                32,2361  02741 1                 RETROFLG
230014 REF   1                32,2362  64364 1                 RTD18
230016 REF  25  LAST  910     32,2363  03405 0          STORE  DELVLVC        NEGATE X COMPONENT, RETROGRADE
230018                        32,2364  51575 1  RTD18   VLOAD  ABVAL
230019 REF  26  LAST  910     32,2365  03405 0                 DELVLVC
23002  REF   8  LAST  732     32,2366  27763 0          STOVL  VGDISP
2301   REF   7  LAST  909     32,2367  03656 1                 R(T2)/
2302   REF  10  LAST  904     32,2370  02657 1          STORE  RVEC           ***** LANDING SITE COMPUTATION *****
2303                          32,2371  45246 0          ABVAL  DSU
2304   REF   1                32,2372  33620 0                 3048ORTE
2305   REF   3  LAST  900     32,2373  26760 1          STOVL  RDESIRED
2306   REF   5  LAST  909     32,2374  03710 1                 V(T2)/
2307   REF  12  LAST  904     32,2375  36746 1          STCALL VVEC
2308   REF   2  LAST  900     32,2376  64304 1                 TMRAD100       R3,V3,T23 FROM TIMERAD
2309                          32,2377  53575 0          VLOAD  UNIT
2310   REF   8  LAST  910     32,2400  03656 1                 R(T2)/
2311                          32,2401  53515 0          PDVL   UNIT           UR3                          PL06D
2312   REF   6  LAST  910     32,2402  03710 1                 V(T2)/
2313                          32,2403  72441 0          DOT    SL1            GAMMAE=ARCSIN(UR3 . UV3)     PL00D
2314                          32,2404  65336 1          ARCSIN PDDL           V(T3)                        PL02D
2315                          32,2405  00045 0                 36D
2316                          32,2406  51525 1          PDDL   ABS
2317                          32,2407  45006 0          PUSH   CALL           /GAMMAE/                     PL04D
2318   REF   2  LAST  647     32,2410  64105 1                 AUGEKUGL       PHIE                         PL06D
2319                          32,2411  43215 0          DAD    DAD
2320   REF   4  LAST  908     32,2412  03724 0                 T12            T23
2321   REF   4  LAST  909     32,2413  03552 0                 T2
2322                          32,2414  00003 1          STORE  02D             T(LS) = T2&T23&TE
232204                        32,2415  53135 0          SLOAD  BZE
232208 REF   1                32,2416  03013 0                 P37RANGE
232212 REF   1                32,2417  64421 1                 RTD22
232216                        32,2420  00005 1          STORE  04D             OVERRIDE RANGE (PCR 261)
23222                         32,2421  73545 1  RTD22   DLOAD  SIN
```

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```
2323                                32,2422  00005 1                 04D
2325  REF   5 LAST  293             32,2423  17403 0  STODL  LNG(SPL)      LNG(SPL)=SIN(PHIE)                PL04D
2326                                32,2424  77746 1  COS
2327  REF  11 LAST  853             32,2425  03401 1  STORE  LAT(SPL)      LAT(SPL)=COS(PHIE)
2328                                32,2426  53575 0  VLOAD  UNIT
2329  REF   9 LAST  910             32,2427  03656 1         R(T2)/
2330                                32,2430  41406 0  PUSH   PUSH
2331                                32,2431  53515 0  PDVL   UNIT                                              PL22D
2332  REF   7 LAST  910             32,2432  03710 1         V(T2)/
2333                                32,2433  47315 0  PDVL   VXV
2334                                32,2434  53435 0  VXV    UNIT       UH3=UNIT(UR3 X UV3 X UR3)              PL10D
2335                                32,2435  63361 0  VXSC   PDVL
2336  REF   6 LAST  911             32,2436  03403 0         LNG(SPL)
2337                                32,2437  53361 0  VXSC   VAD                                               PL04D
2338  REF  12 LAST  911             32,2440  03401 1         LAT(SPL)
2340                                32,2441  43014 0  CLEAR  CLEAR      T(LS) IN MPAC
2341  REF  11 LAST  853             32,2442  00662 0         ERADFLAG
2342  REF  19 LAST  853             32,2443  01663 0         LUNAFLAG
23425 REF  17 LAST  901             32,2444  16152 0  STODL  ALPHAV      ALPHAV=UR3(COSPHIE)+UH3(SINPHIE)       PL02D
2343                                32,2445  77624 1  CALL
2344  REF   8 LAST  806             32,2446  26453 1         LAT-LONG
2345                                32,2447  77745 1  DLOAD
2346  REF  11 LAST  853             32,2450  00747 0         LAT
2347  REF  13 LAST  911             32,2451  17401 1  STODL  LAT(SPL)      LATITUDE LANDING SITE  *****
2348  REF   9 LAST  619             32,2452  00751 1         LONG
2349  REF   7 LAST  911             32,2453  37403 1  STCALL LNG(SPL)      LONGITUDE LANDING SITE  *****
2350  REF   8 LAST  909             32,2454  03752 1         SPRTEX
```

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P2500 INITIAL VECTOR SUBROUTINE

R2501 DESCRIPTION
R2502 A PRECISION INTEGRATION OF THE STATE VECTOR TO THE TIME OF IGNITION ISPERFORMED.PRECOMPUTATIONS OCCUR.

R2504 CALLING SEQUENCE
R2505 L CALL
R2506 L+1 INVC100

R2507 NORMAL EXIT MODE
R2508 AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R2509 ALARM EXIT MODE
R2510 AT L+2 OF CALLING SEQUENCE WITH MPAC = OCTAL 612 FOR STATE VECTOR IN MOONS SPHERE OF INFLUENCE

R2512 SUBROUTINES CALLED
R2513 CSMPREC

R2514 ERASABLE INITIALIZATION REQUIRED
R2515 PUSHLIST
R2516 NONE
R2517 MPAC
R2518 NONE
R2519 OTHER
R2520 SPRTETIG TIME OF IGNITION DP B28 CS
R2522 CSM STATE VECTOR

R2523 OUTPUT
R2524 R(T1)/ INITIAL POSITION VECTOR AT TIG VECTOR B29 METERS
R2526 V(T1)/ INITIAL VELOCITY VECTOR AT TIG VECTOR B7 METERS/CS
R2528 T1 INITIAL VECTOR TIME (TIG) DP B28 CS
R2530 UR1/ UNIT INITIAL VECTOR VECTOR B1
R2532 UH/ UNIT HORIZONTAL VECTOR VECTOR B1
R2534 CFPA COSINE OF INITIAL FLIGHT PATH ANGLE DP B1

```
2600                                  32,2455  71220 1  INVC100  STQ     DLOAD
2601  REF   9  LAST  911             32,2456  03752 1           STORE   SPRTEX
2602  REF   2  LAST  909             32,2457  03413 1           STORE   SPRTETIG
2603  REF  38  LAST  783             32,2460  34041 0           STCALL  TDEC1
2604  REF   6  LAST  746             32,2461  27145 1           CSMPREC PRECISION INTEGRATION  R0,V0 TO R1,V1
2605                                  32,2462  67175 0           VLOAD   SXA,2
2606  REF  31  LAST  783             32,2463  00001 0           RATT
2607  REF   2  LAST  131             32,2464  03745 1           P(T1)
2608  REF   4  LAST  904             32,2465  27640 0           STOVL   R(T1)/
2609  REF  24  LAST  783             32,2466  00007 0           VATT
2610  REF   4  LAST  910             32,2467  17672 1           STODL   V(T1)/
2611  REF   7  LAST  515             32,2470  00015 0           TAT
2612  REF   5  LAST  905             32,2471  03716 1           STORE   T1
2613                                  32,2472  53135 0           SLOAD   BZE
2614  REF   3  LAST  912             32,2473  03746 1           P(T1)
```

```
2615  REF  1                 32,2474  64500 0                 INVC109
2624                         32,2475  52135 1  INVC107 SLOAD  GOTO
2625  REF  1                 32,2476  33631 0                 OCT612
2626  REF  4 LAST  902       32,2477  64272 1                 RTEALRM     R1,V1 NOT IN PROPER SPHERE OF INFLUENCE
2650                         32,2500  53575 0  INVC109 VLOAD  UNIT
2651  REF  5 LAST  912       32,2501  03640 0                 R(T1)/
2652  REF  4 LAST  910       32,2502  17554 0          STODL  UR1/        UR1/                          B1
2653                         32,2503  00045 0                 36D
2654  REF  5 LAST  899       32,2504  27646 0          STOVL  R(T1)       R(T1)                         B29
2655  REF  5 LAST  912       32,2505  03672 1                 V(T1)/
2656                         32,2506  77656 1          UNIT
2657  REF  2 LAST  132       32,2507  03562 0          STORE  UV1/
2658                         32,2510  72441 0          DOT    SL1
2659  REF  5 LAST  913       32,2511  03554 0                 UR1/
2660  REF  2 LAST  131       32,2512  03747 0          STORE  CFPA        CFPA                          B1
2661                         32,2513  45246 0          ABS    DSU
2662  REF  1                 32,2514  33644 1                 EPC1RTE
2663                         32,2515  71240 1          BMN    DLOAD
2664  REF  1                 32,2516  64525 1                 INVC115     NOT NEAR RECTILINEAR
2665  REF  6 LAST  910       32,2517  15326 1                 1RTEB2
2666                         32,2520  41525 0          PDDL   PUSH
2668  REF  2 LAST  910       32,2521  15330 0                 ZERORTE
2669                         32,2522  41466 0          VDEF   PUSH        N/ = (0,0,1)
2670                         32,2523  77650 1          GOTO
2671  REF  1                 32,2524  64531 1                 INVC120
2672                         32,2525  47375 0  INVC115 VLOAD  VXV
2673  REF  6 LAST  913       32,2526  03554 0                 UR1/
2674  REF  3 LAST  913       32,2527  03562 0                 UV1/
2675                         32,2530  77606 1          PUSH               N/ = UR X UV                  B2
2676                         32,2531  71214 0  INVC120 CLEAR  DLOAD
2677  REF  2 LAST  910       32,2532  02661 1                 RETROFLG
2678                         32,2533  51006 0          PUSH   BPL
2679  REF  1                 32,2534  64540 1                 INVC125
2680                         32,2535  57575 1          VLOAD  VCOMP       RETROGRADE ORBIT
2681                         32,2536  43006 0          PUSH   SET
2683  REF  3 LAST  913       32,2537  02461 0                 RETROFLG
2684                         32,2540  77775 1  INVC125 VLOAD
2685                         32,2541  53435 0          VXV    UNIT
2686  REF  7 LAST  913       32,2542  03554 0                 UR1/
2687  REF  4 LAST  910       32,2543  03562 0          STORE  UH/         UH/                           B1
2688                         32,2544  77650 1          GOTO
2689  REF 10 LAST  912       32,2545  03752 1                 SPRTEX
```

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P3000 PRECISION TRAJECTORY COMPUTATION SUBROUTINE

R3001 DESCRIPTION
R3002 A NUMERICALLY INTEGRATED TRAJECTORY IS GENERATED WHICH FOR THE RETURN TO EARTH PROBLEM SATISFIES THE REENTRY
R3004 CONSTRAINTS (RCON AND X(T2)) ACHIEVED BY THE INITIAL CONIC TRAJECTORY AND MEETS THE DVD REQUIREMENT AS CLOSELY
R3006 AS POSSIBLE.
R3007
R3010 CALLING SEQUENCE
R3011 L CALL
R3012 L+1 PREC100

R3013 NORMAL EXIT MODE
R3014 AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R3015 ALARM EXIT MODE
R3016 AT L+2 OF CALLING SEQUENCE WITH MPAC =
R3017 OCTAL 605 FOR EXCESS ITERATIONS
R3018 OCTAL 613 FOR REENTRY ANGLE OUT OF LIMITS

R3019 SUBROUTINES CALLED
R3020 INTSTALL
R3021 RTENCK2
R30215 RTENCK3
R3022 TIMERAD
R3023 PARAM
R3024 V2T100

R3025 ERASABLE INITIALIZATION REQUIRED
R3026 PUSHLIST
R3027 NONE
R3028 MPAC
R3029 NONE
R3030 OTHER

R3031	R(T1)/	INITIAL POSITION VECTOR	VECTOR	B29/B27	METERS
R3033	V2(T1)/	POST IMPULSE INITIAL VELOCITY VECTOR	VECTOR	B7/B5	METERS/CS
R3035	V(T1)/	INITIAL VELOCITY VECTOR	VECTOR	B7/B5	METERS/CS
R3039	T1	INITIAL VECTOR TIME	DP	B28	CS
R3041	T12	INITIAL TO FINAL POSITION TIME	DP	B28	CS
R3045	RCON	CONIC FINAL RADIUS	DP	B29/B27	METERS
R3047	R(T1)	MAGNITUDE OF INITIAL POSITION VECTOR	DP	B29/B27	METERS
R3049	X(T2)	COTANGENT OF FINAL FLIGHT PATH ANGLE	DP	B0	
R3051	X(T1)	COTANGENT OF INITIAL FLIGHT PATH ANGLE	DP	B5	
R3057	RTEDVD	DELTA VELOCITY DESIRED	DP	B7/B5	METERS/CS
R3059	MAMAX1	MAJOR AXIS LIMIT FOR LOWER BOUND ON GAMDV ITERATOR	DP	B30/B28	METERS
R3061	MAMAX2	MAJOR AXIS LIMIT FOR UPPER BOUND ON GAMDV ITERATOR	DP	B30/B28	METERS
R3063	UR1/	UNIT INITIAL VECTOR	VECTOR	B1	
R3065	UH/	UNIT HORIZONTAL VECTOR	VECTOR	B1	
R3067	BETA1	1+X(T2)**2	DP	B1	
R3069	PHI2	PERIGEE OR APOGEE INDICATOR	DP	B2	-1 PERIGEE,+1 APOGEE

R3071

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R3072 OUTPUT
R3073 V2(T1)// POST IMPULSE INITIAL VELOCITY VECTOR VECTOR B7 METERS/CS
R3075 R(T2)// FINAL POSITION VECTOR VECTOR B29 METERS
R3077 V(T2)// FINAL VELOCITY VECTOR VECTOR B7 METERS/CS
R3079 T2 FINAL TIME DP B28 CENTISECONDS
R3081

R3100 DEBRIS
R3101 RD FINAL R DESIRED DP B29/B27 METERS
R3111 R/APRE R/A DP B6
R3113 P/RPRE P/R DP B4
R3115 RPRE MAGNITUDE OF R(T2)// DP B29/B27 METERS
R3117 X(T2)PRE COTANGENT OF GAMMA2 DP B0
R3119 DT12 CORRECTION TO FINAL TIME T2 DP B28 CENTISECONDS
R3121 RCON FINAL RADIUS DP B29/B27 METERS
R3123 DRCON DELTA RCON DP B29/B27 METERS

R3125

```
 3150                          32,2546  71220 1  PREC100  STQ     DLOAD
 3151  REF  11  LAST  913      32,2547  03752 1                   SPRTEX
 3156  REF   1                 32,2550  33606 1                   1ORTE
 3157  REF   4  LAST  901      32,2551  17730 0           STODL   NN1A
 3158  REF   7  LAST  902      32,2552  03636 1                   RCON
 3159  REF   2  LAST  131      32,2553  03664 0           STORE   RD
 3164                          32,2554  77745 1  PREC120  DLOAD
31645  REF   1                 32,2555  15344 0                   2RTEB1
31646  REF   2  LAST  131      32,2556  17650 1           STODL   DT21PR          DT21PR = POSMAX
 3165  REF   1                 32,2557  33604 0                   M15RTE
 3166  REF   2  LAST  131      32,2560  37546 1           STCALL  NN2
 3169  REF   1                 32,2561  63652 0                   RTENCK3
 3170                          32,2562  77624 1  PREC125  CALL
 3171  REF   1                 32,2563  37727 1                   PARAM
 3172                          32,2564  77745 1           DLOAD
 3173  REF   4  LAST  675      32,2565  02742 1                   P
 3222  REF   1                 32,2566  14033 1           STODL   P/RPRE
 3223  REF   3  LAST  689      32,2567  02744 1                   R1A
 3224  REF   1                 32,2570  14035 1           STODL   R/APRE
 3225  REF   4  LAST  689      32,2571  00041 1                   R1
 3226  REF   1                 32,2572  14031 0           STODL   RPRE
 3227  REF   3  LAST  130      32,2573  03770 1                   COGA
 3228                          32,2574  77661 0           SL
 3229                          32,2575  20206 1                   5
 3230  REF   1                 32,2576  03724 0           STORE   X(T2)PRE
 3241                          32,2577  43276 0           DCOMP   DAD
 3242  REF  10  LAST  902      32,2600  03726 1                   X(T2)
 3243                          32,2601  45246 0           ABS     DSU
 3244  REF   1                 32,2602  33652 0                   EPC4RTE
 3245                          32,2603  50000 1           BOV     BMN
32455  REF   1                 32,2604  64606 0                   PREC130
 3246  REF   1                 32,2605  64775 0                   PREC175
```

R3247 DESIRED REENTRY ANGLE NOT ACHIEVED

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3248                          32,2606  50145 1  PREC130  DLOAD   BMN
3249   REF  3  LAST  915      32,2607  03546 0           NN2
3250   REF  1                 32,2610  64614 0           PREC140
3251                          32,2611  52135 1  PREC132  SLOAD   GOTO          TOO MANY ITERATIONS
3252   REF  2  LAST  901      32,2612  33630 1           OCT605                EXIT WITH ALARM
3253   REF  1                 32,2613  65100 0           PRECX

R3259  DETERMINE RADIUS AT WHICH THE DESIRED REENTRY ANGLE WILL BE ACHIEVED

3260                          32,2614  53145 1  PREC140  DLOAD   BZE
3261   REF  5  LAST  915      32,2615  03730 0           NN1A
3264   REF  1                 32,2616  64654 1           PREC162
3265                          32,2617  62545 1  PREC150  DLOAD   SL2                                          B2
3266   REF  2  LAST  915      32,2620  00033 1           P/RPRE
3267                          32,2621  72405 0           DMP     SL1           BETA2=BETA1*P/R                B2 PL02
3268   REF  3  LAST  902      32,2622  03744 0           BETA1
32685                         32,2623  71206 0           PUSH    DLOAD
3269   REF  2  LAST  915      32,2624  00035 1           R/APRE
3270                          32,2625  41212 0           SL4     DMP
32705                         32,2626  00001 0           COD
3271                          32,2627  50021 1           BDSU    BMN           BETA3=1-BETA2*R/A
3272   REF  1                 32,2630  31771 1           1RTEB4
3273   REF  1                 32,2631  64644 0           PREC160
3274                          32,2632  75512 0  PREC155  SL2     SQRT
3275                          32,2633  44205 0           DMP     BDSU
3276   REF  3  LAST  902      32,2634  03751 1           PHI2
3277   REF  1                 32,2635  31767 0           1RTEB3
3278                          32,2636  65301 0           NORM    PDDL
3279   REF 35  LAST  903      32,2637  00047 1           X1
3280                          32,2640  56342 1           SR1     DDV           BETA4=BETA2/(1-PHI2*SQRT(BETA3))
3281                          32,2641  52057 1           SL*     GOTO                                         B1
3282                          32,2642  20200 1           0-1,1
3283   REF  1                 32,2643  64662 1           PREC165
3284                          32,2644  60345 0  PREC160  DLOAD   NORM
32845  REF  3  LAST  916      32,2645  00035 1           R/APRE
3285   REF 36  LAST  916      32,2646  00047 1           X1
32855                         32,2647  53665 1           BDDV    SL*                                          B1
3286   REF  1                 32,2650  15334 1           1RTEB1
32865                         32,2651  20173 0           0-6,1
3287                          32,2652  77650 1           GOTO
32875  REF  2  LAST  916      32,2653  64662 1           PREC165
3288                          32,2654  60345 0  PREC162  DLOAD   NORM
32885  REF  2  LAST  915      32,2655  00031 0           RPRE
3289   REF 37  LAST  916      32,2656  00047 1           X1
32895                         32,2657  53665 1           BDDV    SL*           BETA4=RD/RPRE                  B1
3290   REF  3  LAST  915      32,2660  03664 0           RD
32905                         32,2661  20200 1           0 -1,1
3291                          32,2662  41401 1  PREC165  SETPD   PUSH
32915                         32,2663  00001 0           0
3292                          32,2664  57425 0           DSU     DCOMP
```

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32923  REF   2  LAST  916   32,2665   15334 1                 1RTEB1
329235 REF   2  LAST  124   32,2666   03755 0          STORE  BETA12
32924                       32,2667   71240 1          BMN    DLOAD
329243 REF   1              32,2670   64701 0                 PREC168
329247 REF   2  LAST  915   32,2671   03724 0                 X(T2)PRE
32925                       32,2672   71240 1          BMN    DLOAD
329253 REF   1              32,2673   64677 0                 PREC167
329257 REF   3  LAST  917   32,2674   03755 0                 BETA12
32926                       32,2675   77676 0          DCOMP
329265 REF   4  LAST  917   32,2676   03755 0          STORE  BETA12
32927                       32,2677   77745 1  PREC167 DLOAD
329275 REF   5  LAST  917   32,2700   03755 0                 BETA12
3293                        32,2701   45246 0  PREC168 ABS    DSU
3294   REF   1              32,2702   33654 0                 EPC6RTE
3295                        32,2703   71240 1          BMN    DLOAD
3296   REF   2  LAST  915   32,2704   64775 0                 PREC175
3297                        32,2705   72405 0          DMP    SL1
3298   REF   3  LAST  916   32,2706   00031 0                 RPRE
3299                        32,2707   77606 1          PUSH                  RF = NEW RADIUS
3300                        32,2710   43345 1  PREC170 DLOAD  DAD
3301   REF   4  LAST  916   32,2711   03546 0                 NN2
3302   REF   2  LAST  901   32,2712   33600 1                 1RTEB28
3303   REF   5  LAST  917   32,2713   03546 0          STORE  NN2
3304                        32,2714   43175 0          VLOAD  SET
3305   REF  10  LAST  911   32,2715   03656 1                 R(T2)7
3306   REF   9  LAST  908   32,2716   03466 0                 RVSW
3307   REF  11  LAST  910   32,2717   26657 1          STOVL  RVEC
3308   REF   8  LAST  911   32,2720   03710 1                 V(T2)7
3309                        32,2721   77765 0          SIGN
3310   REF   6  LAST  917   32,2722   03755 0                 BETA12
3311   REF  13  LAST  910   32,2723   16746 0          STODL  VVEC
3312   REF   3  LAST  917   32,2724   15334 1                 1RTEB1
3313                        32,2725   57565 0          SIGN   DCOMP
3314   REF   7  LAST  917   32,2726   03755 0                 BETA12
3315                        32,2727   71354 0          LXA,2  DLOAD
3316   REF 287  LAST  907   32,2730   00154 1                 MPAC
3317                        32,2731   67140 0          LXC,1  SXA,2
3318   REF   4  LAST  908   32,2732   03550 1                 CONICX1
3320   REF   3  LAST  908   32,2733   02756 1                 SGNRDOT
3321   REF   4  LAST  910   32,2734   36760 0          STCALL RDESIRED      COMPUTE DT12 (CORRECTION TO TIME OF
3322   REF   2  LAST  908   32,2735   25607 1                 TIMERAD                NEW RADIUS)
3323                        32,2736   75345 1          DLOAD  SIGN
3324   REF   5  LAST  908   32,2737   00037 0                 T
3325   REF   8  LAST  917   32,2740   03755 0                 BETA12
3326                        32,2741   60325 0          PDDL   NORM          DT21=(PHI4)DT21                    PL02D
3327   REF   3  LAST  915   32,2742   03650 1                 DT21PR
3328   REF  38  LAST  916   32,2743   00047 1                 X1
3329                        32,2744   53665 1          BDDV   SL*
3330                        32,2745   00001 0                 COD
33305                       32,2746   20176 0                   -3,1
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3331                          32,2747  50006 1                PUSH   BMN          BETA13=(DT21)/(DT21PR)          B3 PL04D
33315  REF  1                 32,2750  64755 1                       PREC172
3332                          32,2751  65345 0                DLOAD  PDDL         BETA14=1                        B0 PL04D
33325  REF  2  LAST  915      32,2752  15344 0                       2RTEB1
3333                          32,2753  77650 1                GOTO
33335  REF  1                 32,2754  64757 0                       PREC173
3334                          32,2755  65345 0  PREC172       DLOAD  PDDL         BETA14=.6                       B0 PL04D
33345  REF  1                 32,2756  33610 0                       M.6RTE
3335                          32,2757  45271 1  PREC173       DDV    DSU
33355                         32,2760  00003 1                       C2D
3336   REF  2  LAST  916      32,2761  31767 0                       1RTEB3
33365                         32,2762  71240 1                BMN    DLOAD
3337   REF  1                 32,2763  64767 0                       PREC174
33375                         32,2764  77605 1                DMP
3338   REF  4  LAST  917      32,2765  03650 1                       DT21PR
33385                         32,2766  00001 0                STORE  COD          DT21=(BETA14)DT21PR             B28
3339                          32,2767  41545 0  PREC174       DLOAD  PUSH
33395                         32,2770  00001 0                       COD
3340   REF  5  LAST  918      32,2771  37650 0                STCALL DT21PR
3341   REF  1                 32,2772  63634 0                       RTENCK2
3342                          32,2773  77650 1                GOTO
3343   REF  1                 32,2774  64562 1                       PREC125
3356                          32,2775  45345 1  PREC175       DLOAD  DSU
3357   REF  4  LAST  917      32,2776  00031 0                       RPRE
3358   REF  4  LAST  916      32,2777  03664 0                       RD
3359                          32,3000  51406 1                PUSH   ABS          RPRE-RD = RERR
3360                          32,3001  50025 0                DSU    BMN
3361   REF  1                 32,3002  33656 1                       EPC7RTE
3362   REF  1                 32,3003  35022 1                       PREC220

R3363  DESIRED RADIUS HAS NOT BEEN ACHIEVED

3364                          32,3004  53145 1                DLOAD  BZE
3365   REF  6  LAST  916      32,3005  03730 0                       NN1A
3366   REF  1                 32,3006  64611 0                       PREC132         TOO MANY ITERATIONS
3367                          32,3007  53025 0                DSU    BZE
3368   REF  2  LAST  915      32,3010  33606 1                       1ORTE
3369   REF  1                 32,3011  65044 1                       PREC207
3370                          32,3012  45345 1  PREC205       DLOAD  DSU             NOT FIRST PASS OF ITERATION
3371   REF  4  LAST  902      32,3013  03670 0                       RPRE,
3372   REF  5  LAST  918      32,3014  00031 0                       RPRE            RPRE,-RPRE                      B29/B27
3373                          32,3015  55301 0                NORM   BDDV
3374   REF 19  LAST  840      32,3016  00050 1                       X2
3375   REF  4  LAST  901      32,3017  03666 1                       DRCON
33755                         32,3020  41457 1                SL*    PUSH            DRCON/(RPRE,-RPRE)=S            B2
3376                          32,3021  57600 0                       S -2,2
33765                         32,3022  40015 1                DAD    BOV             S GR +4 OR LS -4
3377   REF  4  LAST  917      32,3023  15334 1                       1RTEB1
33775  REF  1                 32,3024  65031 0                       PREC205M
3378                          32,3025  45246 0                ABS    DSU
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33785  REF   5  LAST  918   32,3026  15334 1                  1RTEB1
3379                       32,3027  77640 0          BMN
33795  REF   1                    32,3030  65034 0                  PREC206
3380                       32,3031  57545 1  PREC205M DLOAD    DCOMP          S GR 0 OR LS -4
33805  REF   3  LAST  918   32,3032  15344 0                  2RTEB1
3381                       32,3033  77725 1          PDDL              S=-4                    B2
33815                      32,3034  41345 0  PREC206 DLOAD    DMP
3382                       32,3035  77712 0          SL2
33825  REF   5  LAST  918   32,3036  03666 1          STORE     DRCON          DRCON=S(RERR)           B29
3383                       32,3037  77615 0          DAD
3384   REF   8  LAST  915   32,3040  03636 1                    RCON
3385   REF   9  LAST  919   32,3041  03636 1          STORE     RCON           RCON+DRCON=RCON
3386                       32,3042  77650 1          GOTO
3387   REF   1                    32,3043  65063 1                  PREC210
3388                       32,3044  63545 0  PREC207 DLOAD    DSQ            FIRST PASS OF ITERATION
3389   REF   5  LAST  918   32,3045  03664 0                    RD
3390                       32,3046  70501 1          NORM      SR1
3391   REF  39  LAST  917   32,3047  00047 1                    X1
3392                       32,3050  60325 0          PDDL      NORM
3393   REF   6  LAST  918   32,3051  00031 0                    RPRE
3394   REF  20  LAST  918   32,3052  00050 1                    X2
3395                       32,3053  55260 0          XSU,1     BDDV
3396   REF  21  LAST  919   32,3054  00047 1                    X2
3397                       32,3055  77657 0          SR*
3398                       32,3056  20600 0                    0 -1,1
3399   REF  10  LAST  919   32,3057  03636 1          STORE     RCON           RD**2/RPRE=RCON
3400                       32,3060  77625 0          DSU
3401   REF   6  LAST  919   32,3061  03664 0                    RD
3402   REF   6  LAST  919   32,3062  03666 1          STORE     DRCON          RCON-RD=DRCON
3403                       32,3063  77745 1  PREC210 DLOAD                    PREPARE FOR NEXT ITERATION
3404   REF   7  LAST  919   32,3064  00031 0                    RPRE
3405   REF   5  LAST  918   32,3065  17670 0          STODL     RPRE,
3406   REF   7  LAST  918   32,3066  03730 0                    NN1A
3407                       32,3067  77625 0          DSU
3408   REF   3  LAST  917   32,3070  33600 1                    1RTEB28
3409   REF   8  LAST  919   32,3071  37730 1          STCALL    NN1A
3410   REF   2  LAST  900   32,3072  65102 1                    V2T100
3411                       32,3073  52030 0          BHIZ      GOTO
3412   REF   1                    32,3074  64554 1                  PREC120
3413   REF   2  LAST  916   32,3075  65100 0                  PRECX

R3414  DESIRED RADIUS ACHIEVED

34145  REF   1                    16,2000                  SETLOC    RTE2
34146                      16,3022                  BANK
34148  REF   1                                     COUNT*    $$/P37
3415                       16,3022  45345 1  PREC220 DLOAD    DSU
3416   REF  11  LAST  915   16,3023  03726 1                    X(T2)
3417   REF   3  LAST  917   16,3024  03724 0                    X(T2)PRE
3418                       16,3025  45246 0          ABS       DSU
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3419   REF   1              16,3026   35035 1                    EPC8RTE
3420                        16,3027   67240 0          BMN       SLOAD
3421   REF   1              16,3030   65076 0                    PREC225
3422   REF   1              16,3031   35037 0                    OCT613
3423                        16,3032   77650 1          GOTO
3424   REF   3  LAST  919   16,3033   65100 0                    PRECX          IF REENTRY ANGLE OUT OF LIMITS

34241                       16,3034   00040 0  EPC8RTE 2DEC      .002
34241                       16,3035   30447 0
34242                       16,3036   00613 0  OCT613  OCT       613

R3425  DESIRED FINAL ANGLE HAS BEEN REACHED

34251  REF   2  LAST  906   32,2000                    SETLOC    RTE
34252                       32,3076                    BANK
3426   REF   2 LAST  906 TO  919:   388   388*         COUNT*    $$/P37
3429                        32,3076   77745 1  PREC225 DLOAD
3430   REF   3  LAST  913   32,3077   15330 0                    ZERORTE
3431                        32,3100   77650 1  PRECX   GOTO
3432   REF  12  LAST  915   32,3101   03752 1                    SPRTEX
```

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P3800 INTEGRATION CALLING SUBROUTINE

R3801 DESCRIPTION
R3802 PERFORMS CONIC AND PRECISION INTEGRATIONS USING SUBROUTINE INTEGRVS. THERE ARE THREE ENTRANCES (RTENCK1,
R3804 RTENCK2 AND RTENCK3) FOR DIFFERENT SOURCES OF INPUT AND DIFFERENT OPTIONS. THERE IS A COMMON SET OF OUTPUT
R3806 WHICH INCLUDES SET UP OF INPUT FOR THE PARAM SUBROUTINE

R3807 RTENCK1 (CONIC INTEGRATION)

R3808 CALLING SEQUENCE
R3809 L CALL
R3810 L+1 RTENCK1

R3811 ERASABLE INITIALIZATION REQUIRED
R3812 SAME AS FOR THE RTENCK3 ENTRANCE

R3813 RTENCK2 (PRECISION INTEGRATION)

R3814 CALLING SEQUENCE
R3815 L CALL
R3816 L+1 RTENCK2

R3817 ERASABLE INITIALIZATION REQUIRED
R3818 PUSHLIST
R3819 PUSHLOC-2 INTEGRATION TIME DT12 (CORRECTION TO T2) DP B28 CS
R3821 OTHER
R3822 R(T2)/ FINAL POSITION VECTOR VECTOR .B29 METERS
R3824 V(T2)/ FINAL VELOCITY VECTOR VECTOR B7 METERS/CS
R3826 T2 FINAL TIME DP B28 CS

R3828 RTENCK3 (PRECISION INTEGRATION)

R3829 CALLING SEQUENCE
R3830 L CALL
R3831 L+1 RTENCK3

R3832 ERASABLE INITIALIZATION REQUIRED
R3834 R(T1)/ INITIAL POSITION VECTOR VECTOR B29 METERS
R3836 V2(T1)/ POST IMPULSE INITIAL VELOCITY VECTOR VECTOR B7 M/CS
R3838 T1 INITIAL VECTOR TIME DP B28 CS
R3840 T2 FINAL TIME DP B28 CS

R3842 EXIT MODE
R3843 AT L+2 OF CALLING SEQUENCE
R3844 SUBROUTINES CALLED
R3845 INTSTALL
R3846 INTEGRVS

R3847 OUTPUT
R3848 PUSHLIST

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```
R3849       PUSHLOC-6   FINAL POSITION VECTOR R(T2)/                VECTOR  B29     METERS
R3851         X1        CONICS MUTABLE ENTRY FOR EARTH (-2)         SP      B14
R3853       MPAC
R3854                   FINAL VELOCITY VECTOR V(T2)/                VECTOR  B7      M/CS
R3856       OTHER
R3857         R(T2)/    AS IN PUSHLIST
R3858         V(T2)/    AS IN MPAC
R3859         T2        FINAL TIME                                  DP      B28     CS
R3861

 3890  REF   1                 31,2000                         SETLOC  RTE3
 3891                          31,3624                         BANK
 3892  REF   1                                                 COUNT*  $$/P37
 3897                          31,3624   45020 1  RTENCK1     STQ     CALL
 3898  REF   8  LAST  908     31,3625   03547 1                  RTENCKEX
 3899  REF  17  LAST  641     31,3626   27516 0                  INTSTALL
 3900                          31,3627   43175 0              VLOAD   SET
 3901  REF   6  LAST  913     31,3630   03640 0                  R(T1)/
 3902  REF  11  LAST  588     31,3631   01473 0                  INTYPFLG
 3903                          31,3632   77650 1              GOTO
 3904  REF   1                 31,3633   63660 1                  RTENCK3B
R3905

 3906                          31,3634   45020 1  RTENCK2     STQ     CALL
 3907  REF   9  LAST  922     31,3635   03547 1                  RTENCKEX
 3908  REF  18  LAST  922     31,3636   27516 0                  INTSTALL
 3909                          31,3637   77214 0              CLEAR   VLOAD
 3910  REF  12  LAST  922     31,3640   01673 1                  INTYPFLG
 3911  REF  11  LAST  917     31,3641   03656 1                  R(T2)/
 3912  REF  11  LAST  515     31,3642   25535 0              STOVL   RCV
 3913  REF   9  LAST  917     31,3643   03710 1                  V(T2)/
 3914  REF  10  LAST  514     31,3644   15543 1              STODL   VCV
 3915  REF   5  LAST  910     31,3645   03552 0                  T2
 3916  REF  13  LAST  515     31,3646   01517 0              STORE   TET
 3917                          31,3647   77615 0              DAD
 3918                          31,3650   77650 1              GOTO
 3919  REF   1                 31,3651   63666 1                  RTENCK3D

R3920
 3921                          31,3652   45020 1  RTENCK3     STQ     CALL
 3922  REF  10  LAST  922     31,3653   03547 1                  RTENCKEX
 3923  REF  19  LAST  922     31,3654   27516 0                  INTSTALL
 3925                          31,3655   43175 0  RTENCK3A    VLOAD   CLEAR
 3926  REF   7  LAST  922     31,3656   03640 0                  R(T1)/
 3927  REF  13  LAST  922     31,3657   01673 1                  INTYPFLG
 3928  REF  12  LAST  922     31,3660   25535 0  RTENCK3B    STOVL   RCV
 3929  REF   6  LAST  910     31,3661   03700 0                  V2(T1)/
 3930  REF  11  LAST  922     31,3662   15543 1              STODL   VCV
 3931  REF   6  LAST  912     31,3663   03716 1                  T1
 3932  REF  14  LAST  922     31,3664   15517 0              STODL   TET
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3933   REF   6  LAST  922   31,3665   03552 0                    T2
3934   REF  39  LAST  912   31,3666   00041 1  RTENCK3D STORE    TDEC1
3935                        31,3667   45014 0           CLEAR    CALL
3936   REF  13  LAST  515   31,3670   00263 0                    MOONFLAG
3937   REF   7  LAST  514   31,3671   27211 0                    INTEGRVS
3938                        31,3672   77775 1           VLOAD
3939   REF  32  LAST  912   31,3673   00001 0                    RATT
3950   REF  12  LAST  922   31,3674   03656 1           STORE    R(T2)/
3951                        31,3675   70125 0           PDDL     LXC,1
3952   REF   8  LAST  912   31,3676   00015 0                    TAT
3953   REF   5  LAST  917   31,3677   03550 1                    CONICX1
3954   REF   7  LAST  923   31,3700   27552 0           STOVL    T2
3955   REF  25  LAST  912   31,3701   00007 0                    VATT
3956   REF  10  LAST  922   31,3702   03710 1           STORE    V(T2)/
3957                        31,3703   77650 1           GOTO
3958   REF  11  LAST  922   31,3704   03547 1                    RTENCKEX
3959   REF   3  LAST  920   32,2000                     SETLOC   RTE
3960                        32,3102                     BANK
3961   REF   3 LAST  920 TO  922:     4   392*         COUNT*   $$/P37
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P4000 V2(T1) COMPUTATION SUBROUTINE

R4001 DESCRIPTION
R4002 A POST IMPULSE VELOCITY VECTOR (V2(T1)) IS COMPUTED WHICH EITHER
R4003 (1) MEETS THE INPUT VELOCITY CHANGE DESIRED (RTEDVD) IN A MINIMUM TIME OR
R4005 (2) IF A VELOCITY CHANGE ISN:T SPECIFIED (RTEDVD) = 0), A V2(T1) IS COMPUTED WHICH MINIMIZES THE IMPULSE (DV)
R4007 AND CONSEQUENTLY FUEL.

R4008 CALLING SEQUENCE
R4009 L CALL
R4010 L+1 V2T100

R4011 NORMAL EXIT MODE
R4012 AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R4013 ALARM EXIT MODE
R4014 AT L+2 OF CALLING SEQUENCE WITH MPAC = OCTAL 605 FOR EXCESS ITERATIONS

R4015 SUBROUTINES CALLED
R4016 GAMDV10
R4017 XTILIM
R4018 DVCALC

R4019 ERASABLE INITIALIZATION REQUIRED
R4020 PUSHLIST
R4021 NONE
R4022 MPAC
R4023 NONE
R4024 OTHER

R4025	R(T1)	MAGNITUDE OF INITIAL POSITION VECTOR	DP	B29/B27	METERS
R4027	RCON	MAGNITUDE OF FINAL POSITION VECTOR	DP	B29/B27	METERS
R4029	V(T1)/	INITIAL VELOCITY VECTOR	VECTOR	B7/B5	METERS/CS
R4031	RTEDVD	DELTA VELOCITY DESIRED	DP	B7/B5	METERS/CS
R4033	UR1/	UNIT INITIAL VECTOR	VECTOR	B1	
R4035	UH/	UNIT HORIZONTAL VECTOR	VECTOR	B1	
R4037	X(T2)	COTANGENT OF FINAL FLIGHT PATH ANGLE	DP	B0	
R4039	X(T1)	COTANGENT OF INITIAL FLIGHT PATH ANGLE(INPUT FOR PREC)	DP	B5	
R4041	CFPA	COSINE OF INITIAL FLIGHT PATH ANGLE	DP	B1	
R4043	MAMAX1	MAJOR AXIS LIMIT FOR LOWER BOUND ON GAMDV ITERATOR	DP	B30/B28	METERS
R4045	MAMAX2	MAJOR AXIS LIMIT FOR UPPER BOUND ON GAMDV ITERATOR	DP	B30/B28	METERS
R4049	PHI2	REENTRY NEAR PERIGEE OR APOGEE INDICATE (RTE ONLY)	DP	B2	-1 PERIGEE,+1 APOGEE
R4051	N1	CONIC OR PRECISION ITERATION COUNTER	DP	B28	NEGATIVE CONIC,PLUS PREC

R4053
R4054 OUTPUT

R4055	V2(T1)/	POST IMPULSE INITIAL VELOCITY VECTOR	VECTOR	B7/B5	METERS/CS
R4057	DV	INITIAL VELOCITY CHANGE	DP	B7/B5	METERS/CS
R4059	X(T1)	COTANGENT OF INITIAL FLIGHT PATH ANGLE (POST IMPULSE)	DP	B5	
R4061	PCON	SEMI-LATUS RECTUM	DP	B28/B26	METERS
R4063	BETA1	1+X(T2)**2	DP	B1	

R4067

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R4068   DEBRIS
R4069     PUSHLIST
R4070       00D         X(T1),,=PREVIOUS PRECISION X(T1)                    DP      B5
R4074       02D         THETA1=BETA5*LAMBDA-1                               TP      B17
R4076       05D         THETA2=2*R(T1)*(LAMBDA-1)                           TP      B38/B36
R4078       08D         THETA3=MU**.5/R(T1)                                 DP      B-4/B-5
R4080       10D         X(T1)MIN=LOWER BOUND ON X(T1) IN GAMDV ITERATOR     DP      B5
R4082       12D         DX(T1)MAX=MAXIMUM DELTA X(T1)                       DP      B5
R4084       14D         X(T1)MAX=UPPER BOUND ON X(T1) IN GAMDV ITERATOR     DP      B5
R4086       16D         DX(T1)=ITERATOR INCREMENT                           DP      B5
R4088       31D         GAMDV10 SUBROUTINE RETURN ADDRESS
R4089       32D         DVCALC SUBROUTINE RETURN ADDRESS
R4090       33D         V2T100 SUBROUTINE RETURN ADDRESS

 4100                           32,3102  71220 1  V2T100   STQ     DLOAD
 41005                          32,3103  00041 1                  33D
 4101   REF  11  LAST  919      32,3104  03636 1                  RCON
 41013                          32,3105  45240 0           BMN    DSU          ABORT IF RCON NEGATIVE
 41015  REF   1                 32,3106  65112 0                  V2TERROR
 4102   REF   6  LAST  913      32,3107  03646 0                  R(T1)
 41023                          32,3110  77640 0           BMN
 41025  REF   1                 32,3111  65115 1                  V2T101
 4103                           32,3112  77776 1  V2TERROR EXIT                    OR IF LAMBDA LESS THAN ONE
 41035  REF   4  LAST  443      32,3113  0 5726 1          TC     PODOO        NO SOLUTION IF LAMBDA LESS THAN 1
 4104                           32,3114  20610 1          OCT    20610

 41045                          32,3115  43001 1  V2T101   SETPD  CLEAR
 4105                           32,3116  00001 0                  0                                  PL00D
 4106   REF   1                 32,3117  00272 0                  F2RTE
 4107                           32,3120  60345 0           DLOAD  NORM
 4108   REF  12  LAST  925      32,3121  03636 1                  RCON
 4109   REF  40  LAST  919      32,3122  00047 1                  X1
 4110                           32,3123  60325 0           PDDL   NORM
 4111   REF   7  LAST  925      32,3124  03646 0                  R(T1)
 4112   REF  31  LAST  890      32,3125  00051 0                  S1
 4113                           32,3126  00013 0           STORE  10D
 4114                           32,3127  56342 1           SR1    DDV          R1/RCON = LAMBDA          B1
 4115                           32,3130  65260 0           XSU,1  PDDL                                   PL02D
 4116   REF  32  LAST  925      32,3131  00050 1                  S1
 4117   REF  12  LAST  919      32,3132  03726 1                  X(T2)
 4118                           32,3133  77716 1           DSQ
 4120                           32,3134  43342 0           SR1    DAD
 4121   REF   6  LAST  919      32,3135  15334 1                  1RTEB1
 4122   REF   4  LAST  916      32,3136  03744 0           STORE  BETA1        1+X(T2)**2 = BETA1        B1
 4123                           32,3137  77605 1           DMP
 4124                           32,3140  00001 0                  00D
 41245                          32,3141  00035 1           STORE  28D          BETA1*LAMBDA = BETA5
 41246                          32,3142  53605 1           DMP    SL*
 412461                         32,3143  00001 0                  00D
 412462                         32,3144  20172 1                  0 -7,1
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4125                          32,3145  45257 0        SL*   DSU
4126                          32,3146  20172 1              0 -7,1
4127  REF  2  LAST  600       32,3147  33574 1              1RTEB17
4128                          32,3150  65234 1        RTB   PDDL      BETA5*LAMBDA-1 = THETA1        B17 PL05D
41282 REF  3  LAST  631       32,3151  45657 1              TPMODE
41285 REF  7  LAST  925       32,3152  15334 1              1RTEB1
41287                         32,3153  57457 0        SR*   DCOMP
4129                          32,3154  20601 1              0,1
41295                         32,3155  41215 1        DAD   DMP
4130                          32,3156  00001 0              00D
41302 REF  8  LAST  925       32,3157  03646 0              R(T1)
41305                         32,3160  47057 0        SL*   RTB
41307                         32,3161  20172 1              0 -7D,1
4131  REF  4  LAST  926       32,3162  45657 1              TPMODE
4132                          32,3163  77725 1        PDDL                2*R(T1)*(LAMBDA-1)=THETA2  B38/B36 PL08D
4133  REF  1                  32,3164  33674 1              RTMORTE
4134                          32,3165  70501 1        NORM  SR1
4135  REF 22  LAST  919       32,3166  00050 1              X2
4136                          32,3167  56264 1        XSU,2 DDV
4137  REF 33  LAST  925       32,3170  00050 1              S1
4138                          32,3171  00013 0              10D
4139                          32,3172  65257 1        SR*   PDDL      MU**.5/R(T1)=THETA3        B-4/B-5 PL10D
4140                          32,3173  57170 0              6,2
4141  REF  3  LAST  899       32,3174  03652 0              MAMAX1
4142                          32,3175  41406 0        PUSH  PUSH      MAMAX1=MA
4143                          32,3176  77624 1        CALL
4144  REF  1                  32,3177  65741 0              XT1LIM
4145                          32,3200  41476 1        DCOMP PUSH      X(T1)MIN                   B5 PL12D
4146                          32,3201  40476 0        DCOMP SR4
4147                          32,3202  41525 0        PDDL  PUSH      DX(T1)MAX                  B5 PL14D
4148  REF  3  LAST  899       32,3203  03654 0              MAMAX2
4149                          32,3204  45006 0        PUSH  CALL
4150  REF  2  LAST  926       32,3205  65741 0              XT1LIM
4151                          32,3206  50125 1        PDDL  BMN       X(T1)MAX                   B5 PL16D
4152  REF  9  LAST  919       32,3207  03730 0              NN1A
4153  REF  1                  32,3210  65213 1              V2T102
4154                          32,3211  77650 1        GOTO
4155  REF  1                  32,3212  65225 1              V2T110

R4156 PROCEED HERE IF NOT PRECISION COMPUTATION

4158                          32,3213  77745 1  V2T102 DLOAD
4159  REF  7  LAST  899       32,3214  03632 0              RTEDVD
4160                          32,3215  52054 1        BZE   GOTO
4161  REF  1                  32,3216  65220 1              V2T105
4162  REF  1                  32,3217  65321 1              V2T140
4163                          32,3220  50145 1  V2T105 DLOAD BMN
4164  REF  3  LAST  913       32,3221  03747 0              CFPA
4165  REF  2  LAST  926       32,3222  65321 1              V2T140
4166                          32,3223  77650 1        GOTO
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 4167   REF   1                32,3224   65327 1                    V2T145

R4168   DURING A PRECISION TRAJECTORY ITERATION CONSTRAIN THE INDEPENDENT
R4169   VARIABLE TO INSURE THAT ALL CONICS PASS THROUGH RCON ON THE SAME PASS
R4170   THROUGH X(T2)

 4171                            32,3225   47145 1  V2T110   DLOAD   RTB
 4172   REF   3  LAST  926      32,3226   33574 1           IRTEB17
 4173   REF   5  LAST  926      32,3227   45657 1           TPMODE
 4174                            32,3230   65276 1           DCOMP   PDDL            -1                          B17 PL19D
 4175   REF   4  LAST  919      32,3231   15344 0           2RTEB1
 4176                            32,3232   45257 0           SR*     DSU
 41765                           32,3233   20601 1                   C,1
 4177                            32,3234   00001 0                   00D
 41775                           32,3235   53605 1           DMP     SL*
 4178                            32,3236   00035 1                   28D
 41785                           32,3237   20172 1                   0 -7,1
 4179                            32,3240   76257 0           SL*     TAD
 41795                           32,3241   20172 1                   0 -7,1
 4180                            32,3242   65234 1           RTB     PDDL            BETA5(2-LAMBDA)-1=BETA6     B17 PL19D
 4181   REF   6  LAST  927      32,3243   45657 1                   TPMODE
 4182   REF   2  LAST  131      32,3244   03722 0                   X(T1)
 4183                            32,3245   00001 0           STORE   00D             X(T1),,                     B5
 4184                            32,3246   77751 1           TLOAD                                               PL16D
 4185                            32,3247   53040 0           BMN     BZE
 4186   REF   1                  32,3250   65255 0                   V2T115
 41865  REF   2  LAST  927      32,3251   65255 0                   V2T115
 4187                            32,3252   52061 1           SL      GOTO
 4188                            32,3253   20210 0                   7
 4189   REF   1                  32,3254   65266 0                   V2T120
 4190                            32,3255   50145 1  V2T115   DLOAD   BMN
 4191   REF   4  LAST  916      32,3256   03751 1                   PHI2
 4192   REF   1                  32,3257   65277 0                   V2T125
 4193                            32,3260   77676 0           DCOMP
 4194   REF   5  LAST  927      32,3261   17751 1           STODL   PHI2
 4195   REF   3  LAST  918      32,3262   33606 1                   IORTE
 4196   REF  10  LAST  926      32,3263   03730 0           STORE   NN1A
 4197                            32,3264   77650 1           GOTO
 4198   REF   2  LAST  927      32,3265   65277 0                   V2T125
 4199                            32,3266   47166 0  V2T120   SQRT    RTB
 4200   REF   1                  32,3267   45765 1                   DPMODE
 42005                           32,3270   50125 1           PDDL    BMN             BETA6**.5=X(T1)LIM          B5 PL18D
 4201   REF   6  LAST  927      32,3271   03751 1                   PHI2
 4202   REF   1                  32,3272   65305 1                   V2T130
 4203                            32,3273   45545 1           DLOAD   STADR                                       PL16D
 4204                            32,3274   77760 0           STORE   14D             X(T1)LIM = X(T1)MAX
 4205                            32,3275   77676 0           DCOMP
 4206                            32,3276   00013 0           STORE   10D             -X(T1)LIM = X(T1)MIN
 4207                            32,3277   53145 1  V2T125   DLOAD   BZE
 4208   REF   3  LAST  927      32,3300   03722 0                   X(T1)
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4209   REF  3 LAST 926  32,3301  65321 1                V2T140
4210            32,3302  52040 1          BMN    GOTO
4211   REF  4 LAST 928  32,3303  65321 1                V2T140
4212   REF  2 LAST 927  32,3304  65327 1                V2T145
4213            32,3305  53145 1  V2T130  DLOAD  BZE
4214   REF  4 LAST 927  32,3306  03722 0                X(T1)
4215   REF  1           32,3307  65316 0                V2T135
4216            32,3310  71240 1          BMN    DLOAD                                    PL16D
4217   REF  2 LAST 928  32,3311  65316 0                V2T135
4218            32,3312  77626 0          STADR
4219            32,3313  77764 1          STORE  10D     X(T1)LIM = X(T1)MIN
4220            32,3314  77650 1          GOTO
4221   REF  3 LAST 928  32,3315  65327 1                V2T145
4222            32,3316  57545 1  V2T135  DLOAD  DCOMP                                    PL16D
4223            32,3317  77626 0          STADR
4224            32,3320  77760 0          STORE  14D     -X(T1)LIM = X(T1)MAX
4225            32,3321  77745 1  V2T140  DLOAD
4226            32,3322  00013 0                10D
4227   REF  5 LAST 928  32,3323  17722 0          STODL  X(T1)   X(T1)MIN = X(T1)
4228            32,3324  00015 0                12D
4229            32,3325  52006 0          PUSH   GOTO    DX(T1)MAX = DX(T1)               PL18D
4230   REF  1           32,3326  65334 0                V2T150
4231            32,3327  77745 1  V2T145  DLOAD
4232            32,3330  00017 1                14D
4233   REF  6 LAST 928  32,3331  17722 0          STODL  X(T1)   X(T1)MAX = X(T1)
4234            32,3332  00015 0                12D
4235            32,3333  41476 1          DCOMP  PUSH    -DX(T1)MAX = DX(T1)              PL18D
4236            32,3334  77624 1  V2T150  CALL           GOTO X(T1)-DV ITERATOR
4237   REF  1           32,3335  65464 1                GAMDV10
4238            32,3336  53145 1          DLOAD  BZE     EXIT IF MINIMUM FUEL MODE
4239   REF  8 LAST 926  32,3337  03632 0                RTEDVD
4240   REF  1           32,3340  65462 1                V2T1X

R4241  CONTINUE IF TIME CRITICAL MODE

4242            32,3341  50025 0          DSU    BMN
4243   REF  3 LAST 903  32,3342  03706 0                DV
4244   REF  1           32,3343  65346 0                V2T155
4245            32,3344  77650 1          GOTO
4246   REF  1           32,3345  65401 1                V2T175
4247            32,3346  50145 1  V2T155  DLOAD  BMN
4248   REF 11 LAST 927  32,3347  03730 0                NN1A
4249   REF  1           32,3350  65353 1                V2T160
4250            32,3351  77650 1          GOTO
4251   REF  1           32,3352  65423 1                V2T185

R4252  CONIC TRAJECTORY COMPUTATION

4253            32,3353  53145 1  V2T160  DLOAD  BZE
4254   REF  7 LAST 928  32,3354  03722 0                X(T1)
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4255   REF   1                32,3355   65361 0                    V2T165
4256                          32,3356   52040 1            BMN     GOTO
4257   REF   2  LAST  929      32,3357   65361 0                    V2T165
4258   REF   1                32,3360   65460 0                    V2T300
4259                          32,3361   53145 1  V2T165    DLOAD   BZE
4260   REF   4  LAST  926      32,3362   03747 0                    CFPA
4261   REF   2  LAST  929      32,3363   65460 0                    V2T300
4262                          32,3364   71240 1            BMN     DLOAD
4263   REF   3  LAST  929      32,3365   65460 0                    V2T300
4264                          32,3366   00017 1                    14D
4265   REF   8  LAST  928      32,3367   17722 0            STODL   X(T1)          X(T1)MAX=X(T1)
4266                          32,3370   00015 0                    12D
4267                          32,3371   77676 0            DCOMP
4268                          32,3372   34021 0            STCALL  16D            -DX(T1)MAX=DX(T1)
4269   REF   2  LAST  928      32,3373   65464 1                    GAMDV1D
4270                          32,3374   45345 1            DLOAD   DSU
4271   REF   9  LAST  928      32,3375   03632 0                    RTEDVD
4272   REF   4  LAST  928      32,3376   03706 0                    DV
4273                          32,3377   77640 0            BMN
4274   REF   4  LAST  929      32,3400   65460 0                    V2T300
4279                          32,3401   71214 0  V2T175    SET     DLOAD
4280   REF   2  LAST  925      32,3402   00072 1                    F2RTE
4281   REF   9  LAST  929      32,3403   03722 0                    X(T1)
42811                         32,3404   77614 1            BOFF
42812  REF   3  LAST  899      32,3405   02742 1                    SLOWFLG
42813  REF   1                32,3406   65413 1                    V2T177
42814                         32,3407   14013 0            STODL   10D              X(T1)MIN
42815                         32,3410   00015 0                    12D            DX(T1)MAX
42816                         32,3411   77650 1            GOTO
42817  REF   1                32,3412   65416 1                    V2T179
4282                          32,3413   14017 1  V2T177    STODL   14D
4283                          32,3414   00015 0                    12D
4284                          32,3415   77676 0            DCOMP
4285                          32,3416   34021 0  V2T179    STCALL  16D              DX(T1)
4286   REF   3  LAST  929      32,3417   65464 1                    GAMDV1D
4287                          32,3420   50145 1            DLOAD   BMN
42875  REF  12  LAST  928      32,3421   03730 0                    NN1A
4288   REF   5  LAST  929      32,3422   65460 0                    V2T300

R42885  PREVENT A LARGE CHANGE IN INDEPENDENT VARIABLE DURING AN ITERATION FOR A
R428851 PRECISION TRAJECTORY

4289                          32,3423   45345 1  V2T185    DLOAD   DSU
4290   REF  10  LAST  929      32,3424   03722 0                    X(T1)
4291                          32,3425   00001 0                    00D
4292                          32,3426   65246 1            ABS     PDDL           /X(T1)-X(T1),,/ = BETA7
4293                          32,3427   00015 0                    12D
4294                          32,3430   44352 0            SL1     BDSU
4295                          32,3431   71240 1            BMN     DLOAD
4296   REF   6  LAST  929      32,3432   65460 0                    V2T300
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4297                        32,3433  00001 0                    00D        CONTINUE IF BETA7 LARGER THAN 2DX(T1)MAX
4298  REF  11  LAST  929    32,3434  03722 0          STORE     X(T1)      X(T1),, = X(T1)
4299                        32,3435  50025 0          DSU       BMN
4300                        32,3436  00017 1                    14D
4301  REF   1               32,3437  65445 1                    V2T195
4302                        32,3440  77745 1          DLOAD
4303                        32,3441  00017 1                    14D
4304  REF  12  LAST  930    32,3442  03722 0          STORE     X(T1)      X(T1)MAX = X(T1)
4305                        32,3443  77650 1          GOTO
4306  REF   1               32,3444  65456 0                    V2T205
4307                        32,3445  45345 1  V2T195   DLOAD     DSU
4308  REF  13  LAST  930    32,3446  03722 0                    X(T1)
4309                        32,3447  00013 0                    10D
4310                        32,3450  52040 1          BMN       GOTO
4311  REF   1               32,3451  65453 0                    V2T200
4312  REF   2  LAST  930    32,3452  65456 0                    V2T205
4313                        32,3453  77745 1  V2T200   DLOAD
4314                        32,3454  00013 0                    10D
4315  REF  14  LAST  930    32,3455  03722 0          STORE     X(T1)      X(T1)MIN = X(T1)
4316                        32,3456  77624 1  V2T205   CALL
4317  REF   1               32,3457  65665 1                    DVCALC
4318                        32,3460  77745 1  V2T300   DLOAD
4319  REF   4  LAST  920    32,3461  15330 0                    ZERORTE
4320                        32,3462  77650 1  V2T1X     GOTO
4321                        32,3463  00041 1                    33D
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P4400 X(T1)-DV ITERATOR SUBROUTINE

R4401 DESCRIPTION
R4402 COMPUTES A POST IMPULSE VELOCITY VECTOR (V2(T1)) WHICH REQUIRES A MINIMUM DV.
R4404 CALLING SEQUENCE
R4405 L CALL
R4406 L+1 GAMDV10

R4407 NORMAL EXIT MODE
R4410 AT L+2 OF CALLING SEQUENCE

R4411 ALARM EXIT MODE
R4412 AT V2T1X WITH MPAC = OCTAL 605 FOR EXCESS ITERATIONS

R4413 SUBROUTINES CALLED
R4414 DVCALC

R4415 ERASABLE INITIALIZATION REQUIRED
R4416 PUSHLIST

R4417	02D	THETA1=BETA5*LAMBDA-1	TP	B17	
R4419	05D	THETA2=2*R(T1)*(LAMBDA-1)	TP	B38/B36	
R4421	08D	THETA3=MU**.5/R(T1)	DP	B-4/B-5	
R4423	10D	X(T1)MIN=LOWER BOUND ON INDEPENDENT VARIABLE X(T1)	DP	B5	
R4425	12D	DX(T1)MAX=MAXIMUM DX(T1)	DP	B5	
R4427	14D	X(T1)MAX=UPPER BOUND ON INDEPENDENT VARIABLE X(T1)	DP	B5	
R4429	16D	DX(T1)=ITERATOR INCREMENT	DP	B5	

R4431 MPAC
R4432 NONE
R4433 OTHER

R4434	V(T1)/	INITIAL VELOCITY VECTOR	VECTOR	B7/B5	METERS/CS
R4436	RTEDVD	DELTA VELOCITY DESIRED	DP	B7/B5	METERS/CS
R4438	UR1/	UNIT INITIAL VECTOR	VECTOR	B1	
R4440	UH/	UNIT HORIZONTAL VECTOR	VECTOR	B1	
R4442	X(T1)	COTANGENT OF INITIAL FLIGHT PATH ANGLE (FROM VERTICAL)	DP	B5	
R4444	F2RTE	TIME CRITICAL OR MINIMUM FUEL MODE INDICATOR	STATE AREA		0 MIN. FUEL, 1 MIN. TIME

R4446
R4447 OUTPUT

R4448	V2(T1)/	POST IMPULSE INITIAL VELOCITY VECTOR	VECTOR	B7/B5	METERS/CS
R4450	DV	INITIAL VELOCITY CHANGE	DP	B7/B5	METERS/CS
R4452	X(T1)	COTANGENT OF INITIAL FPA MEASURED FROM VERTICAL	DP	B5	
R4454	PCON	SEMI-LATUS RECTUM	DP	B28/B26	METERS

R4456
R4457 DEBRIS
R4458 PUSHLIST

R4459	00D	X(T1),,
R4462	02D	THETA1
R4463	05D	THETA2
R4464	08D	THETA3
R4465	10D	X(T1)MIN
R4466	12D	DX(T1)MAX

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R4467      14D          X(T1)MAX
R4468      16D          DX(T1)
R4473      22D          DV,=PREVIOUS DV                                    DP      B7/B5
R4475      24D          BETA9=X(T1)+1.1DX(T1)                              DP      B5
R4477      31D          GAMDV10 SUBROUTINE RETURN ADDRESS
R4478      32D          DVCALC SUBROUTINE RETURN ADDRESS
R4479      33D          V2T100 SUBROUTINE RETURN ADDRESS
 4490                    32,3464   77620 0  GAMDV10  STQ
 4491                    32,3465   00037 0           31D
 4500                    32,3466   45001 1  SETPD    CALL
 4501                    32,3467   00023 0           18D                                                    PL18D
 4502  REF  2 LAST 930   32,3470   65665 1           DVCALC
 4503                    32,3471   45345 1  DLOAD    DSU
 4504                    32,3472   00017 1           14D
 4505                    32,3473   00013 0           10D
 4506                    32,3474   77600 1  BOV
 4507  REF  1            32,3475   65515 0           GAMDV20
 4508                    32,3476   45206 1  PUSH     DSU       X(T1)MAX-X(T1)MIN=BETA8          B5 PL20D
 4509  REF  1            32,3477   33576 0           EPC9RTE
 4510                    32,3500   71240 1  BMN      DLOAD
 4511  REF  1            32,3501   65663 1           GAMDVX    BOUNDS CLOSE TOGETHER
 4512                    32,3502   00023 0           18D
 4513                    32,3503   50025 0  DSU      BMN       BETA8-DX(T1)MAX
 4514                    32,3504   00015 0           12D
 4515  REF  1            32,3505   65511 1           GAMDV15
 4516                    32,3506   52001 1  SETPD    GOTO                                                   PL18D
 4517                    32,3507   00023 0           18D
45175  REF  2 LAST 932   32,3510   65515 0           GAMDV20
 4518                    32,3511   77745 1  GAMDV15  DLOAD                                                  PL18D
 4519                    32,3512   70565 0  SIGN     SR1
 4520                    32,3513   00021 1           16D
 4521                    32,3514   00021 1  STORE    16D       BETA8(SIGNDX(T1))/2=DX(T1)
 4522                    32,3515   77745 1  GAMDV20  DLOAD
 4523  REF  1            32,3516   33602 0           M144RTE
 4524  REF  6 LAST 917   32,3517   03546 0  STORE    NN2
 4525                    32,3520   43345 1  GAMDV25  DLOAD    DAD
 4526  REF  7 LAST 932   32,3521   03546 0           NN2
 4527  REF  4 LAST 919   32,3522   33600 1           IRTEB28
 4528                    32,3523   67240 0  BMN      SLOAD
 4529  REF  1            32,3524   65530 1           GAMDV30
 4530  REF  3 LAST 916   32,3525   33630 1           OCT605
 4531                    32,3526   77650 1  GOTO
 4532  REF  2 LAST 928   32,3527   65462 1           V2T1X
 4533  REF  8 LAST 932   32,3530   03546 0  GAMDV30  STORE    NN2       NN2=NN2+1
 4534                    32,3531   65345 0  DLOAD    PDDL      X(T1)=X(T1),                     B5 PL20D
 4535  REF 15 LAST 930   32,3532   03722 0           X(T1)
 4536  REF  5 LAST 929   32,3533   03706 0           DV
 4537                    32,3534   43325 1  PDDL     DAD       DV=DV,                           B7/B5 PL22D
 4538  REF 16 LAST 932   32,3535   03722 0           X(T1)
 4539                    32,3536   00021 1           16D
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4540   REF  17  LAST  932   32,3537  37722 1            STCALL  X(T1)          X(T1)+DX(T1)=X(T1)                    B5
4541   REF   3  LAST  932   32,3540  65665 1                    DVCALC
4542                        32,3541  71214 0            BON     DLOAD
4543   REF   3  LAST  929   32,3542  00312 1                    FZRTE
4544   REF   1               32,3543  65557 0                    GAMDV35
4545   REF   6  LAST  932   32,3544  03706 0                    DV
4546                        32,3545  50025 0            DSU     BMN             CONTINUE IF FUEL CRITICAL MODE
4547                        32,3546  00025 0                    2D
4548   REF   1               32,3547  65554 0                    GAMDV33
4549                        32,3550  57545 1  GAMDV32    DLOAD   DCOMP
4550                        32,3551  00021 1                    16D
4551                        32,3552  77742 0            SR1
4552                        32,3553  00021 1            STORE   16D
4553                        32,3554  52001 1  GAMDV33    SETPD   GOTO
4554                        32,3555  00023 0                    18D                                          PL18D
4555   REF   1               32,3556  65622 1                    GAMDV50

R4556  TIME CRITICAL MODE

4557                        32,3557  45345 1  GAMDV35    DLOAD   DSU
4558   REF  10  LAST  929   32,3560  03632 0                    RTEDVD
4559   REF   7  LAST  933   32,3561  03706 0                    DV
4560                        32,3562  41525 0            PDDL    PUSH            DVD-DV=DVERR                  B7/B5 PL22D
4561                        32,3563  51545 1  GAMDV40    DLOAD   ABS             DV,                                   PL24D
4562                        32,3564  00025 0                    2D
4563                        32,3565  50025 0            DSU     BMN
4564   REF   1               32,3566  33660 1                    EPCLORTE
4565   REF   2  LAST  932   32,3567  65663 1                    GAMDVX
4566                        32,3570  71204 1  GAMDV45    BOVB    DLOAD
45661  REF   8  LAST  880   32,3571  57544 0                    TCDANZIG        ASSURE OVFIND IS 0
4567                        32,3572  60221 0            BDSU    NORM
4568   REF   8  LAST  933   32,3573  03706 0                    DV
4569   REF  23  LAST  926   32,3574  00050 1                    X2
4570                        32,3575  77725 1            PDDL                    DV-DV,                        B7/B5=N2 PL22D
4571                        32,3576  70501 1            NORM    SR1             DVERR                         B8/B6=N1
4572   REF  41  LAST  925   32,3577  00047 1                    X1
4573                        32,3600  65271 0            DDV     PDDL            DVERR/ DV - DV
4576                        32,3601  41221 0            BDSU    DMP                                                  PL18D
4577   REF  18  LAST  933   32,3602  03722 0                    X(T1)
4578                        32,3603  77660 1            XSU,1
4579   REF  24  LAST  933   32,3604  00047 1                    X2
45791                       32,3605  00021 1            STORE   16D             PRESERVE SIGN IF OVERFLOW
45792                       32,3606  40057 1            SR*     BOV
4580                        32,3607  20600 0                    0 -1,1
45801  REF   1               32,3610  65616 0                    GAMDV47
4581                        32,3611  00021 1            STORE   16D             (X(T1)-X(T1),)DVERR/(DV-DV,)=DX(T1)
4582                        32,3612  45246 0            ABS     DSU
4583                        32,3613  00015 0                    12D
4584                        32,3614  77640 0            BMN
4585   REF   2  LAST  933   32,3615  65622 1                    GAMDV50
```

```
 4586                        32,3616  75345 1  GAMDV47  DLOAD   SIGN
 4587                        32,3617  00015 0           12D
 4588                        32,3620  00021 1           16D
 4589                        32,3621  00021 1           STORE   16D          DX(T1)MAX(SIGNDX(T1))=DX(T1)

R4590  CHECK TO KEEP INDEPENDENT VARIABLE IN BOUNDS

 4591                        32,3622  41345 0  GAMDV50  DLOAD   DMP
 4592                        32,3623  00021 1           16D
 4593  REF   1               32,3624  33612 1           1.1RTE81
 4594                        32,3625  43352 1           SL1     DAD
 4595  REF  19  LAST  933    32,3626  03722 0                   X(T1)
 4596                        32,3627  00031 0           STORE   24D          X(T1)+1.1DX(T1)=BETA9        B5
 4597                        32,3630  50025 0           DSU     BMN
 4598                        32,3631  00017 1                   14D
 4599  REF   1               32,3632  65641 1                   GAMDV55
 4600                        32,3633  45345 1           DLOAD   DSU
 4601                        32,3634  00017 1                   14D
 4602  REF  20  LAST  934    32,3635  03722 0                   X(T1)
 4603                        32,3636  77742 0           SR1
 4604                        32,3637  34021 0           STCALL  16D          (X(T1)MAX-X(T1))/2=DX(T1)    B5
 4605  REF   1               32,3640  65654 0                   GAMDV65
 4606                        32,3641  45345 1  GAMDV55  DLOAD   DSU
 4607                        32,3642  00031 0                   24D
 4608                        32,3643  00013 0                   10D
 4609                        32,3644  52040 1           BMN     GOTO
 4610  REF   1               32,3645  65647 1                   GAMDV60
 4611  REF   2  LAST  934    32,3646  65654 0                   GAMDV65
 4612                        32,3647  45345 1  GAMDV60  DLOAD   DSU
 4613                        32,3650  00013 0                   10D
 4614  REF  21  LAST  934    32,3651  03722 0                   X(T1)
 4615                        32,3652  77742 0           SR1
 4616                        32,3653  00021 1           STORE   16D          (X(T1)MIN-X(T1))/2=DX(T1)    B5
 4617                        32,3654  51545 1  GAMDV65  DLOAD   ABS
 4618                        32,3655  00021 1                   16D
 4619                        32,3656  50025 0           DSU     BMN
 4620  REF   2  LAST  932    32,3657  33576 0                   EPC9RTE
 4621  REF   3  LAST  933    32,3660  65663 1                   GAMDVX
 4622                        32,3661  77650 1           GOTO
 4623  REF   1               32,3662  65520 0                   GAMDV25
 4624                        32,3663  77650 1  GAMDVX   GOTO
 4625                        32,3664  00037 0                   31D
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P4700   DV CALCULATION SUBROUTINE

R4701   INPUT
R4702     PUSHLIST
R4703       02D         THETA1=BETA5*LAMBDA-1                      TP       B17
R4705       05D         THETA2=2*R(T1)*(LAMBDA-1)                  TP       B38/B36
R4707       08D         THETA3=MU**.5/R(T1)                        DP       B-4/B-5
R4709     OTHER
R4710       X(T1)       COTANGENT OF POST IMPULSE INITIAL FLIGHT PATH ANGLE  DP       B5
R4712       V(T1)/      INITIAL VELOCITY VECTOR (PRE IMPULSE)      VECTOR   B7/B5   METERS/CS
R4714       UR1/        UNIT INITIAL VECTOR                        VECTOR   B1
R4716       UH/         UNIT HORIZONTAL VECTOR                     VECTOR   B1
R4718
R4719   OUTPUT
R4720       V2(T1)/     POST IMPULSE INITIAL VELOCITY VECTOR       VECTOR   B7/B5   METERS/CS
R4722       DV          INITIAL VELOCITY CHANGE                    DP       B7/B5   METERS/CS
R4724       PCON        SEMI-LATUS RECTUM                          DP       B28/B26 METERS
R4726
R4727   DEBRIS
R4728       28D         THETA3*PCON**.5                            DP       B10/B8-N1
R4730       C(PUSLOC)   THETA3(PCON**.5)*X(T1)*UR1/                VECTOR   B7/B5
R4732       32D         DVCALC SUBROUTINE RETURN ADDRESS
R4733       X1          NORMALIZATION FACTOR FOR VALUE IN 28D
R4734   PUSHLOC IS RESTORED TO ITS ENTRANCE VALUE UPON EXITING DVCALC

4750                    32,3665  71220 1  DVCALC   STQ     DLOAD
4751                    32,3666  00040 0           DLOAD   32D
4752  REF 22 LAST 934   32,3667  03722 0           DLOAD   X(T1)
4753                    32,3670  54316 1           DSQ     SR
4754                    32,3671  20610 1           DSQ     7
4755                    32,3672  76276 0           DCOMP   TAD
4756                    32,3673  00003 1           DCOMP   02D
4757                    32,3674  41501 0           NORM    PUSH
4758  REF 42 LAST 933   32,3675  00047 1           NORM    X1
4759                    32,3676  60351 0           TLOAD   NORM
4760                    32,3677  00006 1           TLOAD   06D
4761  REF 25 LAST 933   32,3700  00050 1           TLOAD   X2
4762                    32,3701  70434 0           RTB     SR1
47625 REF  2 LAST 927   32,3702  45765 1           RTB     DPMODE
476251                  32,3703  56264 1           XSU,2   DDV
4763  REF 43 LAST 935   32,3704  00046 0           XSU,2   X1
47635                   32,3705  77657 0           SR*
476351                  32,3706  57170 0           STORE   6,2
4764  REF  3 LAST 902   32,3707  03720 1           STORE   PCON      THETA2/(THETA1-X(T1)**2)=PCON B28/26
4765                    32,3710  41366 1           SQRT    DMP
4766                    32,3711  00011 1           SQRT    08D
4767                    32,3712  77701 1           NORM
4768  REF 44 LAST 935   32,3713  00047 1           NORM    X1
4769                    32,3714  14035 1           STODL   28D       THETA3*PCON**.5          B10/B8 -N1
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4770  REF  23  LAST  935   32,3715  03722 0          X(T1)
4771                       32,3716  74301 0   NORM   VXSC
4772  REF  26  LAST  935   32,3717  00050 1          X2
4773  REF   8  LAST  913   32,3720  03554 0          UR1/          X(T1)*UR1/                B5+B1 -N2
4774                       32,3721  74274 0   XAD,2  VXSC
4775  REF  45  LAST  935   32,3722  00046 0          X1
4776                       32,3723  00035 1          28D
4777                       32,3724  63257 1   VSR*   PDVL          THETA3(PCON**.5)X(T1)*UR1/ B7/B5
4778                       32,3725  57207 0          0 -9D,2              +
4779  REF   5  LAST  913   32,3726  03562 0          UH/
4780                       32,3727  53761 1   VXSC   VSR*          THETA3(PCON**.5)UH/        B7/B5
4781                       32,3730  00035 1          28D
4782                       32,3731  20575 1          0 -4,1               =
4783                       32,3732  45455 1   VAD    STADR
4784  REF   7  LAST  922   32,3733  74077 1   STORE  V2(T1)/       V2(T1)/                    B7/B5
4785                       32,3734  51451 0   VSU    ABVAL
4786  REF   6  LAST  913   32,3735  03672 1          V(T1)/
4787  REF   9  LAST  933   32,3736  03706 0   STORE  DV            ABVAL(V2(T1)/-V1(T)/)=DV   B7/B5
4788                       32,3737  77650 1   GOTO
4789                       32,3740  00040 0          32D
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P4800   SUBROUTINE TO COMPUTE BOUNDS ON INDEPENDENT VARIABLE X(T1)

R4801   INPUT
R4802     PUSHLIST
R4803       PUSHLOC -4  MAJOR AXIS (MA)                          DP      B30/B28
R4805       PUSHLOC -2  MAJOR AXIS (MA) AGAIN                    DP      B30/B28
R4807       28D         BETA5=LAMBDA*BETA1                       DP      B9
R4809     OTHER
R4810       RCON                                                 DP      B29/B27
R4812       R(T1)                                                DP      B29/B27
R4814   OUTPUT
R4815     MPAC
R4816       X(T1)LIM    LIMIT ON INDEPENDENT VARIABLE X(T1)      DP      B5
R4818   DEBRIS
R4819     PUSHLIST
R4820       C(PUSHLOC)  MA-RCON                                  DP      (B30/28)-N1
R4823       C(PSHLOC)+2 MA                                       DP      B30/B28
R4825       X1          NORMALIZATION FACTOR FOR MA-RCON
R4826       20D         XT1LIM SUBROUTINE RETURN ADDRESS
R4827   PUSHLOC IS RESTORED TO ITS ENTRANCE VALUE UPON EXITING XT1LIM

 4850                       32,3741   71220 1  XT1LIM   STQ     DLOAD
 4851                       32,3742   00024 1                    20D
 4852   REF  13  LAST  925  32,3743   03636 1                    RCON
 4853                       32,3744   44342 1           SR1      BDSU
 4854                       32,3745   65301 0           NORM     PDDL      MA-RCON                    B30-N1
 4855   REF  27  LAST  936  32,3746   00050 1                    X2
 4856                       32,3747   70525 1           PDDL     SR1
 4857   REF   9  LAST  926  32,3750   03646 0                    R(T1)
 4858                       32,3751   56221 0           BDSU     DDV
 4859                       32,3752   41257 1           SL*      DMP
 4860                       32,3753   57601 1                    0-3,2                                 B3
 48605                      32,3754   00035 1                    28D
 4861                       32,3755   45257 0           SL*      DSU       BETA10=BETA5(MA-RT)/(MA-RC)-1   B11
 48615                      32,3756   20173 0                    0-6,1
 4862   REF   1             32,3757   33577 1                    1RTEB25 +1      1,0 B-11
 48625                      32,3760   40152 0           SL1      BDV                                   B10
 4863   REF   1             32,3761   65765 0                    XT1LIM2
 48635                      32,3762   52040 1           BMN      GOTO
 4864   REF   1             32,3763   65771 0                    XT1LIM5
 48645  REF   1             32,3764   65767 1                    XT1LIM3
 4865                       32,3765   77745 1  XT1LIM2  DLOAD              BETA10=POSMAX IF OVERFLOW
 48655  REF   5  LAST  927  32,3766   15344 0                    2RTEB1
 4866                       32,3767   52166 1  XT1LIM3  SQRT    GOTO      X(T1)=SQRT(BETA10)            B5
 48665  REF   1             32,3770   65773 1                    XT1LIMX
 4867                       32,3771   77745 1  XT1LIM5  DLOAD
 4868   REF   5  LAST  930  32,3772   15330 0                    ZERORTE
 4869                       32,3773   77650 1  XT1LIMX  GOTO
 4870                       32,3774   00024 1                    20D
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P4900 CONSTANTS FOR THE P37 AND P70 PROGRAMS AND SUBROUTINES

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49006  REF   1                35,2000                        SETLOC  RTECON1
49007                         35,3571                        BANK

49008  REF   1                                               COUNT*  $$/P37
4901   REF   4  LAST   35      26,3333          1RTEB1   =     UNITX
4902   REF   8  LAST  688      26,3325          1RTEB2   =     DP1/4TH
4903   REF   1                34,3766          1RTEB3   =     DP2(-3)          1 B-3
4904   REF   5  LAST  887      34,3770          1RTEB4   =     DP2(-4)          1 B-4
4913                          35,3571  00002 0 1RTEB13  2DEC  1.B-13
4913                          35,3572  00000 1
4917                          35,3573  00000 1 1RTEB17  2DEC  1.B-17
4917                          35,3574  04000 0
4925                          35,3575  00000 1 1RTEB25  2DEC  1.B-25
4925                          35,3576  00010 0
A4926                                                                 * * B25 AND B28 MUST BE CONSECUTIVE * *
4928                          35,3577  00000 1 1RTEB28  2DEC  1.B-28
4928                          35,3600  00001 0
4929   REF   4  LAST  783      26,3327          ZERORTE  =     UNITZ
4930                          35,3601  77777 0 M144RTE  2DEC  -144.B-28
4930                          35,3602  77557 0
49301                         35,3603  77777 0 M15RTE   2DEC  -15
49301                         35,3604  77760 0
49302                         35,3605  00000 1 10RTE    2DEC  10
49302                         35,3606  00012 1
49303                         35,3607  54631 1 M.6RTE   2DEC  -.6
49303                         35,3610  63145 1
4931                          35,3611  21463 0 1.1RTEB1 2DEC  1.18-1
4931                          35,3612  06315 0
49312  REF  10  LAST  641      26,3343          2RTEB1   =     DPPOSMAX
4932                          35,3613  77777 0 M9RTEB28 2DEC  -9
4932                          35,3614  77766 0
4933                          35,3615  77777 0 M8RTEB28 2DEC  -8
4933                          35,3616  77767 1
4934                          35,3617  00000 1 30480RTE 2DEC  30480.B-29
4934                          35,3620  35610 0
4935                          35,3621  37405 1 VCSPS    2DEC  31.510396 B-5   (SEE 2VEXHUST)
4935                          35,3622  12250 0
4936                          35,3623  33041 1 VCRCS    2DEC  27.0664B-5
4936                          35,3624  37714 1
4937                          35,3625  00003 1 MDOTRCS  2DEC  .00163758-3
4937                          35,3626  13241 1
4938   REF   5  LAST  938      26,3333          CSUBT    =     UNITX
4940                          35,3627  00605 1 OCT605   OCT    00605
4941                          35,3630  00612 1 OCT612   OCT    00612
4943                          35,3631  40214 1 MCOS7.5  2DEC  -.99144486
4943                          35,3632  45266 1
4944                          35,3633  73645 1 MSIN7.5  2DEC  -.13052619
4944                          35,3634  56536 1
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4945                    35,3635   70467 0  MCOS22.5 2DEC   -.923879538-2
4945                    35,3636   71205 0
4946                    35,3637   16525 1  THETA165 2DEC   .458333333
4946                    35,3640   12525 0
4947                    35,3641   22525 0  THETA210 2DEC   .583333333
4947                    35,3642   12525 0
4951                    35,3643   17775 1  EPC1RTE  2DEC   .999668-1
4951                    35,3644   06676 0
4952                    35,3645   00000 1  EPC2RTE  2DEC   100.B-29
4952                    35,3646   00062 0
4953                    35,3647   00020 0  EPC3RTE  2DEC   .001
4953                    35,3650   14223 1
4954                    35,3651   00000 1  EPC4RTE  2DEC   .00001
4954                    35,3652   05174 0
4956                    35,3653   00000 1  EPC6RTE  2DEC   .0000078-1
4956                    35,3654   01654 1
4957                    35,3655   00000 1  EPC7RTE  2DEC   1000.B-29
4957                    35,3656   00764 1
4959  REF  2 LAST 937   35,3575             EPC9RTE  =      1RTE825
4960                    35,3657   00000 1  EPC10RTE 2DEC   .0001B-7
4960                    35,3660   00322 1
4961                    35,3661            BANK     35
4962  REF  2 LAST 938   35,2000            SETLOC   RTECON1
4963                    35,3661            BANK
49635 REF  2 LAST 938 TO 939:    56    56*          COUNT*  $$/P37
4964                    35,3661   75725 0  C4RTE    2DEC    -6.986643 E7B-30
4964                    35,3662   75417 1
4971                    35,3663   00325 0  K1RTE    2DEC    7.E6B-29
4971                    35,3664   23740 0
4972                    35,3665   00306 1  K2RTE    2DEC    6495000.B-29
4972                    35,3666   06614 1
4973                    35,3667   76027 0  K3RTE    2DEC    -.06105
4973                    35,3670   70156 1
4974                    35,3671   74517 1  K4RTE    2DEC    -.10453
4974                    35,3672   54131 0
4980                    35,3673   30276 1  RTMURTE  2DEC    199650.501B-18
4980                    35,3674   05001 0
4995                    35,3675   00003 1  E3RTE    2DEC    121920.B-29
4995                    35,3676   27040 0
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2001   REF   1                  42,2000                        SETLOC  SBAND
2002                            42,3504                        BANK

2003   REF   1                                                 COUNT*  $$/R05
2004   REF   3  LAST  812       E4,1417                        EBANK=  EMSALT

2007   REF 225  LAST  905       42,3504   0 6006 1  SBANDANT  TC      INTPRET
2008                            42,3505   45034 1             RTB     CALL
2009   REF  25  LAST  783       42,3506   51751 0             LOADTIME        PICKUP CURRENT TIME SCALED B-28
2010   REF   9  LAST  782       42,3507   47530 1             CDUTRIG         COMPUTE SINES AND COSINES OF CDU ANGLES
2012   REF  40  LAST  923       42,3510   34041 0             STCALL  TDEC1   ADVANCE INTEGRATION TO TIME IN TDEC1
2013   REF  10  LAST  783       42,3511   27170 1             CSMCONIC        USING CONIC INTEGRATION
2014                            42,3512   46135 1             SLOAD   BHIZ     ORIGIN OF REFERENCE INERTIAL SYSTEM IS
2015   REF  28  LAST  937       42,3513   00050 1                     X2      EARTH = 0, MOON = 2
2016   REF   1                  42,3514   65527 1                     EISOI
2017                            42,3515   77775 1             VLOAD
2018   REF  33  LAST  923       42,3516   00001 0                     RATT
2019   REF   1                  42,3517   00003 1             STORE   RCM     MOVE RATT TO PREVENT WIPEOUT
2020                            42,3520   45145 0             DLOAD   CALL    MOON, PUSH ON
2021   REF   9  LAST  923       42,3521   00015 0                     TAT     GET ORIGINAL TIME
2022   REF   2  LAST  634       42,3522   54141 1                     LUNPOS  COMPUTE POSITION VECTOR OF MOON
2023                            42,3523   57455 1             VAD     VCOMP   R= -(REM+RCM) = NEG. OF S/C POS. VEC
2024   REF   2  LAST  940       42,3524   00003 1                     RCM
2025                            42,3525   77650 1             GOTO
2026   REF   2  LAST  940       42,3526   65531 0                     EISOI +2
2027                            42,3527   57575 1  EISOI      VLOAD   VCOMP   EARTH, R= -RCM
2028   REF  34  LAST  940       42,3530   00001 0                     RATT
2029                            42,3531   64201 0             SETPD   MXV     RCS TO STABLE MEMBER- B-1X B-29X B+1
2030                            42,3532   00003 1                     2D      2D
2031   REF  48  LAST  892       42,3533   01734 0                     REFSMMAT        STABLE MEMBER.  B-1X B-29X B+1= B-29
2032                            42,3534   65372 1             VSL1    PDDL    8D
2033   REF  25  LAST  887       42,3535   15336 0                     HIGZEROS
2034   REF   1                  42,3536   24025 0             STOVL   YAWANG  ZERO OUT YAWANG, SET UP FOR SMNB
2035   REF   3  LAST  940       42,3537   00003 1                     RCM     TRANSFORMATION. SM COORD. SCALED B-29
2036                            42,3540   77624 1             CALL
2037   REF   5  LAST  727       42,3541   47633 1                     *SMNB*
2038   REF   1                  42,3542   00003 1             STORE   R       SAVE NAV. BASE COORDINATES
2039                            42,3543   63256 0             UNIT    PDVL    14D
2040   REF   2  LAST  940       42,3544   00003 1                     R
2041                            42,3545   72431 1             VPROJ   VSL2    COMPUTE PROJECTION OF VECTOR INTO CM
2042   REF   2  LAST  298       42,3546   15330 0                     HIUNITZ XY-PLANE, R-(R.UZ)UZ
2043                            42,3547   40045 1             BVSU    BOV     CLEAR OVERFLOW INDICATOR IF SET
2044   REF   3  LAST  940       42,3550   00003 1                     R
2045   REF   1                  42,3551   65552 0                     COVCNV
2046                            42,3552   40056 0  COVCNV     UNIT    BOV     TEST OVERFLOW FOR INDICATION OF NULL
2047   REF   1                  42,3553   65567 0                     NOADJUST        VECTOR
2048                            42,3554   50206 0             PUSH    DOT     20D
2049   REF   4  LAST  400       42,3555   15334 1                     HIUNITX COMPUTE YAW ANGLE = ACOS (URP.UX)
2050                            42,3556   65552 0             SL1     ACOS    REVOLUTIONS SCALED B0
2051                            42,3557   50315 0             PDVL    DOT     22D YAWANG
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2052   REF   1                 42,3560  00017 1                 URP
2053   REF   2  LAST  298      42,3561  15332 1                 HIUNITY       COMPUTE FOLLOWING- URP.UY
2054                           42,3562  51152 0          SL1    BPL           POSITIVE
2055   REF   2  LAST  940      42,3563  65567 0                 NOADJUST      YES, 0- 180 DEGREES
2056                           42,3564  45345 1          DLOAD  DSU           NO, 181-360 DEGREES 20D
2057   REF  11  LAST  938      42,3565  15344 0                 DPPOSMAX      COMPUTE 2 PI MINUS YAW ANGLE
2058                           42,3566  77606 1          PUSH                 22D YAWANG
2059                           42,3567  50375 0  NOADJUST VLOAD  DOT           COMPUTE PITCH ANGLE
2060   REF   1                 42,3570  00011 1                 UR            ACOS (UR.UZ) - PI/2
2061   REF   3  LAST  940      42,3571  15330 0                 HIUNITZ
2062                           42,3572  65552 0          SL1    ACOS          REVOLUTIONS B0
2063                           42,3573  77625 0          DSU
2064   REF   3  LAST  889      42,3574  15326 1                 HIDP1/4
2065   REF   4  LAST  292      42,3575  16312 0          STODL  RHOSB
2066   REF   2  LAST  940      42,3576  00025 0                 YAWANG
2067   REF   2  LAST  292      42,3577  02314 0          STORE  GAMMASB       PATCH FOR CHECKOUT
2068                           42,3600  77776 1          EXIT
2068C5 REF   7  LAST  555      42,3601  3 5047 1         CAF    PRIO5
2068C6 REF  14  LAST  869      42,3602  0 5176 1         TC     PRIOCHNG

20681  REF  16  LAST  793      42,3603  3 1247 1         CA     EXTVBACT      IS BIT 5 STILL ON
20682  REF  25  LAST  748      42,3604  7 4764 1         MASK   BIT5
20683                           42,3605  0 0006 1         EXTEND
20684  REF  33  LAST  641      42,3606  1 5524 0         BZF    ENDEXT        NO, WE HAVE BEEN ANSWERED
2069   REF   1                 42,3607  3 3625 0         CAF    V06N51        DISPLAY ANGLES
2070   REF 211  LAST  907      42,3610  0 4636 0         TC     BANKCALL
2071   REF   3  LAST  568      42,3611   20607 1         CADR   GOMARKFR
2072   REF   7  LAST  521      42,3612  0 5626 0         TC     B5OFF         TERMINATE
2073   REF   8  LAST  941      42,3613  0 5626 0         TC     B5OFF
2074   REF  85  LAST  905      42,3614  0 5205 0         TC     ENDOFJOB      RECYCLE
2075   REF  34  LAST  738      42,3615  3 4766 1         CAF    BIT3          IMMEDIATE RETURN
2076   REF  12  LAST  905      42,3616  0 5516 0         TC     BLANKET       BLANK R3
20763  REF   2  LAST  261      42,3617  3 4755 1         CAF    PRIO4
20766  REF  15  LAST  941      42,3620  0 5176 1         TC     PRIOCHNG

2077   REF  47  LAST  776      42,3621  3 4770 0         CAF    BIT1          DELAY MINIMUM TIME TO ALLOW DISPLAY IN
2078   REF 212  LAST  941      42,3622  0 4636 0         TC     BANKCALL
2079   REF  16  LAST  809      42,3623   01731 0         CADR   DELAYJOB
2080   REF   2  LAST  261      42,3624  1 3504 1         TCF    SBANDANT
2086                           42,3625   01463 1 V06N51  VN     0651
2087                             0002          RCM      EQUALS 2D
2088                             0010          UR       EQUALS 8D
2089                             0016          URP      EQUALS 14D
2090                             0024          YAWANG   EQUALS 20D
2091                             0026          PITCHANG EQUALS 22D
2092   REF   4  LAST  940        0002          R        EQUALS RCM
2093   REF  12  LAST  743      30,2000                    SBANK= LOWSUPER
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*** END OF MENELAUS.061 ***

L TVCINITIALIZE USER'S PAGE NO. 1 EO S?

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R1000   NAME     TVCDAPON (TVC DAP INITIALIZATION AND STARTUP CALL)
R1001   LOG SECTION...TVCINITIALIZE                SUBROUTINE...DAPCSM
R1002   MODIFIED BY SCHLUNDT                       21 OCTOBER 1968
R10025  MODIFIED BY BEALS TO ELIMINATE CSMMASS UPDATE LOGIC (NOW DONE IN S40.8)
R1003   FUNCTIONAL DESCRIPTION
R1004        PERFORMS TVCDAP INITIALIZATION (GAINS, TIMING PARAMETERS, FILTER VARIABLES, ETC.)
R1006        COMPUTES STEERING (S40.8) GAIN KPRIMEDT, AND ZEROES PASTDELV,+1 VARIABLE
R1008        MAKES INITIALIZATION CALL TO ..NEEDLER.. FOR TVC DAP NEEDLES-SETUP
R1009        PERFORMS INITIALIZATION FOR ROLL DAP
R1010        CALLS TVCEXECUTIVE AT TVCEXEC, VIA WAITLIST
R1011        CALLS TVCDAP CDU-RATE INITIALIZATION PKG AT DAPINIT  VIA T5
R1012        PROVIDES FOR LOADING OF LOW-BANDWIDTH COEFFS AND GAINS AT SWICHOVR
R1013   CALLING SEQUENCE - T5LOC=2CADR(TVCDAPON,EBANK=BZERO), T5=.6SECT5
R1014        IN PARTICULAR, CALLED BY ..DOTVCON.. IN P40
R10141       MRCLEAN AND TVCINIT4 ARE POSSIBLE RESTART ENTRY POINTS
R1015   NORMAL EXIT MODE
R1016        TCF RESUME
R1017   SUBROUTINES CALLED
R1018        NEEDLER, MASSPROP
R1019   ALARM OR ABORT EXIT MODES
R1020        NONE
R1021   ERASABLE INITIALIZATION REQUIRED
R1022        CSMMASS, LEMMASS, DAPDATR1 (FOR MASSPROP SUBROUTINE)
R1023        TVC PAD LOADS (SEE EBANK6 IN ERASABLE ASSIGNMENTS)
R1024        PACTOFF, YACTOFF, CDUX
R1025        TVCPHASE AND THE T5 BITS OF FLAGWRD6 (SET AT DOTVCON IN P40)
R1026   OUTPUT
R1027        ALL TVC AND ROLL DAP ERASABLES, FLAGWRD6 (BITS 13,14), T5, WAITLIST
R1028   DEBRIS
R1029        NONE

  1032   REF    1              17,2000                          SETLOC DAPS7
  1033                         17,2163                          BANK

 10335  *REF    1                                               COUNT* $$/INIT
  1034   REF   16  LAST  719   E6,1446                          EBANK= CNTR
  1035   REF    7  LAST  734   17,2163  22 016 0   TVCDAPON    LXCH   BANKRUPT     T5 RUPT ARRIVAL (CALL BY DOTVCON - P40)
  1036                         17,2164  0 0006 1                EXTEND              SAVE Q REQUIRED IN RESTARTS (MRCLEAN AND
 10361   REF    7  LAST  734   17,2165  22 012 1                QXCH   QRUPT              TVCINIT4 ARE ENTRIES)
  1038   REF    1              17,2166  3 2524 0   MRCLEAN     CAF    NZERO       NUMBER TO ZERO, LESS ONE  (MUST BE ODD)
A1039                                                                                    TVC RESTARTS ENTER HERE  (NEW BANK)
  1040   REF  190  LAST  895   17,2167  10 000 0     +1        CCS    A
  1041   REF   17  LAST  943   17,2170  55'446 1                TS     CNTR
  1042   REF  148  LAST  904   17,2171  3 4772 1                CAF    ZERO
  1043   REF   85  LAST  895   17,2172  54 001 1                TS     L
  1044   REF   18  LAST  943   17,2173  51'446 0                INDEX  CNTR
  1045   REF    1              17,2174  53'530 1                DXCH   OMEGAYC      FIRST (LAST) TWO LOCATIONS
  1046   REF   19  LAST  943   17,2175  11'446 1                CCS    CNTR
  1047   REF    1              17,2176  1 2167 1                TCF    MRCLEAN +1
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10471                          17,2177  0 0006 1                EXTEND                  SET UP ANOTHER T5 RUPT TO CONTINUE
10472  REF    1                17,2200  3 2540 1                DCA     INITLOC2        INITIALIZATION AT TVCINIT1
10473  REF   11  LAST  735     17,2201  52 113 0                DXCH    T5LOC           THE PHSCHK2 ENTRY (REDOTVC) AT TVCDAPON
10474  REF   16  LAST  706     17,2202  3 4750 1                CAF     POSMAX          +3 IS IN ANOTHER BANK. MUST RESET
10475  REF    8  LAST  735     17,2203  54 030 0                TS      TIME5           BBCON TOO (FULL 2CADR), FOR THAT
10476  REF   26  LAST  734     17,2204  1 5323 1       ENDMRC   TCF     RESUME          ENTRY.

10477  REF    8  LAST  943     17,2205  22 016 0       TVCINIT1 LXCH    BANKRUPT
10478                          17,2206  0 0006 1                EXTEND
10479  REF    8  LAST  943     17,2207  22 012 1                QXCH    QRUPT

1048   REF   28  LAST  711     17,2210  0 4714 1                TC      IBNKCALL        UPDATE IXX, IAVG/TLX FOR DAP GAINS (R03
1049   REF    4  LAST  704     17,2211  13313 1                 CADR    MASSPROP        OR NOUNS 46 AND 47 MUST BE CORRECT)

1059   REF   56  LAST  737     17,2212  31'465 1                CAE     DAPDATR1        CHECK LEM-ON/OFF
1060   REF   37  LAST  796     17,2213  7 4753 0                MASK    BIT14
1061   REF  191  LAST  943     17,2214  10 000 0                CCS     A
1062   REF   48  LAST  941     17,2215  3 4770 0                CAF     BIT1            LEM-ON (BIT1)
1063   REF   20  LAST  943     17,2216  55'446 1                TS      CNTR            LEM-OFF (ZERO)

106302 REF   21  LAST  944     17,2217  51'446 0                INDEX   CNTR            LOAD THE FILTER COEFFICIENTS
106304 REF    1                17,2220  3 2521 0                CAF     CSMCFADR
106306 REF    2  LAST  110     17,2221  55'704 1                TS      COEFFADR
106308 REF    1                17,2222  0 2412 1                TC      LOADCOEF

10631  REF   22  LAST  944     17,2223  51'446 0                INDEX   CNTR            PICK UP LM-OFF,-ON KTLX/I
106312 REF    1                17,2224  31'416 0                CAE     EKTLX/I         SCALED (1.08 8+2) 1/SECSQ CSM/LM
106314 REF    2  LAST  109     17,2225  55'630 1                TS      KTLX/I                    ( "  8+4)   "   CSM

10632  REF    1                17,2226  0 2452 0                TCR     S40.15          COMPUTE 1/CONACC , VARK

1064   REF   23  LAST  944     17,2227  4 1446 1       TVCINIT2 CS      CNTR            PICK LM-OFF,-ON VALUE FOR FILTER PERIOD
1065   REF  192  LAST  944     17,2230  50 000 1                INDEX   A               DETERMINATION:
1066   REF   28  LAST  745     17,2231  3 4767 0                CAF     BIT2            BIT2 FOR CSM ONLY 40MS FILTER
1067   REF    3  LAST  727     17,2232  55'626 0                TS      KPRIMEDT        BIT3 FOR CSM/LM 80MS FILTER

1070                           17,2233  4 0000 0                COM                     PREPARE T5TVCDT
1071   REF   17  LAST  944     17,2234  6 4750 1                AD      POSMAX
1072   REF   49  LAST  944     17,2235  6 4770 0                AD      BIT1
1073   REF    2  LAST  109     17,2236  55'625 0                TS      T5TVCDT

10732  REF    1                17,2237  4 4752 1                CS      SWTOVBIT        RESET SWTOVER FLAG
10733  REF    8  LAST  559     17,2240  7 0105 1                MASK    FLAGWRD9
10734  REF    9  LAST  944     17,2241  54 105 1                TS      FLAGWRD9
1074   REF   24  LAST  944     17,2242  51'446 0                INDEX   CNTR            PICK UP LEM-OFF,-ON KPRIME
1075   REF    1                17,2243  31'414 1                CAE     EKPRIME         SCALED (100 PI)/16
1076                           17,2244  0 0006 1                EXTEND
1077   REF    4  LAST  944     17,2245  7 1626 0                MP      KPRIMEDT        (TVCDT/2, SC.AT B+14CS)
1078   REF  193  LAST  944     17,2246  22 000 1                LXCH    A               SC.AT PI/8    (DIMENSIONLESS)
1079   REF    5  LAST  944     17,2247  53'627 1                DXCH    KPRIMEDT
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1080   REF  25  LAST  944   17,2250  51'446 0            INDEX  CNTR       PICK UP LEM-OFF,-ON REPFRAC
1081   REF   2  LAST  726   17,2251  31'421 1            CAE    EREPFRAC
1082   REF   5  LAST  726   17,2252  55'633 1            TS     REPFRAC

10821  REF  26  LAST  945   17,2253  51'446 0            INDEX  CNTR       PICK UP ONE-SHOT CORRECTION TIME
10822  REF   1               17,2254  3 2530 0            CAF    TCORR
10823  REF  27  LAST  945   17,2255  55'446 1            TS     CNTR

1085   REF   1               17,2256  3 4351 1            CAF    NINETEEN   SET VCNTR FOR VARIABLE-GAIN UPDATES IN
1086   REF   2  LAST  109   17,2257  55'634 0            TS     VCNTR      10 SECS (TVCEXEC 1/2 SEC RATE)
1095   REF  14  LAST  719   17,2260  31'423 0  TVCINIT3  CAE    PACTOFF    TRIM VALUES TO TRIM-TRACKERS, OUTPUT
1096   REF   2  LAST  109   17,2261  55'605 1            TS     PDELOFF         TRACKERS, OFFSET-UPDATES, AND
1097   REF   5  LAST  180   17,2262  55'623 0            TS     PCMD            OFFSET-TRACKER FILTERS
1099   REF   3  LAST  705   17,2263  55'601 0            TS     DELPBAR         NOTE, LO-ORDER DELOFF,DELBAR ZEROED

1100   REF   7  LAST  719   17,2264  31'424 1            CAE    YACTOFF
1101   REF   2  LAST  109   17,2265  55'607 0            TS     YDELOFF
1102   REF   4  LAST  182   17,2266  55'624 1            TS     YCMD
1103   REF   3  LAST  705   17,2267  55'603 1            TS     DELYBAR

11031  REF  57  LAST  944   17,2270  31'465 1  ATTINIT   CAE    DAPDATR1   ATTITUDE-ERROR INITIALIZATION LOGIC
11032  REF  28  LAST  721   17,2271  7 4754 1            MASK   BIT13          TEST FOR CSM OR CSM/LM
11033                        17,2272  0 0006 1            EXTEND
1104   REF   1               17,2273  1 2321 1            BZF    NEEDLEIN        BYPASS INITIALIZATION FOR CSM/LM

110401 REF  50  LAST  944   17,2274  3 4770 0            CAF    BIT1            SET UP TEMPORARY COUNTER
110402 REF   3  LAST  110   17,2275  55'611 1  +5        TS     TTMP1

110403 REF   4  LAST  945   17,2276  51'611 0            INDEX  TTMP1
110404 REF   3  LAST  703   17,2277  3 1664 1            CA     ERRBTMP    ERRBTMP CONTAINS RCS ATTITUDE ERRORS
110405                       17,2300  0 0006 1            EXTEND               ERRORY & ERRORZ (P40 AT DOTVCON)
110406 REF   1               17,2301  7 2527 1            MP     1/ATTLIM   .007325(ERROR) = 0 IF ERROR < 1.5 DEG
110407                       17,2302  0 0006 1            EXTEND
110408                       17,2303  1 2313 0            BZF    +8D             |ERROR| LESS THAN 1.5 DEG
110409                       17,2304  0 0006 1            EXTEND
11041                        17,2305  6 2310 1            BZMF   +3              |ERROR| > 1.5 DEG, AND NEG
110411 REF   1               17,2306  3 2526 1            CA     ATTLIM          |ERROR| > 1.5 DEG, AND POS
110412                       17,2307  1 2311 1            TCF    +2
110413 REF   2  LAST  945   17,2310  4 2526 0  +3        CS     ATTLIM
110414 REF   5  LAST  945   17,2311  51'611 0  +2        INDEX  TTMP1
110415 REF   4  LAST  945   17,2312  55'664 0            TS     ERRBTMP
110416 REF   6  LAST  945   17,2313  11'611 1  +8        CCS    TTMP1           TEST TEMPORARY COUNTER
110417 REF   1               17,2314  1 2275 1            TCF    ATTINIT +5      BACK TO REPEAT FOR PITCH ERROR

110418 REF   5  LAST  945   17,2315  3 1664 1            CA     ERRBTMP    ERRORS ESTABLISHED AND LIMITED
110419 REF   2  LAST  109   17,2316  55'575 0            TS     PERRB
11042  REF   6  LAST  945   17,2317  3 1665 0            CA     ERRBTMP +1
110421 REF   2  LAST  109   17,2320  55'577 1            TS     YERRB

1111   REF  15  LAST  735   17,2321  4 1501 0  NEEDLEIN  CS     RCSFLAGS   SET BIT 3 FOR INITIALIZATION PASS AND GO
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1112   REF  35  LAST  941   17,2322  7 4766 0          MASK   BIT3          TO NEEDLER.  WILL CLEAR FOR TVC DAP
1113   REF  16  LAST  945   17,2323  27'501 0          ADS    RCSFLAGS      (RETURNS AFTER CADR)
1114   REF  29  LAST  944   17,2324  0 4714 1          TC     IBNKCALL
1115   REF   6  LAST  551   17,2325   42425 1          CADR   NEEDLER

1116   REF 149  LAST  943   17,2326  3 4772 1 TVCINIT4 CAF    ZERO          SET TVCPHASE TO INDICATE TVCDAPON-THRU-
1117   REF   4  LAST  705   17,2327  55'635 1          TS     TVCPHASE            NEEDLEIN INITIALIZATION FINISHED.
A1118                                                                      (POSSIBLE TVC-RESTART ENTRY)

1119   REF  18  LAST  786   17,2330  30 032 0          CAE    CDUX          PREPARE ROLL DAP
1120   REF   6  LAST  205   17,2331  55'645 0          TS     CDUCMD

1125  *REF   2  LAST  943   17,2332  3 2524 0          CAF    NZERO         CALL TVCEXECUTIVE IN 0.51 SEC
1126   REF  24  LAST  829   17,2333  0 5233 0          TC     WAITLIST
1127   REF  28  LAST  945   E6,1446                    EBANK= CNTR
1128   REF   2  LAST  200   17,2334   03037 0          2CADR  TVCEXEC
1128                        17,2335   34066 0

1129                        17,2336  0 0006 1          EXTEND                CALL FOR DAPINIT
1130   REF   1              17,2337  3 2536 0          DCA    DAPINIT5
1131   REF  12  LAST  944   17,2340  52 113 0          DXCH   T5LOC
1132   REF   3  LAST  944   17,2341  31'625 1          CAE    T5TVCDT       (ALLOW TIME FOR RESTART COMPUTATIONS)
1133   REF   9  LAST  944   17,2342  54 030 0          TS     TIME5

1134   REF  27  LAST  944   17,2343  1 5323 1 ENDTVCIN TCF    RESUME

1138                        17,2344  0 0004 0 SWICHOVR INHINT
1139   REF   5  LAST  946   17,2345  3 1635 0          CA     TVCPHASE      SAVE TVCPHASE
1140   REF   1              17,2346  55'611 1          TS     PHASETMP
1141   REF  29  LAST  944   17,2347  4 4767 1          CS     BIT2          SET TVCPHASE = -2 (INDICATES SWITCH-OVER
1142   REF   6  LAST  946   17,2350  55'635 1          TS     TVCPHASE            TO RESTART LOGIC)

1143                        17,2351  0 0006 1    +5    EXTEND                SAVE Q FOR RETURN (RESTART ENTRY POINT,
1144   REF   1              17,2352  23'613 1          QXCH   RTRNLOC             TVCPHASE AND PHASETMP ALREADY SET)

1145   REF   1              17,2353  3 2525 1          CAF    NZEROJR       ZEROING LOOP FOR FILTER STORAGE LOCS
1146   REF   2  LAST  110   17,2354  55'661 0    +8    TS     CNTRTMP

1147   REF 150  LAST  946   17,2355  3 4772 1 MCLEANJR CA     ZERO
1148   REF  86  LAST  943   17,2356  54 001 1          TS     L
1149   REF   3  LAST  946   17,2357  51'661 1          INDEX  CNTRTMP
1150   REF   2  LAST  108   17,2360  53'541 1          DXCH   PIMP1 -1
1151   REF   4  LAST  946   17,2361  11'661 0          CCS    CNTRTMP
1152   REF 194  LAST  944   17,2362  10 000 0          CCS    A
1153   REF   2  LAST  262   17,2363  1 2354 0          TCF    SWICHOVR +8D

1154   REF  10  LAST  944   17,2364  4 0105 1          CS     FLAGWRD9      SET SWITCHOVER FLAG FOR DOWNLINK
1155   REF   2  LAST  944   17,2365  7 4752 1          MASK   SWTOVBIT
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1156   REF  11  LAST  946   17,2366  26 105 1          ADS     FLAGWRD9

1157   REF   2  LAST  944   17,2367  31'420 0          CAE     EKTLX/I +2      LOW BANDWIDTH GAINS - DAP
1158   REF   3  LAST  944   17,2370  55'630 1          TS      KTLX/I
1159   REF   2  LAST  944   17,2371  0 2461 0          TCR     S40.15 +7

1160   REF   1               17,2372  3 2532 1          CAF     FKPRIMDT                        - STEERING
1161   REF   6  LAST  944   17,2373  55'626 0          TS      KPRIMEDT

1162   REF   2  LAST  727   17,2374  3 2533 0          CAF     FREPFRAC                        - TMC LOOP
1163   REF   6  LAST  945   17,2375  55'633 1          TS      REPFRAC

11631                        17,2376  0 0006 1          EXTEND                  UPDATE TRIM ESTIMATES
11632  REF   4  LAST  945   17,2377  3 1602 1          DCA     DELPBAR
11633  REF   3  LAST  945   17,2400  53'606 1          DXCH    PDELOFF
11634                        17,2401  0 0006 1          EXTEND
11635  REF   4  LAST  945   17,2402  3 1604 1          DCA     DELYBAR
11636  REF   3  LAST  945   17,2403  53'610 0          DXCH    YDELOFF

1164   REF   1               17,2404  3 2523 1          CA      LBCFADR
1165   REF   3  LAST  944   17,2405  55'704 1          TS      COEFFADR
1166   REF   2  LAST  944   17,2406  0 2412 1          TC      LOADCOEF

1167   REF   2  LAST  946   17,2407  31'611 0          CAE     PHASETMP        RESTORE TVCPHASE
1168   REF   7  LAST  946   17,2410  55'635 1          TS      TVCPHASE

1169   REF   2  LAST  946   17,2411  0 1613 1          TC      RTRNLOC         BACK TO PRESWTCH OR TVCRESTARTS


1170                         17,2412  0 0006 1  LOADCOEF EXTEND                  LOAD DAP FILTER COEFFICIENTS
1171   REF   4  LAST  947   17,2413  5 1704 0          INDEX   COEFFADR          FROM: ERASABLE FOR CSM/LM HB
1172                        17,2414  3 0001 0          DCA     0                       FIXED   FOR CSM/LM LB
1173   REF   2  LAST  110   17,2415  53'706 0          DXCH    N10                     FIXED   FOR CSM

1174                        17,2416  0 0006 1          EXTEND                  NOTE: FOR CSM/LM, NORMAL COEFFICIENT
1175   REF   5  LAST  947   17,2417  5 1704 0          INDEX   COEFFADR        LOAD WILL BE HIGH BANDWIDTH PAD LOAD
1176                        17,2420  3 0003 1          DCA     2               ERASABLES. DURING CSM/LM SWITCHOVER,
1177   REF   3  LAST  947   17,2421  53'710 1          DXCH    N10 +2          THIS LOGIC IS USED TO LOAD LOW BANDWIDTH
R1178                                                                        COEFFICIENTS FROM FIXED MEMORY.

1180                        17,2422  0 0006 1          EXTEND
1181   REF   6  LAST  947   17,2423  5 1704 0          INDEX   COEFFADR
1182                        17,2424  3 0005 1          DCA     4
1183   REF   4  LAST  947   17,2425  53'712 0          DXCH    N10 +4

1184                        17,2426  0 0006 1          EXTEND
1185   REF   7  LAST  947   17,2427  5 1704 0          INDEX   COEFFADR
1186                        17,2430  3 0007 0          DCA     6
1187   REF   5  LAST  947   17,2431  53'714 0          DXCH    N10 +6
```

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1188                              17,2432  0 0006 1          EXTEND
1189  REF   8 LAST  947           17,2433  5 1704 0          INDEX   COEFFADR
1190                              17,2434  3 0011 1          DCA     8D
1191  REF   6 LAST  947           17,2435  53'716 1          DXCH    N10 +8D

1192                              17,2436  0 0006 1          EXTEND
1193  REF   9 LAST  948           17,2437  5 1704 0          INDEX   COEFFADR
1194                              17,2440  3 0013 0          DCA     10D
1195  REF   7 LAST  948           17,2441  53'720 1          DXCH    N10 +10D

1196                              17,2442  0 0006 1          EXTEND
1197  REF  10 LAST  948           17,2443  5 1704 0          INDEX   COEFFADR
1198                              17,2444  3 0015 0          DCA     12D
1199  REF   8 LAST  948           17,2445  53'722 0          DXCH    N10 +12D

1200  REF  11 LAST  948           17,2446  51'704 0          INDEX   COEFFADR
1201                              17,2447  3 0016 0          CA      14D
1202  REF   9 LAST  948           17,2450  55'723 1          TS      N10 +14D

1203  REF 155 LAST  895           17,2451  0 0002 0          TC      Q

1204  REF   3 LAST  734           17,2452  31'467 0  S40.15   CAE     IXX          GAIN COMPUTATIONS (1/CONACC, VARK)
1205                              17,2453  0 0006 1          EXTEND                ENTERED FROM TVCINITIALIZE AND TVCEXEC
1206  REF   1                     17,2454  7 2534 0          MP      2PI/M        2PI/M SCALED 1/(B+8 N M)
1207                              17,2455  20 001 1          DDOUBL                IXX   SCALED B+20 KG-MSQ
1208                              17,2456  20 001 1          DDOUBL
1209                              17,2457  20 001 1          DDOUBL
1210  REF   2 LAST  109           17,2460  55'631 0          TS      1/CONACC             SCALED B+9 SEC-SQ/REV

A12102                                                                ENTRY FROM CSM/LM V46 SWITCHOVER
1211  REF   4 LAST  947           17,2461  31'630 0  +7      CAE     KTLX/1          SCALED (1.08 B+2) 1/SECSQ CSM/LM
1212                              17,2462  0 0006 1          EXTEND                        (  "  B+4)   CSM
1213  REF   1                     17,2463  7 1471 0          MP      IAVG/TLX        SCALED B+2 SECSQ
1214                              17,2464  20 001 1          DDOUBL
1215                              17,2465  20 001 1          DDOUBL
1216  REF   2 LAST  109           17,2466  55'632 0          TS      VARK            SCALED (1.08 B+2)   CSM/LM
1217  REF 156 LAST  948           17,2467  0 0002 0          TC      Q                     (  "  B+4)   CSM

1218                              17,2470  37777 1  CSMN10   DEC     .99999       N10    CSM ONLY FILTER COEFFICIENTS
1219                              17,2471  67657 1           DEC     -.2549       N11/2
1220                              17,2472  01703 1           DEC     .0588        N12
1221                              17,2473  47472 0           DEC     -.7620       D11/2
1222                              17,2474  27656 1           DEC     .7450        D12

1223                              17,2475  37777 1           DEC     .99999       N20
1224                              17,2476  60361 0           DEC     -.4852       N21/2
1225                              17,2477  00000 1           DEC     0            N22
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1226                    17,2500  67304 1          DEC     -.2692          D22/2
1227                    17,2501  00000 1          DEC     0               D22

1228                    17,2502  37777 1 LBN10    DEC     +.99999         N10     LOW BANDWIDTH FILTER COEFFICIENTS
1229                    17,2503  65371 1          DEC     -.3285          N11/2
1230                    17,2504  65337 0          DEC     -.3301          N12
1231                    17,2505  42700 0          DEC     -.9101          D11/2
1232                    17,2506  33045 0          DEC     +.8460          D12

1233                    17,2507  01000 0          DEC     +.03125         N20
1234                    17,2510  00000 1          DEC     0               N21/2
1235                    17,2511  00000 1          DEC     0               N22
1236                    17,2512  42700 0          DEC     -.9101          D21/2
1237                    17,2513  33045 0          DEC     +.8460          D22

1238                    17,2514  20000 0          DEC     +.5000          N30
1239                    17,2515  60730 0          DEC     -.47115         N31/2
1240                    17,2516  17145 1          DEC     +.4749          N32
1241                    17,2517  41323 0          DEC     -.9558          D31/2
1242                    17,2520  35773 1          DEC     +.9372          D32

1243  REF   1           17,2521  02470 0 CSMCFADR GENADR  CSMN10           CSM ONLY COEFFICIENTS ADDRESS
1244  REF   1           17,2522  01425 0 HBCFADR  GENADR  HBN10           HIGH BANDWIDTH COEFFICIENTS ADDRESS
1245  REF   1           17,2523  02502 1 LBCFADR  GENADR  LBN10           LOW BANDWIDTH COEFFICIENTS ADDRESS

1246                    17,2524  00063 1 NZERO    DEC     51              MUST BE ODD FOR MRCLEAN
1247                    17,2525  00027 1 NZEROJR  DEC     23              MUST BE ODD FOR MCLEANJR

12471                   17,2526  00210 1 ATTLIM   DEC     0.00833         INITIAL ATTITUDE ERROR LIMIT (1.5 DEG)
12472                   17,2527  00170 1 1/ATTLIM DEC     0.007325        .007325(ERROR) = 0 IF ERROR < 1.5 DEG

1248                    17,2530  00005 1 TCORR    OCT     00005           CSM
1249                    17,2531  00000 1   +1     OCT     00000           CSM/LM (HB,LB)

1250                    17,2532  00247 0 FKPRIMDT DEC     .0102           CSM/LM (LB), (.05 X .08) SCALED AT PI/8
1251                    17,2533  00232 1 FREPFRAC DEC     .0375 B-2       CSM/LM (LB),  0.0375 SCALED AT B+2

1252  REF   7 LAST 448    4351                   NINETEEN =      VD1
1253                    17,2534  33074 1 2PI/M    DEC     .00331017 B+8   2PI/M, SCALED AT 1/(B+8 N-M)

1255  REF  29 LAST 946  E6,1446                             EBANK= CNTR
1256  REF   1           17,2535  03227 0 DAPINIT5 2CADR   DAPINIT
1256  REF   1           17,2536  40066 0

1257  REF  30 LAST 949  E6,1446                             EBANK= CNTR
1258  REF   1           17,2537  02205 1 INITLOC2 2CADR   TVCINIT1
1258  REF   1           17,2540  36066 1
```

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R1000   PROGRAM NAME.... TVCEXECUTIVE, CONSISTING OF TVCEXEC, NEEDLEUP, VARGAINS
R1001                     1SHOTCHK, REPCHEK, CG.CORR, COPYCYCLES, ETC.
R1002   LOG SECTION...TVCEXECUTIVE                    SUBROUTINE...DAPCSM
R1003   MODIFIED BY SCHLUNDT                          21 OCTOBER 1968
R10035  MODIFIED BY BEALS TO ELIMINATE CSMMASS UPDATE LOGIC (NOW DONE IN S40.8)
R1004   FUNCTIONAL DESCRIPTION....

R1005        *A SELF-PERPETUATING WAITLIST TASK AT 1/2 SECOND INTERVALS WHICH:
R1006         PREPARES THE ROLL DAP WITH OGA (CDUX)
R1007         PREPARES THE ROLL FDAI NEEDLE (FLY-TO  OGA ERROR)
R1008         PREPARES THE ROLL PHASE PLANE  OGAERR  (FLY-FROM  OGA ERROR)
R1009         PREPARES THE TVC ROLLDAP TASK WAITLIST CALL (3 CS DELAY)
R1010         UPDATES THE NEEDLES DISPLAY
R1011         CALLS MASSPROP TO UPDATE INERTIA DATA
R10111        UPDATES PITCH, YAW, AND ROLL DAP GAINS FROM MASSPROP DATA
R1012         PERFORMS ONE-SHOT CORRECTION FOR TMC LOOP 0-3 SEC AFTER IGNITION
R1013         PERFORMS REPETITIVE UPDATES FOR TMC LOOP AFTER THE ONE-SHOT CORR.

R1017   CALLING SEQUENCE....

R1018        *TVCEXEC CALLED AS A WAITLIST TASK, IN PARTICULAR BY TVCINIT4 AND BY
R1019         ITSELF, BOTH AT 1/2 SECOND INTERVALS

R1020   NORMAL EXIT MODE.... TASKOVER

R1021   ALARM OR ABORT EXIT MODES.... NONE

R1022   SUBROUTINES CALLED....NEEDLER, S40.15, MASSPROP, TASKOVER, IBNKCALL

R1023   OTHER INTERFACES....

R1024        *TVCRESTART PACKAGE FOR RESTARTS
R1025        *PITCHDAP, YAWDAP FOR VARIABLE GAINS AND ENGINE TRIM ANGLES
R1027   ERASABLE INITIALIZATION REQUIRED....

R1028        *SEE TVCDAPON....TVCINIT4
R1029        *VARK AND 1/CONACC (S40.15 OF TVCINITIALIZE)
R1032        *PAD LOAD EREPFRAC
R1033        *BITS 15,14 OF FLAGWRD6 (T5 BITS)
R1034        *TVCEXPHS FOR RESTARTS
R1035        *ENGINE-ON BIT (11.13) FOR RESTARTS
R1036        *CDUX, OGAD

R1037   OUTPUT....

R1038        *ROLL DAP OGANOW, FDAI NEEDLE (AK), AND PHASE PLANE OGAERR
R1039        *VARIABLE GAINS FOR PITCH/YAW AND ROLL TVC DAPS
R1040        *SINGLE-SHOT AND REPETITIVE CORRECTIONS TO ENGINE TRIM ANGLES
R1041         PACTOFF AND YACTOFF
R1046   DEBRIS.... MUCH, BUT SHAREABLE WITH RCS/ENTRY, ALL IN EBANK6
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1048   REF   1                  16,2000                    SETLOC  DAPROLL
1049                            16,3037                    BANK
1050   REF  31  LAST  949       E6,1446                    EBANK=  CNTR
1051   REF   1                                             COUNT*  $$/TVCX


1052   REF  25  LAST  735       16,3037  4 0102 0  TVCEXEC  CS      FLAGWRD6   CHECK FOR TERMINATION (BITS 15,14 READ
1053   REF  15  LAST  735       16,3040  7 4076 0           MASK    DPCONFIG   1? FROM TVCDAPON TO RCSDAPON
1054                            16,3041  0 0006 1           EXTEND
1055   REF   1                  16,3042  6 3217 0           BZMF    TVCEXFIN   TERMINATE

1056   REF   8  LAST  828       16,3043  3 5011 1           CAF     .5SEC      W.L. CALL TO PERPETUATE TVCEXEC
1057   REF  18  LAST  829       16,3044  0 5223 1           TC      TWIDDLE
1058   REF   3  LAST  946       16,3045    03037 0          ADRES   TVCEXEC
1060   REF  19  LAST  946       16,3046  30 032 0  ROLLPREP CAE     CDUX       UPDATE ROLL LADDERS (NO NEED TO RESTART-
1061   REF   7  LAST  946       16,3047  57'645 1           XCH     OGANOW          PROTECT, SINCE ROLL DAPS RE-START)
1062   REF   2  LAST  110       16,3050  57'646 1           XCH     OGAPAST

1063   REF   2  LAST  702       16,3051  31'447 1           CAE     OGAD       PREPARE ROLL FDAI NEEDLE  WITH FLY-TO
1064                            16,3052  0 0006 1           EXTEND                  ERROR (COMMAND - MEASURED)
1065   REF   8  LAST  951       16,3053  21'645 0           MSU     OGANOW
1066   REF  16  LAST  551       16,3054  55'476 1           TS      AK         FLY-TO OGA ERROR, SC.AT B-1 REVS

1067                            16,3055  0 0006 1           EXTEND             PREPARE ROLL DAP PHASE PLANE  OGAERR
1068   REF   2  LAST  720       16,3056  7 4751 1           MP      -BIT14
1069   REF   1                  16,3057  55'647 1           TS      OGAERR     PHASE-PLANE (FLY-FROM) OGAERROR,
A1070                                                                              SC.AT B+0 REVS

1071   REF  30  LAST  829       16,3060  3 6214 0           CAF     THREE      SET UP ROLL DAP TASK (ALLOW SOME TIME)
1072   REF  19  LAST  951       16,3061  0 5223 1           TC      TWIDDLE
1073   REF   1                  16,3062    03342 1          ADRES   ROLLDAP
1075   REF  30  LAST  946       16,3063  0 4714 1  NEEDLEUP TC      IBNKCALL   DO A NEEDLES UPDATE (RETURNS AFTER CADR)
1076   REF   7  LAST  946       16,3064    42425 1          CADR    NEEDLER         (NEEDLES RESTARTS ITSELF)

10823  REF   3  LAST  945       16,3065  11'634 0  VARGAINS CCS     VCNTR      TEST FOR GAIN UPDATE TIME
10824  REF   1                  16,3066  1 3074 0           TCF     EXECCOPY   NOT YET
1085   REF  31  LAST  951       16,3067  0 4714 1  GAINCHNG TC      IBNKCALL   UPDATE IXX, IAVG, IAVG/TLX
1086   REF   1                  16,3070    13347 0          CADR    FIXCW      MASSPROP ENTRY  (ALREADY INITIALIZED)
1087   REF  32  LAST  951       16,3071  0 4714 1           TC      IBNKCALL   UPDATE 1/CONACC, VARK
10871  REF   3  LAST  947       16,3072    36452 1          CADR    S40.15          (S40.15 IS IN TVCINITIALIZE)
1092   REF   2  LAST  945       16,3073  3 4351 1           CAF     NINETEEN   RESET THE VARIABLE-GAIN UPDATE COUNTER
1093   REF   4  LAST  951       16,3074  55'634 0  EXECCOPY TS      VCNTR
1100   REF  32  LAST  951       16,3075  11'446 1  1SHOTCHK CCS     CNTR       CHECK TIME FOR ONE-SHOT OR REPCORR
1101                            16,3076  1 3102 0           TCF     +4              NOT YET
1102   REF   1                  16,3077  1 3115 0           TCF     1SHOTOK         NOW
1103   REF   1                  16,3100  1 3106 1           TCF     REPCHEK         ONE-SHOT OVER, ON TO REPCORR
1104   REF   2  LAST  951       16,3101  1 3115 0           TCF     1SHOTOK         NOW  (ONE-SHOT ONLY, NO REPCORR)

1105   REF   5  LAST  946       16,3102  55'661 0    +4     TS      CNTRTMP    COUNT DOWN
1106   REF  11  LAST  902       16,3103  3 4766 1           CAF     FOUR       SET UP TVCEXPHS FOR ENTRY AT CNTRCOPY
```

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1107  REF   3  LAST  703   16,3104  55'644 1          TS      TVCEXPHS
1108  REF   1              16,3105  1 3215 0          TCF     CNTRCOPY

1109  REF   7  LAST  947   16,3106  31'633 0  REPCHEK CAE     REPFRAC        CHECK FOR REPETITIVE UPDATES
1110                       16,3107  0 0006 1          EXTEND
1111  REF   2  LAST  951   16,3110  6 3217 0          BZMF    TVCEXFIN           NO, OVER-AND-OUT
1112  REF   2  LAST  107   16,3111  55'445 1          TS      TEMPDAP +1         YES, SET UP CORRECTION FRACTION
1113  REF  33  LAST  832   16,3112  3 4767 0          CAF     TWO            SET UP TVCEXPHS FOR ENTRY AT CORSETUP
1114  REF   4  LAST  952   16,3113  55'644 1          TS      TVCEXPHS
1115  REF   1              16,3114  1 3126 0          TCF     CORSETUP

1119  REF   6  LAST  704   16,3115  3 4762 0  1SHOTOK CAF     ENGONBIT
1120  REF  14  LAST  704   16,3116  7 0101 0          MASK    FLAGWRD5
1122  REF 195  LAST  946   16,3117  10 000 0          CCS     A
1123                       16,3120  1 3122 1          TCF     +2                 ONE-SHOT OK
1124  REF   3  LAST  952   16,3121  1 3217 1          TCF     TVCEXFIN           NO, TERMINATE

1125  REF   5  LAST  952   16,3122  25'644 0          INCR    TVCEXPHS                                      (1)
1168  REF   1              16,3123  3 4754 0  TEMPSET CAF     FCORFRAC           SET UP CORRECTION FRACTION
1169  REF   3  LAST  952   16,3124  55'445 1          TS      TEMPDAP +1

1170  REF   6  LAST  952   16,3125  25'644 0          INCR    TVCEXPHS       ENTRY FROM REPCHECK AT NEXT LOCATION (2)
1171  REF  58  LAST  945   16,3126  31'465 1  CORSETUP CAE    DAPDATR1       CHECK FOR LEM-OFF/ON
1172  REF  29  LAST  945   16,3127  7 4754 1          MASK    BIT13          (NOTE, SHOWS LEM-OFF)
1173                       16,3130  0 0006 1          EXTEND
1174                       16,3131  1 3133 1          BZF     +2             LEM IS ON,  PICK UP   TEMPDAP+1
1175  REF   4  LAST  952   16,3132  31'445 0          CAE     TEMPDAP +1     LEM IS OFF, PICK UP 2(TEMPDAP+1)
1176  REF   5  LAST  952   16,3133  6 1445 0          AD      TEMPDAP +1
1177  REF   6  LAST  952   16,3134  55'444 0          TS      TEMPDAP        CG.CORR USES TEMPDAP

1178  REF  14  LAST  570   16,3135  3 7702 0          CAF     NEGONE         SET UP FOR CNTR = -1 (ONE-SHOT DONE)
1179  REF   6  LAST  951   16,3136  55'661 0          TS      CNTRTMP            (COPYCYCLE AT  .CNTRCOPY. )

1180                       16,3137  0 0006 1  CG.CORR EXTEND                 PITCH TMC LOOP
1181  REF   4  LAST  947   16,3140  3 1606 0          DCA     PDELOFF
1182  REF   2  LAST  110   16,3141  53'656 1          DXCH    PACTTMP
1183                       16,3142  0 0006 1          EXTEND
1184  REF   5  LAST  952   16,3143  4 1606 1          DCS     PDELOFF
1185                       16,3144  20 001 1          DDOUBL
1186                       16,3145  20 001 1          DDOUBL
1187  REF   7  LAST  945   16,3146  53'612 1          DXCH    TTMP1
1188                       16,3147  0 0006 1          EXTEND
1189  REF   5  LAST  947   16,3150  3 1602 1          DCA     DELPBAR
1190                       16,3151  20 001 1          DDOUBL
1191                       16,3152  20 001 1          DDOUBL
1192  REF   8  LAST  952   16,3153  21'612 1          DAS     TTMP1
1193                       16,3154  0 0006 1          EXTEND
1194  REF   9  LAST  952   16,3155  3 1612 0          DCA     TTMP1
1195                       16,3156  0 0006 1          EXTEND
1196  REF   7  LAST  952   16,3157  7 1444 0          MP      TEMPDAP
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1197   REF   3  LAST  952   16,3160  21'656 1            DAS     PACTTMP

1198                        16,3161  0 0006 1            EXTEND                  YAW TMC LOOP
1199   REF   4  LAST  947   16,3162  3 1610 1            DCA     YDELOFF
1200   REF   2  LAST  110   16,3163  53'660 1            DXCH    YACTTMP
1201                        16,3164  0 0006 1            EXTEND
1202   REF   5  LAST  953   16,3165  4 1610 0            DCS     YDELOFF
1203                        16,3166  20 001 1            DDOUBL
1204                        16,3167  20 001 1            DDOUBL
1205   REF  10  LAST  952   16,3170  53'612 1            DXCH    TTMP1
1206                        16,3171  0 0006 1            EXTEND
1207   REF   5  LAST  947   16,3172  3 1604 1            DCA     DELYBAR
1208                        16,3173  20 001 1            DDOUBL
1209                        16,3174  20 001 1            DDOUBL
1210   REF  11  LAST  953   16,3175  21'612 1            DAS     TTMP1
1211                        16,3176  0 0006 1            EXTEND
1212   REF  12  LAST  953   16,3177  3 1612 0            DCA     TTMP1
1213                        16,3200  0 0006 1            EXTEND
1214   REF   8  LAST  952   16,3201  7 1444 0            MP      TEMPDAP
1215   REF   3  LAST  953   16,3202  21'660 1            DAS     YACTTMP

1216   REF   7  LAST  952   16,3203  25'644 0  CORCOPY   INCR    TVCEXPHS        RESTART PROTECT THE COPYCYCLE          (3)
1217                        16,3204  0 0006 1            EXTEND                  TRIM-ESTIMATES, AND
1218   REF   4  LAST  953   16,3205  3 1656 0            DCA     PACTTMP
1219   REF  15  LAST  945   16,3206  55'423 1            TS      PACTOFF                 TRIMS
1220   REF   6  LAST  952   16,3207  53'606 1            DXCH    PDELOFF

1221                        16,3210  0 0006 1            EXTEND
1222   REF   4  LAST  953   16,3211  3 1660 0            DCA     YACTTMP
1223   REF   8  LAST  945   16,3212  55'424 0            TS      YACTOFF
1224   REF   6  LAST  953   16,3213  53'610 0            DXCH    YDELOFF

1225   REF   8  LAST  953   16,3214  25'644 0            INCR    TVCEXPHS        ENTRY FROM 1SHOTCHK AT NEXT LOCATION (4)
1226   REF   7  LAST  952   16,3215  31'661 1  CNTRCOPY  CAE     CNTRTMP         UPDATE CNTR (RESTARTS OK, FOLLOWS CPYCY)
1227   REF  33  LAST  951   16,3216  55'446 1            TS      CNTR

1228   REF 151  LAST  946   16,3217  3 4772 1  TVCEXFIN  CAF     ZERO            RESET TVCEXPHS
1229   REF   9  LAST  953   16,3220  55'644 1            TS      TVCEXPHS
1230   REF  43  LAST  838   16,3221  1 5314 0            TCF     TASKOVER        TVCEXECUTIVE FINISHED


1231   REF  30  LAST  952        4754          FCORFRAC =        BIT13           ONE-SHOT CORRECTION FRACTION
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L TVCMASSPROP USER'S PAGE NO. 1 ED 53

R1000 PROGRAM NAME....MASSPROP
R1001 LOG SECTION....TVCMASSPROP PROGRAMMER...MELANSON (ENGEL, SCHLUNDT)

R1002 FUNCTIONAL DESCRIPTION:

R1003 MASSPROP OPERATES IN TWO MODES:(1)IF LEM MASS OR CONFIGURATION ARE UPDATED (MASSPROP DOES NOT TEST
R1005 FOR THIS) THE ENTIRE PROGRAM MUST BE RUN THROUGH, BREAKPOINT VALUES AND DERIVATIVES OF THE OUTPUTS WITH
R1007 RESPECT TO CSM MASS BEING CALCULATED PRIOR TO CALCULATION OF THE OUTPUTS. (2)OTHERWISE, THE OUTPUTS CAN BE
R1009 CALCULATED USING PREVIOUSLY COMPUTED BREAKPOINT VALUES AND DERIVATIVES.

R10095 CALLING SEQUENCES

R1010 IF LEM MASS OR CONFIGURATION HAS BEEN UPDATED, TRANSFER TO MASSPROP, OTHERWISE TRANSFER TO FIXCW.
R1012 L TC BANKCALL OR IBNKCALL
R1013 L+1 CADR MASSPROP
R1014 OR
R1015 L+1 CADR FIXCW

R1016 L+2 RETURNS VIA Q

R1017 CALLED IN PARTICULAR BY DONOUN47 (JOB) AND TVCEXECUTIVE (TASK)

R1019 JOBS OR TASKS INITIATED - NONE

R1020 SUBROUTINES CALLED - NONE

R1021 ERASABLE INITIALIZATION REQUIRED

R1022 LEMMASS MUST CONTAIN LEM MASS SCALED AT B+16 IN KILOGRAMS
R1023 CSMMASS MUST CONTAIN CSM MASS SCALED AT B+16 IN KILOGRAMS

R1024 DAPDATR1 MUST BE SET TO INDICATE VEHICLE CONFIGURATION.
R10241 BITS (15,14,13) = (0 , 0 , 1) LEM OFF
R102411 (0 , 1 , 0) LEM ON (ASCNT,DSCNT)
R102412 (1 , 1 , 0) LEM ON (ASCNT ONLY)

R1025 ALARMS - NONE

R1026 EXIT - TC Q

R1027 OUTPUTS:

R1028 (1)IXX, SINGLE PRECISION SCALED AT B+20 IN KG-M SQ.
R1029 (2)IAVG, SINGLE PRECISION SCALED AT B+20 IN KG-M SQ.
R1030 (3)IAVG/TLX, SINGLE PRECISION, SCALED AT B+2 SEC-SQD
R1031 THEY ARE STORED IN CONSECUTIVE REGISTERS IXX0, IXX1, IXX2

R10311 CONVERSION FACTOR : (SLUG-FTSQ) = 0.737562 (KG-MSQ)

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R1032   OUTPUTS ARE CALCULATED AS FOLLOWS :

R1033    (1) IF LEM DOCKED, LEMMASS IS FIRST ELIMINATED AS A PARAMETER

R1034        VARST0 = INTVALUE0 + LEMMASS(SLOPEVAL0)      IXX      BREAKPOINT VALUE
R1036        VARST1 = INTVALUE1 + LEMMASS(SLOPEVAL1)      IAVG     BREAKPOINT VALUE
R1038        VARST2 = INTVALUE2 + LEMMASS(SLOPEVAL2)      IAVG/TLX BREAKPOINT VALUE

R1040        VARST3 = INTVALUE3 + LEMMASS(SLOPEVAL3)      IAVG/TLX SLOPE  FOR CSMMASS > 33956 LBS  ( SPS > 10000 LBS)
R1042        VARST4 = INTVALUE4 + LEMMASS(SLOPEVAL4)      IAVG     SLOPE  FOR CSMMASS > 33956 LBS  ( SPS > 10000 LBS)

R1044        VARST5 = INTVALUE5 + LEMMASS(SLOPEVAL5)      IXX      SLOPE  FOR ALL VALUES OF CSMMASS

R1046        VARST6 = INTVALUE6 + LEMMASS(SLOPEVAL6)      IAVG     SLOPE  FOR CSMMASS < 33956 LBS  ( SPS < 10000 LBS)
R1048        VARST7 = INTVALUE7 + LEMMASS(SLOPEVAL7)      IAVG/TLX SLOPE  FOR CSMMASS < 33956 LBS  ( SPS < 10000 LBS)

R1050        VARST8 = INTVALUE8 + LEMMASS(SLOPEVAL8)      IAVG     DECREMENT  TO BRKPT VALUE WHEN LEM DSCNT STAGE OFF
R1052        VARST9 = INTVALUE9 + LEMMASS(SLOPEVAL9)      IAVG/TLX DECREMENT  TO BRKPT VALUE WHEN LEM DSCNT STAGE OFF

R1054    (2) IF LEM NOT DOCKED

R1055        VARST0 = NOLEMVAL0     WHERE THE MEANING AND SCALING OF VARST0
R1056           .          .        TO VARST9 ARE THE SAME AS GIVEN ABOVE
R1057           .          .
R1058           .          .           NOTE... FOR THIS CASE, VARST8,9 HAVE NO
R1059        VARST9 = NOLEMVAL9        MEANING (THEY ARE COMPUTED BUT NOT USED)

R1060    (3) THE FINAL OUTPUT CALCULATIONS ARE THEN DONE

R1061        IXX0 =  VARST0 + (CSMMASS + NEGBPW)VARST5          IXX

R1062        IXX1 =  VARST1 + (CSMMASS + NEGBPW)VARST(4 OR 6)   IAVG

R1063        IXX2 =  VARST2 + (CSMMASS + NEGBPW)VARST(3 OR 7)   IAVG/TLX

R1064   THE DATA USED CAME FROM CSM/LM SPACECRAFT OPERATIONAL DATA BOOK.
R1064.1      VOL. 3, NASA DOCUMENT SNA-8-D-027 (MARCH 1968)

R1065   PERTINENT MASS DATA :          CSM WEIGHT  (FULL)  64100 LBS
R1066                                               (EMPTY) 23956 LBS
R1067                                  LEM WEIGHT  (FULL)  32000 LBS
R1068                                              (EMPTY) 14116 LBS

R1068.1 (WEIGHTS ARE FROM AMENDMENT #1 (APRIL 24,1968) TO ABOVE DATA BOOK)
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1070   REF   1                 05,2000                    SETLOC  DAPMASS
1071                           05,3313                    BANK
1072   REF   34  LAST  953      E6,1446                    EBANK=  CNTR
1073   REF   1                                            COUNT*  $$/MASP

1074   REF   2   LAST  447      05,3313   3 4322 0  MASSPROP CAF    NINE        MASSPROP USES TVC/RCS INTERUPT TEMPS
1075  *REF   2   LAST  108      05,3314  55'506 1    +1      TS     PHI333      SET UP TEN PASSES
1076   REF   59  LAST  952      05,3315  31'465 1  LEMTEST   CAE    DAPDATR1    DETERMINE LEM STATUS
1077   REF   31  LAST  953      05,3316   7 4754 1            MASK   BIT13
1078                           05,3317   0 0006 1            EXTEND
1079   REF   1                 05,3320   1 3324 0            BZF    LEMYES

1080   REF   3   LAST  956      05,3321  51'506 0  LEMNO     INDEX  PHI333      LEM NOT ATTACHED
1081   REF   1                 05,3322   3 3410 1            CAF    NOLEMVAL
1082   REF   1                 05,3323   1 3334 1            TCF    STOINST

1083   REF   5   LAST  292      05,3324  31'472 1  LEMYES    CAE    LEMMASS     LEM IS ATTACHED
1084                           05,3325   6 0000 1            DOUBLE
1085                           05,3326   0 0006 1            EXTEND
1086   REF   4   LAST  956      05,3327   5 1506 0            INDEX  PHI333
1087   REF   1                 05,3330   7 3432 0            MP     SLOPEVAL
1088                           05,3331   20 001 1            DDOUBL
1089   REF   5   LAST  956      05,3332  51'506 0            INDEX  PHI333
1090   REF   1                 05,3333   6 3420 1            AD     INTVALUE

1091   REF   6   LAST  956      05,3334  51'506 0  STOINST   INDEX  PHI333      STORAGE INST BEGIN HERE
1092   REF   3   LAST  108      05,3335  55'511 1            TS     VARSTO
1093   REF   7   LAST  956      05,3336  11'506 1            CCS    PHI333      ARE ALL TEN PASSES COMPLETED
1094   REF   5   LAST  944      05,3337   1 3314 0            TCF    MASSPROP +1 NO - GO DECREMENT PHI333

1098   REF   60  LAST  956      05,3340  11'465 0  DXTEST    CCS    DAPDATR1    IF NEG, BIT15 IS 1, LEM DSCNT STAGE OFF
1099   REF   2   LAST  951      05,3341   1 3347 0            TCF    FIXCW
1100   REF   3   LAST  956      05,3342   1 3347 0            TCF    FIXCW
1101   REF   4   LAST  956      05,3343  53'522 1            DXCH   VARSTO +8D
1102   REF   5   LAST  956      05,3344  21'513 0            DAS    VARSTO +1
1103   REF   1                 05,3345   3 3445 1            CA     DXITFIX
1104   REF   6   LAST  956      05,3346  27'520 0            ADS    VARSTO +7

1105   REF   30  LAST  946      05,3347   3 4767 0  FIXCW     CAF    BIT2        COMPUTATION PHASE BEGINS HERE.  SET UP
1106   REF   8   LAST  956      05,3350  55'506 1            TS     PHI333      THREE PASSES
1107   REF   2   LAST  108      05,3351  55'507 0            TS     PSI333

1108   REF   12  LAST  726      05,3352  31'473 0            CAE    CSMMASS     GET DELTA CSM WEIGHT - SIGN DETERMINES
1109   REF   1                 05,3353   6 3444 0            AD     NEGBPW      SLOPE LOCATIONS.
1110                           05,3354   6 0000 1            DOUBLE
1111   REF   2   LAST  108      05,3355  55'510 0            TS     TEMP333

1112                           05,3356   0 0006 1            EXTEND
1113   REF   1                 05,3357   6 3362 0            BZMF   PEGGY       DETERMINE CORRECT SLOPE
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1114   REF   7  LAST  579   05,3360  3 7701 0          CAF     NEG2
1115   REF   9  LAST  956   05,3361  55'506 1          TS      PHI333

1116   REF  10  LAST  957   05,3362  51'506 0  PEGGY   INDEX   PHI333    ALL IS READY - CALCULATE OUTPUTS NOW
1117   REF   1               05,3363  31'516 1          CAE     VARST5    GET SLOPE
1118                         05,3364  0 0006 1          EXTEND
1119   REF   3  LAST  956   05,3365  7 1510 0          MP      TEMP333   MULT BY DELTA CSM WEIGHT
1120                         05,3366  6 0000 1          DOUBLE
1121   REF   3  LAST  956   05,3367  51'507 1          INDEX   PSI333
1122   REF   7  LAST  956   05,3370  6 1511 0          AD      VARST0    ADD BREAKPOINT VALUE
1123   REF   4  LAST  957   05,3371  51'507 1          INDEX   PSI333
1124   REF   4  LAST  948   05,3372  55'467 1          TS      IXX       ****** OUTPUTS (IXX0, IXX1, IXX2) ******

1125   REF   5  LAST  957   05,3373  11'507 0          CCS     PSI333    BOOKKEEPING - MASSPROP FINISHED OR NOT
1126   REF   1               05,3374  1 3404 0          TCF     BOKKEP2   NO - GO TAKE CARE OF INDEXING REGISTERS

1127   REF  61  LAST  956   05,3375  31'465 1          CAE     DAPDATR1  UPDATE WEIGHT/G
1128   REF  38  LAST  944   05,3376  7 4753 0          MASK    BIT14
1129   REF 196  LAST  952   05,3377  10 000 0          CCS     A
1130   REF   6  LAST  956   05,3400  3 1472 1          CA      LEMMASS
1131   REF  13  LAST  956   05,3401  6 1473 0          AD      CSMMASS
1132   REF   6  LAST  904   05,3402  55'475 1          TS      WEIGHT/G  SCALED AT B+16 IN KILOGRAMS
1133   REF 157  LAST  948   05,3403  0 0002 0  ENDMASSP TC      Q

1134   REF   6  LAST  957   05,3404  55'507 0  BOKKEP2 TS      PSI333    REDUCE PSI BY ONE
1135                         05,3405  0 0006 1          EXTEND
1136   REF  11  LAST  957   05,3406  27'506 1          DIM     PHI333
1137   REF   2  LAST  956   05,3407  1 3362 1          TCF     PEGGY
```

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1138	05,3410	00616 0	NOLEMVAL	DEC	25445. B-20
1139	05,3411	02526 1		DEC	87450. B-20
1140	05,3412	02352 1		DEC	.30715 B-2
1141	05,3413	01471 1		DEC	1.22877 E-5 B+12
1142	05,3414	00634 0		DEC	1.6096 B-6
1143	05,3415	00612 1		DEC	1.54 B-6
1144	05,3416	03706 0		DEC	7.77177 B-6
1145	05,3417	04425 0		DEC	3.46458 E-5 B+12
1146	05,3420	00644 1	INTVALUE	DEC	26850 B-20
1147	05,3421	03710 1		DEC	127518 B-20
1148	05,3422	04246 0		DEC	.54059 B-2
1149	05,3423	02011 0		DEC	.153964 E-4 B+12
1150	05,3424	77501 0		DEC	-.742923 B-6
1151	05,3425	00612 1		DEC	1.5398 B-6
1152	05,3426	04656 0		DEC	9.68 B-6
1153	05,3427	10372 0		DEC	.647625 E-4 B+12
1154	05,3430	77126 1		DEC	-27228. B-20
1155	05,3431	76261 0		DEC	-.26476 B-2
1156	05,3432	00767 1	SLOPEVAL	DEC	1.96307 B-6
1157	05,3433	15624 0		DEC	27.5774 B-6
1158	05,3434	03054 0		DEC	2.3548 E-5 B+12
1159	05,3435	04532 1		DEC	2.1777 E-9 B+26
1160	05,3436	10433 1		DEC	1.044 E-3 B+8
1161	05,3437	00000 1		DEC	0
1162	05,3440	22070 0		DEC	2.21068 E-3 B+8
1163	05,3441	03204 1		DEC	1.5166 E-9 B+26
1164	05,3442	77266 0		DEC	-1.284 B-6
1165	05,3443	02476 0		DEC	2. E-5 B+12
1166	05,3444	70364 1	NEGBPW	DEC	-15402.17 B-16
1167	05,3445	75420 0	DXITFIX	DEC*	-1.88275 E-5 B+12*

L TVCRESTARTS USER'S PAGE NO. 1 EO S3

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R1000   NAME....TVCRESTART PACKAGE,  CONSISTING OF REDOTVC, ENABL1, 2, CMDSOUT, PHSCHK2, ETC.
R1002   LOG SECTION...TVCRESTARTS                       SUBROUTINE...DAPCSM
R1003   MODIFIED BY SCHLUNDT                            21 OCTOBER 1968
R10035  MODIFIED BY BEALS TO ELIMINATE CSMMASS UPDATE LOGIC (NOW DONE IN S40.8)
R1004   FUNCTIONAL DESCRIPTION....

R1005       *RESTART-PROOFS THE TVC DAPS, INCLUDING PITCHDAP, YAWDAP,
R1006        TVCEXECUTIVE, ROLLDAP, TVCINIT4, TVCDAPON, AND CSM/LM V46 SWTCHOVR.
R1007       *TVC RESTARTS DESERVE SPECIAL CONSIDERATION IN SEVERAL AREAS.
R1008        RESTART DOWN-TIME IS IMPORTANT BECAUSE OF THE TRANSIENTS INTRODUCED
R1009        BY THE THRUST VECTOR RETURN TO THE ACTUATOR MECHANICAL NULLS
R1010        FOLLOWING TVC- AND OPTICS-ERROR-COUNTER-DISENABLES (CHANNEL 12).
R1011        TVC    USES A MIXTURE OF WAITLIST, T5, T6, AND JOB CALLS. THERE IS
R1012        FILTER MEMORY (UP TO 6TH ORDER) TO BE PROTECTED IF WILD TRANSIENTS
R1013        ARE TO BE AVOIDED. COUNTERS ARE INVOLVED FOR ONE-SHOT
R1015        CORRECTIONS AND GAIN UPDATES. THE GIMBAL TRIM ESTIMATORS AND THE
R1016        BODY AXIS ATTITUDE ERROR INTEGRATORS INVOLVE DIGITAL SUMMATION.
R1017        DIGITAL DIFFERENTIATORS ARE INVOLVED IN THE BODY AXIS RATE ESTIMA-
R1018        TIONS AND IN THE OUTPUTTING OF ACTUATOR COMMANDS. THERE IS AN
R1019        OFFSET-TRACKER-FILTER TO PROTECT. ETC., ETC.
R1020       *THOSE QUANTITIES WHICH MUST BE PROTECTED ARE STORED IN TEMPORARY
R1021        REGISTERS AS THEY ARE COMPUTED, FOR UPDATING THE REAL REGISTERS
R1022        DURING COPYCYCLES.
R1023       *THE SEVERAL COPYCYCLES ARE EACH PROTECTED BY PHASE POINTS AT THEIR
R1024        BEGINNING AND AT THEIR TERMINATION. THE PHASE POINTS ARE SIMPLY
R1025        ..INCR.. INSTRUCTIONS,   EITHER ..INCR TVCEXPHS.. FOR COPYCYCLES
R1026        IN THE TVCEXECUTIVE, OR ..INCR TVCPHASE.. FOR THE PITCH AND YAW
R1027        COPYCYCLES. INDEXING ON EACH OF THESE POINTERS THEN PERMITS A
R1028        RETURN TO THE APPROPRIATE RESTART POINTS.
R1029       *IF A RESTART OCCURS DURING EITHER COPYCYCLE, THAT COPYCYCLE IS
R1030        COMPLETED. THEN THE NORMAL TVCINIT4....DAPINIT....PITCHDAP STARTUP
R1031        SEQUENCE IS CALLED UPON TO GET THINGS GOING AGAIN.
R1032       *TVC-ENABLE AND OPTICS-ERROR-COUNTER ENABLE MUST BE SET ASAP
R1033        (ALLOWING FOR PROCEDURAL DELAYS). THEN THE ENGINES ARE COMMANDED
R1034        TO THE P,YACTOFF TRIM VALUES. THE DAPS ARE THEN READY TO GO ON THE
R1035        AIR, WITH THE REGULAR STARTUP SEQUENCE, EITHER AT MRCLEAN FOR A
R1036        COMPLETE INITIALIZATION OR AT TVCINIT4 FOR A PARTIAL INITIALIZATION
R1037       *FOR RESTARTS PRIOR TO THE SETTING OF THE T5 BITS AT DOTVCON THE
R1038        PRE40.6 SECTION OF S40.6 TAKES CARE OF RE-ESTABLISHING TRIMS.
R1039       *IF A RESTART OCCURS DURING THE TVCEXEC....TVCEXFIN SEQUENCE THE
R1040        COMPUTATIONS WILL BE COMPLETED, STARTING AT THE APPROPRIATE RESTART
R1041        POINT, AFTER THE DAPS ARE READY TO GO ON THE AIR.
R1042       *IF A RESTART OCCURS PRIOR TO TVCINIT4 (TVCPHASE = -1) E.G. DURING
R1043        THE EARLY DAP INITIALIZATION PHASE, THE DAP STARTUP SEQUENCE IS
R1044        ENTERED AT MRCLEAN FOR A FULL INITIALIZATION.
R10441      *FOR RESTARTS DURING CSM/LM V46 SWITCH-OVER, TVCPHASE IS SET TO -2,
R10442       AND THE RESTART LOGIC GOES BACK TO REDO SWITCH-OVER (AFTER THE
R10443       NORMAL DAP RESTART SEQUENCE IS FOLLOWED).
R1045       *RESTARTS ARE NOT CRITICAL TO THE ROLL DAP PERFORMANCE$ HENCE THE
R1046        THE ROLL DAP IS MERELY RESTARTED.
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R1054       *REDOTVC IS REACHED FOLLOWING ANY RESTART WHICH FINDS THE T5 BITS
R1055        (BITS 15,14 OF FLAGWRD6) SET FOR TVC. DOTVCON SETS TVCPHASE = -1
R1056        AND TVC EXPHS = 0 JUST BEFORE SETTING THESE BITS, JUST BEFORE
R1057        MAKING THE T5 CALL TO TVCDAPON. ON A NORMAL SHUTDOWN DOTVCRCS
R1058        CALLS RCSDAPON, WHICH RESETS THE T5 BITS FOR RCS.
R1060   CALLING SEQUENCE....T5, IN PARTICULAR BY ELRSKIP OF FRESH START/RESTART

R1061   NORMAL EXIT MODES....RESUME, NOQRSM, POSTJUMP (TO TVCINIT4 OR MRCLEAN)

R1062   ALARM OR ABORT EXIT MODES....NONE

R1063   SUBROUTINES CALLED....

R1064       *PCOPY+1, YCOPY+1 (PITCH AND YAW COPYCYCLES)
R1065       *ENABLE1,2, CMDSOUT (RE-ESTABLISH ACTUATOR TRIMS)
R1067       *MRCLEAN OR TVCINIT4 (TVCDAP INITIALIZATIONS)
R10671      *SWICHOVR +5  (CSM/LM V46 SWITCH-OVER)
R1068       *EXRSTRT AND TVCEXECUTIVE PHASE POINTS 1 THRU 6
R1069       *WAITLIST, IBNKCALL, POSTJUMP, ISWCALL

R1070   OTHER INTERFACES....DOTVCON AND RCSDAPON (T5 BITS), ELRSKIP (CALLS IT)
R1071   ERASABLE INITIALIZATION REQUIRED....

R1072       *T5 BITS (1,0), TVCPHASE (-2,-1,0,1,2,3), TVCEXPHS (1 THRU 6)
R1073       *TVC DAP VARIABLES
R1074       *OPERATIONS PERFORMED BY REDOTVC ARE BASED ON THE ASSUMPTION THAT
R1075        THE TVC DAPS ARE RUNNING NORMALLY

R1076   OUTPUT....

R1077       *PITCH AND YAW TVC DAP COPYCYCLES COMPLETED IF INTERUPTED
R1078       *TVCEXECUTIVE COMPLETED IF INTERUPTED
R10791      *CSM/LM V46 SWITCH-OVER REPEATED IF INTERRUPTED
R1080       *ACTUATOR TRIMS RE-ESTABLISHED (ACTUATORS BACK ON THE AIR)
R1081       *TVC DAP INITIALIZATION AS REQUIRED
R1082       *ALL TVC DAP OPERATIONS ON THE AIR

R1083   DEBRIS....TVC TEMPORARIES IN EBANK6
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1085   REF   2  LAST  951   16,2000                    SETLOC  DAPROLL
1086                       16,3222                    BANK
1087   REF   8  LAST  947   E6,1635                    EBANK=  TVCPHASE
1088   REF   1                                        COUNT*  $$/RSRT


1089   REF   9  LAST  944   16,3222  22 016 0  REDOTVC  LXCH    BANKRUPT      TVC RESTART PACKAGE
1090                       16,3223  0 0006 1           EXTEND
1091   REF   9  LAST  944   16,3224  22 012 1           QXCH    QRUPT         (  ..TCR..  IN  ..FINCOPY..  )

1092   REF  10  LAST  953   16,3225  11'644 1  EXECPHS  CCS     TVCEXPHS      CHECK TVCEXECUTIVE PHASE
1093                       16,3226  1 3230 1           TCF     +2                 MUST RESTART TVCEXECUTIVE
1094   REF   1             16,3227  1 3233 1           TCF     TVCDAPHS           NO NEED TO RESTART TVCEXECUTIVE

1095   REF   3  LAST  956   16,3230  3 4322 0           CAF     NINE          9CS DELAY TO FORCE EXRSTRT TO OCCUR
1096   REF  20  LAST  951   16,3231  0 5223 1           TC      TWIDDLE            BEFORE PITCHDAP, AFTER CMDSOUT
1097   REF   1             16,3232   03325 0           ADRES   EXRSTRT
1099   REF   2  LAST  145   16,3233  4 7663 1  TVCDAPHS CS      OCT37776      CHECK BITS 15 AND 1 OF TVCPHASE TO SEE
1100   REF   9  LAST  961   16,3234  7 1635 1           MASK    TVCPHASE           DAP RESTART LOCATION  (-1,1,2,3)
1101   REF 197  LAST  957   16,3235  10 000 0           CCS     A
1102   REF   1             16,3236  1 3315 1           TCF     FINCOPY            FINISH THE COPYCYCLE FIRST
1103   REF   1             16,3237  1 3244 1           TCF     ENABL1             JUST PREPARE THE OUTCOUNTERS AND GO

1104   REF  10  LAST  961   16,3240  4 1635 1           CS      TVCPHASE      TEST FOR TVCPHASE = -2
11041  REF  31  LAST  956   16,3241  7 4767 1           MASK    BIT2               (THIS INDICATES RESTART OCCURRED
11042                      16,3242  0 0006 1           EXTEND                     DURING CSM/LM V46 SWITCH-OVER)
11043  REF   1             16,3243  1 3321 0           BZF     TRIM/CMD      NO, TVCPHASE = -1, RSTRT WAS IN TVCINIT

1105   REF  27  LAST  444   16,3244  3 4761 0  ENABL1   CAF     BIT8          TVC ENABLE, FOLLOWED BY 40 MS (MIN) WAIT
11052  REF  20  LAST  719   16,3245  6 4756 1           AD      BIT11         SET BIT FOR OPTICS-DAC-ENABLE ALSO
1106                       16,3246  0 0006 1           EXTEND                (ENABL1 ENTERED FROM TVCDAPHS / FINCOPY)
1107   REF  39  LAST  719   16,3247  05 012 1           WOR     CHAN12
1108   REF   1             16,3250  3 3331 0           CAF     TVCADDR       WAIT,  CALLING ENABL2  (BBCON THERE)
1109   REF  13  LAST  946   16,3251  54 112 1           TS      T5LOC
1110   REF   2  LAST  961   16,3252  3 3335 1           CAF     TVCADDR +4         60MS  (TVCEXADR)
1111   REF  10  LAST  946   16,3253  54 030 0           TS      TIME5

1112   REF  28  LAST  946   16,3254  1 5323 1           TCF     RESUME


1113   REF  10  LAST  961   16,3255  22 016 0  ENABL2   LXCH    BANKRUPT      CONTINUE PREPARATION OF OUTCOUNTERS

1114   REF  32  LAST  961   16,3256  3 4767 0           CAF     BIT2          OPTICS ERROR CNTR ENABLE, 4MS MIN WAIT
1115                       16,3257  0 0006 1           EXTEND
1116   REF  40  LAST  961   16,3260  05 012 1           WOR     CHAN12
1117   REF   3  LAST  961   16,3261  3 3333 1           CAF     TVCADDR +2    WAIT, CALLING CMDSOUT (BBCON THERE)
1118   REF  14  LAST  961   16,3262  54 112 1           TS      T5LOC
1119   REF   3  LAST  961   16,3263  3 7663 0           CAF     OCT37776           20MS
1120   REF  11  LAST  961   16,3264  54 030 0           TS      TIME5
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1121   REF   2  LAST  204   16,3265  1 5325 1          TCF    NCQRSM


1122   REF  11  LAST  961   16,3266  22 016 0  CMDSOUT LXCH   BANKRUPT      CONTINUE PREPARATION OF OUTCOUNTERS
1123                        16,3267  0 0006 1          EXTEND
1124   REF  10  LAST  961   16,3270  22 012 1          QXCH   QRUPT

1125   REF 152  LAST  953   16,3271  4 4772 0          CS     ZERO          MOST RECENT ACTUATOR COMMANDS
1126   REF   6  LAST  945   16,3272  6 1623 1          AD     PCMD               (AVOID +0)
1127   REF   3  LAST  719   16,3273  54 054 1          TS     TVCPITCH
1128   REF 153  LAST  962   16,3274  4 4772 0          CS     ZERO
1129   REF   5  LAST  945   16,3275  6 1624 0          AD     YCMD
1130   REF   2  LAST  719   16,3276  54 053 0          TS     TVCYAW

1131   REF   3  LAST  719   16,3277  3 5050 1          CAF    PRIO6         RELEASE THE COUNTERS (BITS 11,12)
1132                        16,3300  0 0006 1          EXTEND
1133   REF   7  LAST  720   16,3301  05 014 1          WOR    CHAN14

1138   REF  11  LAST  961   16,3302  11'635 1  PHSCHK2 CCS    TVCPHASE      CHECK TVCPHASE AGAIN
1139   REF   1              16,3303  1 3313 1          TCF    JUMPTVC4
1140   REF   2  LAST  962   16,3304  1 3313 1          TCF    JUMPTVC4
1141   REF 198  LAST  961   16,3305  10 000 0          CCS    A             A CONTAINS THE DIMINISHED ABSOLUTE OF
1142                        16,3306  0 3311 1          TC     +3            TVCPHASE (-2 BECOMES +1, -1 BECOMES +0)
```

```
114201 REF  51  LAST  907   16,3307  0 4655 0          TC     POSTJUMP      REPEAT TVC INITIALIZATION
114202 REF   2  LAST  943   16,3310   36166 0          CADR   MRCLEAN       (DO NOT RETURN)

114203 REF  33  LAST  951   16,3311  0 4714 1    +3    TC     IBNKCALL      REPEAT CSM/LM V46 SWITCH-OVER
114204 REF   3  LAST  946   16,3312   36351 0          CADR   SWICHOVR +5    (RETURN TO CHECK FOR STROKE TEST)

1143   REF  52  LAST  962   16,3313  0 4655 0  JUMPTVC4 TC     POSTJUMP      IF POSITIVE OR ZERO, RESTART AT
1144   REF   1              16,3314   36326 0          CADR   TVCINIT4           TVCINIT4 (ZEROS TVCPHASE, AND
A1145                                                                          CALLS TVC DAPS VIA DAPINIT)
1146   REF  12  LAST  962   16,3315  51'635 0  FINCOPY INDEX  TVCPHASE     PICK UP THE APPROPRIATE COPYCYCLE
1147   REF   1              16,3316  3 3331 0          CAF    TVCCADR
1148   REF   1              16,3317  0 4720 0          TCR    ISWCALL       RE-ENTER THE COPYCYCLE, RETURN AT END
1149   REF   2  LAST  961   16,3320  1 3244 1          TCF    ENABLI        NOW PREPARE THE OUTCOUNTERS


1150                        16,3321  0 0006 1  TRIM/CMD EXTEND               TVCDAPON INITIALIZATION NOT COMPLETED,
1151   REF  16  LAST  953   16,3322  3 1424 1          DCA    PACTOFF            EG. P,YCMD MAY NOT BE SET. SET...
1152   REF   7  LAST  962   16,3323  53'624 1          DXCH   PCMD
1153   REF   3  LAST  962   16,3324  1 3244 1          TCF    ENABLI        NOW PREPARE THE OUTCOUNTERS


1161   REF  11  LAST  961   16,3325  51'644 0  EXRSTRT INDEX  TVCEXPHS     TVCEXECUTIVE RESTARTS....GO TO
1162   REF   1              16,3326  3 3335 1          CAF    TVCEXADR       APPROPRIATE RESTART POINT
1163   REF 199  LAST  962   16,3327  50 000 1          INDEX  A
1164                        16,3330  1 0000 0          TCF    0
```

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R1165 TVC RESTART TABLES.... ORDER IS REQUIRED. HI-ORDER WORDS ONLY, OF 2CADRS, SINCE BBCON IS ALREADY THERE.

```
1167   REF   2  LAST  962   16,3331              TVCADDR  =       TVCCADR     TABLE OF CADRS, UNUSED LOCS FOR GENADRS
1168   REF   1              16,3331  03255 0     TVCCADR  GENADR  ENABL2     (FOR T5 CALL, UNUSED TABLE LOC)
1169   REF   1              16,3332  41005 1       +1     CADR    PCOPY +1   PITCH COPYCYCLE
1170   REF   1              16,3333  03266 0       +2     GENADR  CMDSOUT    (FOR T5 CALL, UNUSED TABLE LOC)
1171   REF   1              16,3334  41171 0       +3     CADR    YCOPY +1   YAW COPYCYCLE
1172                        16,3335  37772 1     TVCEXADR OCT     37772      (UNUSED TABLE.LOC, FILL WITH 60MS, T5)
1173   REF   1              16,3336  03123 1       +1     GENADR  TEMPSET    TVCEXECUTIVE RESTART POINTS (ORDERED)
1174   REF   2  LAST  952   16,3337  03126 1       +2     GENADR  CORSETUP
1175   REF   1              16,3340  03204 1       +3     GENADR  CORCOPY +1
1176   REF   2  LAST  952   16,3341  03215 1       +4     GENADR  CNTRCOPY
```

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```
R1000   PROGRAM NAME....TVCDAP, CONSISTING OF PITCHDAP, YAWDAP, ETC.
R1001   LOG SECTION...TVCDAPS                    SUBROUTINE...DAPCSM
R1002   MODIFIED BY SCHLUNDT                     21 OCTOBER 1968
R1003   FUNCTIONAL DESCRIPTION....

R1004         SELF-PERPETUATING T5 TASKS WHICH GENERATE THE COMMAND SIGNALS
R1005         FOR THE PITCH AND YAW SPS GIMBAL ACTUATORS DURING TVC (SPS) BURNS,
R1006         IN RESPONSE TO BODY-AXIS RATE COMMANDS FROM CROSS-PRODUCT STEERING
R1007         (S40.8).  IF NO STEERING (IMPULSIVE BURNS) MAINTAINS ATTITUDE-HOLD
R1008         ABOUT THE REFERENCE (INITIAL) DIRECTIONS (ZERO RATE COMMANDS).

R1009         THE PITCH AND YAW LOOPS ARE SEPARATE, BUT STRUCTURED IDENTICALLY.
R1010         EACH ATTITUDE-RATE LOOP INCLUDES GIMBAL ANGLE RATE DERIVATION,
R1011         GIMBAL/BODY AXIS TRANSFORMATION, BODY-AXIS ATTITUDE ERROR
R1012         INTEGRATION WITH ERROR LIMITING, THE GENERALIZED 6TH-ORDER FILTER
R1013         FOR CSM OR CSM/LM OPERATION, A FILTER OUTPUT LIMITER,
R1014         CG-OFFSET TRACKER FILTER, AND THE CG-TRACKER MINOR LOOP.

R1015         THE DAPS ARE CYCLIC, CALLING EACH OTHER AT 1/2  THE DAP SAMPLE
R1016         TIME, AS DETERMINED BY T5TVCDT. THE ACTUATOR COMMANDS ARE
R1017         REGENERATED AS ANALOG VOLTAGES BY THE OPTICS ERROR COUNTERS, WHICH
R1018         TRANSMIT THE SIGNAL TO THE ACTUATOR SERVOS WHEN THERE IS PROPER CDU
R1019         MODING.

R1027   CALLING SEQUENCE.... (TYPICALLY)

R1028         T5 CALL OF TVCDAPON (TVCINITIALIZE) BY DOTVCON (P40)
R1029         T5 CALL OF DAPINIT (TVCDAPS) BY TVCINIT4 (TVCINITIALIZE)
R1031         T5 CALL OF PITCHDAP BY DAPINIT
R1032         T5 CALL OF YAWDAP BY PITCHDAP
R1033         T5 CALL OF PITCHDAP BY YAWDAP
R1034                ETC.
R1035         (AUTOMATIC SEQUENCING FROM TVCDAPON)

R1036   NORMAL EXIT MODE....RESUME

R1037   ALARM OR ABORT EXIT MODES....NONE

R1038   SUBROUTINES CALLED....

R1039            HACK FOR STROKE TEST (V68) WAVEFORM GENERATION
R1041            PCOPY, YCOPY FOR COPY-CYCLES (USED ALSO BY TVC RESTART PACKAGE)
R1042            DAPINIT FOR INITIAL CDUS FOR RATE MEASUREMENTS
R1043            ERRORLIM, ACTLIM FOR INPUT (ATTITUDE-ERROR INTEGRATION) AND
R1044                  OUTPUT (ACTUATOR COMMAND) LIMITING, COMMON TO PITCH AND
R1045                  YAW DAPS
R1046            FWDFLTR (INCLUDING OPTVARK) AND PRECOMP, TO COMPUTE FILTER
R1047                OUTPUTS AND STORAGE VALUES
R1048            RESUME
```

```
R1049   OTHER INTERFACES....

R1050         S40.8 CROSS-PRODUCT STEERING FOR BODY AXIS RATE  COMMANDS OMEGAY,ZC
R1051         S40.15 FOR THE INITIAL DAP GAINS VARK AND 1/CONACC
R1052         TVCEXECUTIVE FOR DAP GAIN UPDATES AND TMC LOOP OPERATIONS
R1055         TVCRESTART PACKAGE FOR TVC RESTART PROTECTION.

R1056   ERASABLE INITIALIZATION REQUIRED....

R1057         PAD-LOAD ERASABLES ( SEE ERASABLE ASSIGNMENTS )
R1059         CONFIGURATION BITS  (14, 13)  OF DAPDATR1 AS IN R03
R1060         ENGINE-ON BIT (11.13) FOR RESTARTS
R1061         TVCPHASE FOR RESTARTS ( SEE DOTVCON, AND TVCINIT4 )
R1062         T5 BITS (15,14 OF FLAGWRD6) FOR RESTARTS
R1063         MISCELLANEOUS VARIABLES SET UP OR COMPUTED BY TVCDAPON....TVCINIT4,
R1064             INCLUDING THE ZEROING OF TEMPORARIES BY  MRCLEAN
R1065         CDUX,Y,Z AND SINCDUX....COSCDUZ AS PREPARED BY QUICTRIG (WITH
R1066             UPDATES EVERY 1/2 SECOND)
R1067         ALSO G+N PRIMARY, TVC ENABLE, AND OPTICS ERROR COUNTER ENABLE
R1068             UNLESS BENCH-TESTING.

R1069   OUTPUT....

R1070         TVCPITCH AND TVCYAW WITH COUNTER RELEASE (11.14 AND 11.13 INCREMEN-
R1071             TAL  COMMANDS TO OPTICS ERROR COUNTERS), FILTER NODES, BODY-
R1072             AXIS ATTITUDE ERROR INTEGRATOR, TOTAL ACTUATOR COMMANDS,
R1073             OFFSET-TRACKER-FILTER OUTPUTS, ETC.
R1074   DEBRIS....

R1075         MUCH, SHAREABLE WITH RCS/ENTRY, IN EBANK6 ONLY

  1077  REF   1              20,2000                 SETLOC DAPS2
  1078                       20,2644                 BANK

  1079  REF  35  LAST  956    E6,1446                 EBANK= CNTR

  1080  REF   1                                      COUNT* $$/DAPS
```

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P1081 PITCH TVCDAP STARTS HERE....(INCORPORATES CSM/LEM DAP FILTER, MODOR DESIGN)

```
1083   REF  12  LAST  962   20,2644  22 016 0  PITCHDAP LXCH    BANKRUPT      T5 ENTRY,  NORMAL OR VIA DAPINIT
1084                        20,2645  0 0006 1           EXTEND
1085   REF  11  LAST  962   20,2646  22 012 1           QXCH    QRUPT

1086   REF   1              20,2647  3 3620 0           CAF     YAWT5         SET UP T5 CALL FOR YAW AUTOPILOT (LOW-
1087   REF  15  LAST  961   20,2650  54 112 1           TS      T5LOC               ORDER PART OF 2CADR ALREADY THERE)
1088   REF   4  LAST  946   20,2651  31'625 1           CAE     T5TVCDT
1089   REF  12  LAST  961   20,2652  54 030 0           TS      TIME5

1094   REF   9  LAST  786   20,2653  30 033 1  PCDUDOTS CAE     CDUY          COMPUTE CDUYDOT
1095   REF   2  LAST  109   20,2654  57'636 0           XCH     PCDUYPST
1096                        20,2655  0 0006 1           EXTEND
1097   REF   3  LAST  966   20,2656  21'636 1           MSU     PCDUYPST
1098   REF   1              20,2657  0 2670 1           TCR     RLIMTEST            RATE TEST
1099   REF   2  LAST  109   20,2660  55'642 1           TS      MCDUYDOT            (MINUS,  SC.AT  1/2TVCDT REVS/SEC)

1100   REF  13  LAST  786   20,2661  30 034 0           CAE     CDUZ          COMPUTE CDUZDOT
1101   REF   2  LAST  109   20,2662  57'637 1           XCH     PCDUZPST
1102                        20,2663  0 0006 1           EXTEND
1103   REF   3  LAST  966   20,2664  21'637 0           MSU     PCDUZPST
1104   REF   2  LAST  966   20,2665  0 2670 1           TCR     RLIMTEST            RATE TEST
1105   REF   2  LAST  110   20,2666  55'643 0           TS      MCDUZDOT            (MINUS,  SC.AT  1/2TVCDT REVS/SEC)
1106   REF   1              20,2667  1 2701 1           TCF     PINTEGRL

1107   REF  13  LAST  953   20,2670  55'611 1  RLIMTEST TS      TTMP1         TEST FOR EXCESSIVE CDU RATES (GREATER
1108                        20,2671  0 0006 1           EXTEND                    THAN 2.33 DEG IN ONE SAMPLE PERIOD)
1109   REF   1              20,2672  7 3621 0           MP      1/RTLIM           (USED BY PITCH AND YAW PASSES)
1110                        20,2673  0 0006 1           EXTEND
1111                        20,2674  1 2677 1           BZF     +3
1112   REF 154  LAST  962   20,2675  3 4772 1           CAF     ZERO
1113   REF  14  LAST  966   20,2676  55'611 1           TS      TTMP1
1114   REF  15  LAST  966   20,2677  31'611 0           CAE     TTMP1
1115   REF 158  LAST  957   20,2700  0 0002 0           TC      Q

1116                        20,2701  0 0006 1  PINTEGRL EXTEND        COMPUTE INTEGRAL OF BODY-AXIS PITCH-RATE
1117   REF   3  LAST  945   20,2702  3 1576 1           DCA     PERRB       ERROR, SC.AT B-1 REVS
1118   REF   7  LAST  945   20,2703  53'665 1           DXCH    ERRBTMP

1119                        20,2704  0 0006 1           EXTEND
1120   REF   2  LAST  943   20,2705  3 1530 0           DCA     OMEGAYC
1121   REF   8  LAST  966   20,2706  21'665 1           DAS     ERRBTMP

1122   REF   5  LAST  770   20,2707  4 1151 1           CS      COSCDUZ       PREPARE BODY-AXIS PITCH RATE, OMEGAYB
1123                        20,2710  0 0006 1           EXTEND
1124   REF   5  LAST  770   20,2711  7 1153 0           MP      COSCDUX
1125                        20,2712  20 001 1           DDOUBL
1126                        20,2713  0 0006 1           EXTEND
```

```
1127   REF  3  LAST  966   20,2714  7 1642 1          MP      MCDUYDOT
1128                       20,2715  20 001 1          DDOUBL
1129   REF  1              20,2716  53'536 1          DXCH    OMEGAYB

1130   REF  3  LAST  966   20,2717  4 1643 0          CS      MCDUZDOT
1131                       20,2720  0 0006 1          EXTEND
1132   REF  5  LAST  770   20,2721  7 1145 1          MP      SINCDUX
1133                       20,2722  20 001 1          DDOUBL
1134   REF  2  LAST  967   20,2723  21'536 1          DAS     OMEGAYB        OMEGAYB, SCALED (B-1)/TVCDT  REVS/SEC

1135                       20,2724  0 0006 1          EXTEND                 PICK UP -OMEGAYB (SIGN CHNG, INTEGRATE)
1136   REF  3  LAST  967   20,2725  4 1536 1          DCS     OMEGAYB
1137   REF  9  LAST  966   20,2726  21'665 1          DAS     ERRBTMP

1138   REF  1              20,2727  0 3246 1  PERORLIM TCR     ERRORLIM       PITCH BODY-AXIS-ERROR  INPUT LIMITER

1139                       20,2730  0 0006 1  PFORWARD EXTEND                    PREPARE THE FILTER STORAGE LOCATIONS
1140   REF  3  LAST  946   20,2731  3 1542 0          DCA     PTMP1            FOR THE PITCH CHANNEL
1141   REF  2  LAST  110   20,2732  53'671 1          DXCH    TMP1
1142                       20,2733  0 0006 1          EXTEND
1143   REF  2  LAST  108   20,2734  3 1546 1          DCA     PTMP3
1144   REF  2  LAST  110   20,2735  53'675 0          DXCH    TMP3
1145                       20,2736  0 0006 1          EXTEND
1146   REF  2  LAST  109   20,2737  3 1552 1          DCA     PTMP5
1147   REF  2  LAST  110   20,2740  53'701 1          DXCH    TMP5

1148   REF  1              20,2741  0 3300 1          TCR     FWDFLTR        GO COMPUTE PRESENT OUTPUT
A1149                                                                       (INCLUDES VARIABLE GAIN PACKAGE)

1150                       20,2742  0 0006 1  POFFSET  EXTEND
1151   REF  7  LAST  953   20,2743  3 1606 0          DCA     PDELOFF
1152   REF  2  LAST  110   20,2744  21'667 0          DAS     CMDTMP         NOW SCALED AT B+0 ASCREV

1153   REF  1              20,2745  0 3261 1  PACLIM   TCR     ACTLIM         ROUND OFF & LIMIT PITCH ACTUATOR COMMAND

1154   REF  8  LAST  962   20,2746  4 1623 0  POUT     CS      PCMD           INCREMENTAL PITCH COMMAND
1155   REF  3  LAST  967   20,2747  6 1666 0          AD      CMDTMP
1156   REF  4  LAST  962   20,2750  26 054 1          ADS     TVCPITCH       UPDATE THE ERROR COUNTER (NO RESTART-
A1157                                                                             PROTECT, SINCE ERROR CNTR ZEROED)

1158   REF 21  LAST  961   20,2751  3 4756 1          CAF     BIT11          BIT FOR TVCPITCH COUNT RELEASE
1159                       20,2752  0 0006 1          EXTEND
1160   REF  8  LAST  962   20,2753  05 014 1          WOR     CHAN14

1161                       20,2754  0 0006 1  PPRECOMP EXTEND                    PREPARE THE FILTER STORAGE FOR PITCH
1162   REF  2  LAST  108   20,2755  3 1544 0          DCA     PTMP2
1163   REF  2  LAST  110   20,2756  53'673 0          DXCH    TMP2
1164                       20,2757  0 0006 1          EXTEND
1165   REF  2  LAST  109   20,2760  3 1550 0          DCA     PTMP4
1166   REF  2  LAST  110   20,2761  53'677 1          DXCH    TMP4
```

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```
1167                          20,2762  0 0006 1            EXTEND
1168  REF   2  LAST  109     20,2763  3 1554 1            DCA     PTMP6
1169  REF   2  LAST  110     20,2764  53'703 0            DXCH    TMP6

1170  REF   1                 20,2765  0 3372 1            TCR     PRECOMP          TO THE FILTER FOR PRECOMPUTATION

1171  REF   6  LAST  952     20,2766  31'602 1 DELBARP    CAE     DELPBAR +1       UPDATE PITCH OFFSET-TRACKER-FILTER
1172                          20,2767  0 0006 1            EXTEND
1173  REF   1                 20,2770  7 3623 1            MP      E(-AT)
1174  REF   2  LAST  110     20,2771  55'663 1            TS      DELBRTMP +1
1175  REF   7  LAST  968     20,2772  31'601 1            CAE     DELPBAR
1176                          20,2773  0 0006 1            EXTEND
1177  REF   2  LAST  968     20,2774  7 3623 1            MP      E(-AT)
1178  REF   3  LAST  968     20,2775  21'663 1            DAS     DELBRTMP
1179  REF   4  LAST  967     20,2776  31'666 0            CAE     CMDTMP
1180                          20,2777  0 0006 1            EXTEND
1181  REF   1                 20,3000  7 3622 0            MP      1-E(-AT)
1182  REF   4  LAST  968     20,3001  21'663 1            DAS     DELBRTMP

1183  REF   2  LAST  963     20,3002  0 3004 0 PCOPYCYC   TCR     PCOPY            PITCH COPYCYCLE

1184  REF  29  LAST  961     20,3003  1 5323 1 PDAPEND    TCF     RESUME           PITCH DAP COMPLETED
```

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P1185 PITCH TVCDAP COPYCYCLE SUBROUTINE (CALLED VIA PITCH TVCDAP OR TVC RESTART PACKAGE)

```
 1187   REF  13  LAST  962   20,3004  25'635 0  PCOPY   INCR    TVCPHASE        RESTART-PROTECT THE COPYCYCLE.          (1)
A1188                                                                          NOTE POSSIBLE RE-ENTRY FROM RESTART
A1189                                                                          PACKAGE, SHOULD A RESTART OCCUR
A1190                                                                          DURING PITCH COPYCYCLE.

 1191                          20,3005  0 0006 1          EXTEND
 1192   REF   3  LAST  967   20,3006  3 1671 0          DCA     TMP1
 1193   REF   4  LAST  967   20,3007  53'542 1          DXCH    PTMP1
 1194                         20,3010  0 0006 1          EXTEND
 1195   REF   3  LAST  967   20,3011  3 1673 1          DCA     TMP2
 1196   REF   3  LAST  967   20,3012  53'544 1          DXCH    PTMP2
 1197                         20,3013  0 0006 1          EXTEND
 1198   REF   3  LAST  967   20,3014  3 1675 1          DCA     TMP3
 1199   REF   3  LAST  967   20,3015  53'546 0          DXCH    PTMP3
 1200                         20,3016  0 0006 1          EXTEND
 1201   REF   3  LAST  967   20,3017  3 1677 0          DCA     TMP4
 1202   REF   3  LAST  967   20,3020  53'550 1          DXCH    PTMP4
 1203                         20,3021  0 0006 1          EXTEND
 1204   REF   3  LAST  967   20,3022  3 1701 0          DCA     TMP5
 1205   REF   3  LAST  967   20,3023  53'552 0          DXCH    PTMP5
 1206                         20,3024  0 0006 1          EXTEND
 1207   REF   3  LAST  968   20,3025  3 1703 1          DCA     TMP6
 1208   REF   3  LAST  968   20,3026  53'554 0          DXCH    PTMP6

 1209                         20,3027  0 0006 1  PMISC   EXTEND                  MISC....PITCH-RATE-ERROR INTEGRATOR
 1210   REF  10  LAST  967   20,3030  3 1665 0          DCA     ERRBTMP
 1211   REF   7  LAST  551   20,3031  55'477 0          TS      AK1             FOR PITCH NEEDLES, SC.AT 8-1 REVS
 1212   REF   4  LAST  966   20,3032  53'576 0          DXCH    PERRB

 1213   REF   5  LAST  968   20,3033  31'666 0          CAE     CMDTMP          PITCH ACTUATOR COMMAND
 1214   REF   9  LAST  967   20,3034  55'623 0          TS      PCMD

 1215                         20,3035  0 0006 1          EXTEND                  PITCH OFFSET-TRACKER-FILTER
 1216   REF   5  LAST  968   20,3036  3 1663 0          DCA     DELBRTMP
 1217   REF   8  LAST  968   20,3037  53'602 0          DXCH    DELPBAR

 1218   REF  14  LAST  969   20,3040  25'635 0          INCR    TVCPHASE        PITCH COPYCYCLE COMPLETED               (2)

 1219   REF 159  LAST  966   20,3041  0 0002 0          TC      Q
```

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P1220 YAW TVCDAP STARTS HERE....(INCORPORATES CSM/LEM DAP FILTER, MODOR DESIGN)

```
1222   REF  13  LAST  966   20,3042  22 016 0  YAWDAP   LXCH   BANKRUPT        T5 ENTRY,  NORMAL
1223                        20,3043  0 0006 1           EXTEND
1224   REF  12  LAST  966   20,3044  22 012 1           QXCH   QRUPT

1225   REF   1               20,3045  3 3616 0           CAF    PITCHT5         SET UP T5 CALL FOR PITCH AUTOPILOT (LOW-
1226   REF  16  LAST  966   20,3046  54 112 1           TS     T5LOC                ORDER PART OF 2CADR ALREADY THERE)
1227   REF   5  LAST  966   20,3047  31'625 1           CAE    T5TVCDT
1228   REF  13  LAST  966   20,3050  54 030 0           TS     TIME5

123302 REF  10  LAST  966   20,3051  30 033 1  YCDUDOTS CAE    CDUY            COMPUTE CDUYDOT
123304 REF   2  LAST  109   20,3052  57'640 1           XCH    YCDUYPST
123306                      20,3053  0 0006 1           EXTEND
123308 REF   3  LAST  970   20,3054  21'640 0           MSU    YCDUYPST
12331  REF   3  LAST  966   20,3055  0 2670 1           TCR    RLIMTEST             RATE TEST
123312 REF   4  LAST  967   20,3056  55'642 1           TS     MCDUYDOT             (MINUS, SCALED 1/2TVCDT REV/SEC)

123314 REF  14  LAST  966   20,3057  30 034 0           CAE    CDUZ            COMPUTE CDUZDOT
123316 REF   2  LAST  109   20,3060  57'641 0           XCH    YCDUZPST
123318                      20,3061  0 0006 1           EXTEND
12332  REF   3  LAST  970   20,3062  21'641 1           MSU    YCDUZPST
123322 REF   4  LAST  970   20,3063  0 2670 1           TCR    RLIMTEST             RATE TEST
123324 REF   4  LAST  967   20,3064  55'643 0           TS     MCDUZDOT             (MINUS, SCALED 1/2TVCDT REV/SEC)

1234                        20,3065  0 0006 1  YINTEGRL EXTEND                  COMPUTE INTEGRAL OF BODY-AXIS YAW-RATE
1235   REF   3  LAST  945   20,3066  3 1600 0           DCA    YERRB                ERROR, SC.AT B-1 REVS
1236   REF  11  LAST  969   20,3067  53'665 1           DXCH   ERRBTMP

1237                        20,3070  0 0006 1           EXTEND
1238   REF   1               20,3071  3 1532 1           DCA    OMEGAZC
1239   REF  12  LAST  970   20,3072  21'665 1           DAS    ERRBTMP

1240   REF   6  LAST  966   20,3073  31'151 0           CAE    COSCDUZ         PREPARE BODY-AXIS YAW-RATE, OMEGAZB
1241                        20,3074  0 0006 1           EXTEND
1242   REF   6  LAST  967   20,3075  7 1145 1           MP     SINCDUX
1243                        20,3076  20 001 1           DDOUBL
1244                        20,3077  0 0006 1           EXTEND
1245   REF   5  LAST  970   20,3100  7 1642 1           MP     MCDUYDOT
1246                        20,3101  20 001 1           DDOUBL
1247   REF   1               20,3102  53'540 0           DXCH   OMEGAZB

1248   REF   5  LAST  970   20,3103  4 1643 0           CS     MCDUZDOT
1249                        20,3104  0 0006 1           EXTEND
1250   REF   6  LAST  966   20,3105  7 1153 0           MP     COSCDUX
1251                        20,3106  20 001 1           DDOUBL
1252   REF   2  LAST  970   20,3107  21'540 0           DAS    OMEGAZB         OMEGAZB, SCALED (B-1)/TVCDT  REVS/SEC

1253                        20,3110  0 0006 1           EXTEND                  PICK UP -OMEGAZB (SIGN CHNG, INTEGRATE)
```

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 1254   REF   3  LAST  970   20,3111  4 1540 0          DCS    OMEGAZB
 1255   REF  13  LAST  970   20,3112  21'665 1          DAS    ERRBTMP

 1256   REF   2  LAST  967   20,3113  0 3246 1  YERORLIM TCR    ERRORLIM      YAW   BODY-AXIS-ERROR  INPUT LIMITER

 1257                        20,3114  0 0006 1  YFORWARD EXTEND                    PREPARE THE FILTER STORAGE LOCATIONS
 1258   REF   2  LAST  109   20,3115  3 1556 0          DCA    YTMP1              FOR THE YAW CHANNEL
 1259   REF   4  LAST  969   20,3116  53'671 1          DXCH   TMP1
 1260                        20,3117  0 0006 1          EXTEND
 1261   REF   2  LAST  109   20,3120  3 1562 1          DCA    YTMP3
 1262   REF   4  LAST  969   20,3121  53'675 0          DXCH   TMP3
 1263                        20,3122  0 0006 1          EXTEND
 1264   REF   2  LAST  109   20,3123  3 1566 0          DCA    YTMP5
 1265   REF   4  LAST  969   20,3124  53'701 1          DXCH   TMP5

 1266   REF   2  LAST  967   20,3125  0 3300 1          TCR    FWDFLTR       GO COMPUTE PRESENT OUTPUT
A1267                                                                       (INCLUDES VARIABLE GAIN PACKAGE)

 1268                        20,3126  0 0006 1  YOFFSET  EXTEND
 1269   REF   7  LAST  953   20,3127  3 1610 1          DCA    YDELOFF
 1270   REF   6  LAST  969   20,3130  21'667 0          DAS    CMDTMP        NOW SCALED AT B+0 ASCREV

 1271   REF   2  LAST  967   20,3131  0 3261 1  YACLIM   TCR    ACTLIM        ROUND OFF & LIMIT YAW ACTUATOR COMMAND

 1272   REF   6  LAST  962   20,3132  4 1624 1  YOUT     CS     YCMD          INCREMENTAL YAW   COMMAND
 1273   REF   7  LAST  971   20,3133  6 1666 0          AD     CMDTMP
 1274   REF   3  LAST  962   20,3134  26 053 0          ADS    TVCYAW        UPDATE THE ERROR COUNTER (NO RESTART-
A1275                                                                       PROTECT, SINCE ERROR CNTR ZEROED)

 1276   REF  25  LAST  702   20,3135  3 4755 1          CAF    BIT12         BIT FOR TVCYAW COUNT RELEASE
 1277                        20,3136  0 0006 1          EXTEND
 1278   REF   9  LAST  967   20,3137  05 014 1          WOR    CHAN14

 1279                        20,3140  0 0006 1  YPRECOMP EXTEND                    PREPARE THE FILTER STORAGE FOR YAW
 1280   REF   2  LAST  109   20,3141  3 1560 0          DCA    YTMP2
 1281   REF   4  LAST  969   20,3142  53'673 0          DXCH   TMP2
 1282                        20,3143  0 0006 1          EXTEND
 1283   REF   2  LAST  109   20,3144  3 1564 1          DCA    YTMP4
 1284   REF   4  LAST  969   20,3145  53'677 1          DXCH   TMP4
 1285                        20,3146  0 0006 1          EXTEND
 1286   REF   2  LAST  109   20,3147  3 1570 1          DCA    YTMP6
 1287   REF   4  LAST  969   20,3150  53'703 0          DXCH   TMP6

 1288   REF   2  LAST  968   20,3151  0 3372 1          TCR    PRECOMP           TO THE FILTER FOR PRECOMPUTATION

 1289   REF   6  LAST  953   20,3152  31'604 1  DELBARY  CAE    DELYBAR +1    UPDATE YAW   OFFSET-TRACKER-FILTER
 1290                        20,3153  0 0006 1          EXTEND
 1291   REF   3  LAST  968   20,3154  7 3623 1          MP     E(-AT)
 1292   REF   6  LAST  969   20,3155  55'663 1          TS     DELBRTMP +1
 1293   REF   7  LAST  971   20,3156  31'603 0          CAE    DELYBAR
```

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```
1294                          20,3157  0 0006 1          EXTEND
1295  REF   4  LAST  971      20,3160  7 3623 1          MP      E(-AT)
1296  REF   7  LAST  971      20,3161  21'663 1          DAS     DELBRTMP
1297  REF   8  LAST  971      20,3162  31'666 0          CAE     CMDTMP
1298                          20,3163  0 0006 1          EXTEND
1299  REF   2  LAST  968      20,3164  7 3622 0          MP      1-E(-AT)
1300  REF   8  LAST  972      20,3165  21'663 1          DAS     DELBRTMP

1301  REF   2  LAST  963      20,3166  0 3170 1 YCOPYCYC TCR     YCOPY         YAW   COPYCYCLE

1302  REF  30  LAST  968      20,3167  1 5323 1 YDAPEND  TCF     RESUME        YAW   DAP COMPLETED
```

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P1303 YAW TVCDAP COPYCYCLE SUBROUTINE (CALLED VIA YAW TVCDAP OR TVC RESTART PACKAGE)

```
 1305  REF  15  LAST  969   20,3170  25'635 0  YCOPY   INCR    TVCPHASE        RESTART-PROTECT THE COPYCYCLE.        (3)
A1306                                                                          NOTE POSSIBLE RE-ENTRY FROM RESTART
A1307                                                                          PACKAGE, SHOULD A RESTART OCCUR
A1308                                                                          DURING YAW  COPYCYCLE.

 1309                          20,3171  0 0006 1          EXTEND
 1310  REF   5  LAST  971     20,3172  3 1671 0          DCA     TMP1
 1311  REF   3  LAST  971     20,3173  53'556 1          DXCH    YTMP1
 1312                          20,3174  0 0006 1          EXTEND
 1313  REF   5  LAST  971     20,3175  3 1673 1          DCA     TMP2
 1314  REF   3  LAST  971     20,3176  53'560 1          DXCH    YTMP2
 1315                          20,3177  0 0006 1          EXTEND
 1316  REF   5  LAST  971     20,3200  3 1675 1          DCA     TMP3
 1317  REF   3  LAST  971     20,3201  53'562 0          DXCH    YTMP3
 1318                          20,3202  0 0006 1          EXTEND
 1319  REF   5  LAST  971     20,3203  3 1677 0          DCA     TMP4
 1320  REF   3  LAST  971     20,3204  53'564 0          DXCH    YTMP4
 1321                          20,3205  0 0006 1          EXTEND
 1322  REF   5  LAST  971     20,3206  3 1701 0          DCA     TMP5
 1323  REF   3  LAST  971     20,3207  53'566 1          DXCH    YTMP5
 1324                          20,3210  0 0006 1          EXTEND
 1325  REF   5  LAST  971     20,3211  3 1703 1          DCA     TMP6
 1326  REF   3  LAST  971     20,3212  53'570 0          DXCH    YTMP6

 1327                          20,3213  0 0006 1  YMISC   EXTEND                 MISC....YAW-RATE-ERROR INTEGRATOR
 1328  REF  14  LAST  971     20,3214  3 1665 0          DCA     ERRBTMP
 1329  REF   7  LAST  551     20,3215  55'500 1          TS      AK2                    FOR YAW  NEEDLES, SC.AT B-1 REVS
 1330  REF   4  LAST  970     20,3216  53'600 1          DXCH    YERRB

 1331  REF   9  LAST  972     20,3217  31'666 0          CAE     CMDTMP
 1332  REF   7  LAST  971     20,3220  55'624 1          TS      YCMD

 1333                          20,3221  0 0006 1          EXTEND
 1334  REF   9  LAST  972     20,3222  3 1663 0          DCA     DELBRTMP
 1335  REF   8  LAST  971     20,3223  53'604 0          DXCH    DELYBAR

 1336  REF 155  LAST  966     20,3224  3 4772 1          CAF     ZERO            YAW  COPYCYCLE COMPLETED
 1337  REF  16  LAST  973     20,3225  55'635 1          TS      TVCPHASE               RESET TVCPHASE

 1338  REF 160  LAST  969     20,3226  0 0002 0          TC      Q
```

P1339 SUBROUTINES COMMON TO BOTH PITCH AND YAW DAPS....

R1340 INITIALIZATION PACKAGE FOR CDURATES....

```
 1341   REF  14  LAST  970   20,3227  22 016 0  DAPINIT  LXCH    BANKRUPT        T5 RUPT ENTRY (CALLED BY TVCINT4)

 1342   REF  15  LAST  952   20,3230  3 7702 0           CAF     NEGONE              SET UP
 1343   REF   6  LAST  970   20,3231  6 1625 1           AD      T5TVCDT             T5 CALL FOR PITCHDAP IN TVCDT SECS
 1344   REF   3  LAST  437   20,3232  6 4752 0           AD      NEGMAX              (T5TVCDT = POSMAX - TVCDT/2 +1)
 1345   REF   7  LAST  974   20,3233  6 1625 1           AD      T5TVCDT
 1346   REF  14  LAST  970   20,3234  54 030 0           TS      TIME5
 1347   REF   2  LAST  970   20,3235  3 3616 0           CAF     PITCHT5             (BBCON ALREADY THERE)
 1348   REF  17  LAST  970   20,3236  54 112 1           TS      T5LOC

 1349   REF  11  LAST  970   20,3237  30 033 1           CAE     CDUY            READ AND STORE CDUS FOR DIFFERENTIATOR
 1350   REF   4  LAST  966   20,3240  55'636 1           TS      PCDUYPST            PAST-VALUES
 13501  REF   4  LAST  970   20,3241  55'640 0           TS      YCDUYPST
 1351   REF  15  LAST  970   20,3242  30 034 0           CAE     CDUZ
 1352   REF   4  LAST  966   20,3243  55'637 0           TS      PCDUZPST
 13521  REF   4  LAST  970   20,3244  55'641 1           TS      YCDUZPST

 1353   REF   3  LAST  962   20,3245  1 5325 1           TCF     NOQRSM
```

R1354 BODY-AXIS-ERROR INPUT LIMITER PACKAGE....

```
 1355   REF  15  LAST  973   20,3246  31'664 1  ERRORLIM CAE     ERRBTMP         CHECK FOR INPUT-ERROR LIMIT
 1356                       20,3247  0 0006 1           EXTEND                      CHECKS UPPER WORD ONLY
 1357   REF   1             20,3250  7 4766 0           MP      1/ERRLIM
 1358                       20,3251  0 0006 1           EXTEND
 1359                       20,3252  1 3260 1           BZF     +6
 1360   REF  16  LAST  974   20,3253  11'664 0           CCS     ERRBTMP
 1361   REF   1             20,3254  3 4754 0           CAF     ERRLIM
 1362                       20,3255  1 3257 0           TCF     +2
 1363   REF   2  LAST  974   20,3256  4 4754 1           CS      ERRLIM
 1364   REF  17  LAST  974   20,3257  55'664 0           TS      ERRBTMP         LIMIT WRITES OVER UPPER WORD ONLY

 1365   REF 161  LAST  973   20,3260  0 0002 0           TC      Q
```

R1366 ACTUATOR-COMMAND LIMITER PACKAGE....

```
 1367   REF  10  LAST  973   20,3261  31'667 1  ACTLIM   CAE     CMDTMP +1       ROUND UP FOR OUTPUT
 1368                       20,3262  6 0000 1           DOUBLE
 1369   REF  87  LAST  946   20,3263  54 001 1           TS      L
 1370   REF 156  LAST  973   20,3264  3 4772 1           CAF     ZERO
 1371   REF  11  LAST  974   20,3265  6 1666 0           AD      CMDTMP

 1372                       20,3266  0 0006 1           EXTEND                  CHECK FOR ACTUATOR COMMAND LIMIT
```

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```
1373   REF   1                  20,3267  7 3615 1            MP      1/ACTSAT
1374                            20,3270  0 0006 1            EXTEND
1375                            20,3271  1 3277 1            BZF     +6
1376   REF  12  LAST  974       20,3272  11'666 1            CCS     CMDTMP          APPLY LIMITS
1377   REF   1                  20,3273  3 3614 1            CAF     ACTSAT
1378                            20,3274  1 3276 0            TCF     +2
1379   REF   2  LAST  975       20,3275  4 3614 0            CS      ACTSAT
1380   REF  13  LAST  975       20,3276  55'666 1            TS      CMDTMP          LIMITS WRITE OVER CMDTMP

1381   REF 162  LAST  974       20,3277  0 0002 0            TC      Q

R1382  FILTER COMPUTATIONS FOR PRESENT OUTPUT.....

1383   REF 157  LAST  974       20,3300  3 4772 1  FWDFLTR   CAF     ZERO
1384   REF   2  LAST  109       20,3301  55'615 0            TS      DAP1
1385   REF   2  LAST  109       20,3302  55'617 1            TS      DAP2
1386   REF   2  LAST  109       20,3303  55'621 1            TS      DAP3
1387   REF  14  LAST  975       20,3304  55'666 1            TS      CMDTMP

1388   REF  10  LAST  973       20,3305  55'662 0            TS      DELBRTMP

1389   REF  18  LAST  974       20,3306  31'665 0  1DAPCAS   CAE     ERRBTMP +1      FIRST DAP CASCADE
1390                            20,3307  0 0006 1            EXTEND
1391   REF  10  LAST  948       20,3310  7 1705 0            MP      N10             N10
1392   REF   3  LAST  975       20,3311  55'616 0            TS      DAP1 +1
1393   REF  19  LAST  975       20,3312  3 1664 1            CA      ERRBTMP
1394                            20,3313  0 0006 1            EXTEND
1395   REF  11  LAST  975       20,3314  7 1705 0            MP      N10             N10
1396   REF   4  LAST  975       20,3315  21'616 0            DAS     DAP1
1397   REF   6  LAST  973       20,3316  53'671 1            DXCH    TMP1
1398   REF   5  LAST  975       20,3317  21'616 0            DAS     DAP1

1399   REF   6  LAST  975       20,3320  31'616 1  2DAPCAS   CAE     DAP1 +1         SECOND DAP CASCADE
1400                            20,3321  0 0006 1            EXTEND
1401   REF  12  LAST  975       20,3322  7 1712 0            MP      N10 +5          N20
1402   REF   3  LAST  975       20,3323  55'620 0            TS      DAP2 +1
1403   REF   7  LAST  975       20,3324  3 1615 1            CA      DAP1
1404                            20,3325  0 0006 1            EXTEND
1405   REF  13  LAST  975       20,3326  7 1712 0            MP      N10 +5          N20
1406   REF   4  LAST  975       20,3327  21'620 0            DAS     DAP2
1407   REF   6  LAST  973       20,3330  53'675 0            DXCH    TMP3
1408   REF   5  LAST  975       20,3331  21'620 0            DAS     DAP2

1409   REF  62  LAST  957       20,3332  31'465 1            CAE     DAPDATR1        TEST FOR LEM ON OR OFF
1410   REF  39  LAST  957       20,3333  7 4753 0            MASK    BIT14
1411   REF 200  LAST  962       20,3334  10 000 0            CCS     A
1412   REF   1                  20,3335  1 3344 0            TCF     3DAPCAS         LEM ON
1413                            20,3336  0 0006 1            EXTEND                  LEM OFF
1414   REF   6  LAST  975       20,3337  3 1620 1            DCA     DAP2
```

```
14141                          20,3340  20 001 1          DDOUBL
14142                          20,3341  20 001 1          DDOUBL
1415   REF   3  LAST  975      20,3342  53'622 1          DXCH    DAP3
1416   REF   1                 20,3343  1 3356 0          TCF     CPTVARK

1417   REF   7  LAST  975      20,3344  31'620 1  3DAPCAS CAE     DAP2 +1        THIRD DAP CASCADE
1418                           20,3345  0 0006 1          EXTEND
1419   REF  14  LAST  975      20,3346  7 1717 0          MP      N10 +10D             N30
1420   REF   4  LAST  976      20,3347  55'622 1          TS      DAP3 +1
1421   REF   8  LAST  976      20,3350  3 1617 0          CA      DAP2
1422                           20,3351  0 0006 1          EXTEND
1423   REF  15  LAST  976      20,3352  7 1717 0          MP      N10 +10D             N30
1424   REF   5  LAST  976      20,3353  21'622 1          DAS     DAP3
1425   REF   6  LAST  973      20,3354  53'701 1          DXCH    TMP5
1426   REF   6  LAST  976      20,3355  21'622 1          DAS     DAP3

1427   REF   7  LAST  976      20,3356  4 1622 1  CPTVARK CS      DAP3 +1        VARIABLE GAIN PACKAGE
1428                           20,3357  0 0006 1          EXTEND                 (ALSO, SIGN CHANGE IN FORWARD LOOP)
1429   REF   3  LAST  948      20,3360  7 1632 0          MP      VARK             SCALED (1.08 B+2)   CSM/LM
1430   REF  15  LAST  975      20,3361  55'667 0          TS      CMDTMP +1          (  "  B+4)   CSM
1431   REF   8  LAST  976      20,3362  4 1621 1          CS      DAP3
1432                           20,3363  0 0006 1          EXTEND
1433   REF   4  LAST  976      20,3364  7 1632 0          MP      VARK
1434   REF  16  LAST  976      20,3365  21'667 0          DAS     CMDTMP
1435   REF  17  LAST  976      20,3366  53'667 0          DXCH    CMDTMP         FIX UP SCALING - SCALED B+1 ASCREV
1437                           20,3367  20 001 1          DDOUBL
1438   REF  18  LAST  976      20,3370  53'667 0          DXCH    CMDTMP                       - SCALED B+0 ASCREV
A14381                                                                          NOTE - THERE IS AN INHERANT GAIN OF
A14382                                                                          (B+1 ASCREV/REV) ON THE OUTPUT DACS.

1439   REF 163  LAST  975      20,3371  0 0002 0          TC      Q

R1440  FILTER PRECOMPUTATIONS FOR NEXT PASS.....................

1441   REF 158  LAST  975      20,3372  3 4772 1  PRECOMP CAF     ZERO           ***** FIRST CASCADE FILTER **********
1442   REF  16  LAST  966      20,3373  55'611 1          TS      TTMP1
1443   REF   3  LAST  110      20,3374  55'613 0          TS      TTMP2

1444   REF  20  LAST  975      20,3375  3 1665 0          CA      ERRBTMP +1     MULTIPLY INPUT BY
1445                           20,3376  0 0006 1          EXTEND
1446   REF  16  LAST  976      20,3377  7 1706 0          MP      N10 +1               N11/2
1447   REF  17  LAST  976      20,3400  55'612 1          TS      TTMP1 +1
1448   REF  21  LAST  976      20,3401  3 1664 1          CA      ERRBTMP
1449                           20,3402  0 0006 1          EXTEND
1450   REF  17  LAST  976      20,3403  7 1706 0          MP      N10 +1               N11/2
1451   REF  18  LAST  976      20,3404  21'612 1          DAS     TTMP1

1452   REF   8  LAST  975      20,3405  4 1616 0          CS      DAP1 +1        MULTIPLY OUTPUT BY
```

```
1453                          20,3406  0 0006 1          EXTEND
1454  REF  18 LAST  976       20,3407  7 1710 1          MP      N10 +3          D11/2
1455  REF   4 LAST  976       20,3410  55'614 1          TS      TTMP2 +1
1456  REF   9 LAST  976       20,3411  4 1615 0          CS      DAP1
1457                          20,3412  0 0006 1          EXTEND
1458  REF  19 LAST  977       20,3413  7 1710 1          MP      N10 +3          D11/2
1459  REF   5 LAST  977       20,3414  21'614 1          DAS     TTMP2

1460  REF   6 LAST  977       20,3415  53'614 1          DXCH    TTMP2
1461  REF  19 LAST  976       20,3416  21'612 1          DAS     TTMP1
1462  REF  20 LAST  977       20,3417  53'612 1          DXCH    TTMP1
1463                          20,3420  20 001 1          DDOUBL
1464  REF   6 LAST  973       20,3421  21'673 0          DAS     TMP2

1465  REF   7 LAST  977       20,3422  53'673 0          DXCH    TMP2
1466  REF   7 LAST  975       20,3423  53'671 1          DXCH    TMP1

1467  REF 159 LAST  976       20,3424  3 4772 1          CAF     ZERO
1468  REF  21 LAST  977       20,3425  55'611 1          TS      TTMP1
1469  REF   8 LAST  977       20,3426  55'672 1          TS      TMP2

1470  REF  22 LAST  976       20,3427  3 1665 0          CA      ERRBTMP +1      MULTIPLY INPUT BY
1471                          20,3430  0 0006 1          EXTEND                  SECOND-ORDER NUMERATOR COEFF.
1472  REF  20 LAST  977       20,3431  7 1707 1          MP      N10 +2            N12
1473  REF  22 LAST  977       20,3432  55'612 1          TS      TTMP1 +1
1474  REF  23 LAST  977       20,3433  3 1664 1          CA      ERRBTMP
1475                          20,3434  0 0006 1          EXTEND
1476  REF  21 LAST  977       20,3435  7 1707 1          MP      N10 +2            N12
1477  REF  23 LAST  977       20,3436  21'612 1          DAS     TTMP1

1478  REF  10 LAST  977       20,3437  4 1616 0          CS      DAP1 +1         MULTIPLY OUTPUT BY
1479                          20,3440  0 0006 1          EXTEND
1480  REF  22 LAST  977       20,3441  7 1711 0          MP      N10 +4            D12
1481  REF   9 LAST  977       20,3442  55'673 0          TS      TMP2 +1
1482  REF  11 LAST  977       20,3443  4 1615 0          CS      DAP1
1483                          20,3444  0 0006 1          EXTEND
1484  REF  23 LAST  977       20,3445  7 1711 0          MP      N10 +4            D12
1485  REF  10 LAST  977       20,3446  21'673 0          DAS     TMP2

1486  REF  24 LAST  977       20,3447  53'612 1          DXCH    TTMP1
1487  REF  11 LAST  977       20,3450  21'673 0          DAS     TMP2


1488  REF 160 LAST  977       20,3451  3 4772 1  2CASFLTR CAF    ZERO            *****SECOND CASCADE FILTER*****
1489  REF  25 LAST  977       20,3452  55'611 1          TS      TTMP1
1490  REF   7 LAST  977       20,3453  55'613 0          TS      TTMP2

1491  REF  12 LAST  977       20,3454  3 1616 1          CA      DAP1 +1         MULTIPLY INPUT BY
1492                          20,3455  0 0006 1          EXTEND
1493  REF  24 LAST  977       20,3456  7 1713 1          MP      N10 +6            N21/2
```

```
1494  REF  26  LAST  977  20,3457  55'612 1    TS      TTMP1 +1
1495  REF  13  LAST  977  20,3460  3 1615 1    CA      DAP1
1496                      20,3461  0 0006 1    EXTEND
1497  REF  25  LAST  977  20,3462  7 1713 1    MP      N10 +6          N21/2
1498  REF  27  LAST  978  20,3463  21'612 1    DAS     TTMP1

1499  REF   9  LAST  976  20,3464  4 1620 0    CS      DAP2 +1     MULTIPLY OUTPUT BY
1500                      20,3465  0 0006 1    EXTEND
1501  REF  26  LAST  978  20,3466  7 1715 1    MP      N10 +8D         D21/2
1502  REF   8  LAST  977  20,3467  55'614 1    TS      TTMP2 +1
1503  REF  10  LAST  978  20,3470  4 1617 1    CS      DAP2
1504                      20,3471  0 0006 1    EXTEND
1505  REF  27  LAST  978  20,3472  7 1715 1    MP      N10 +8D         D21/2
1506  REF   9  LAST  978  20,3473  21'614 1    DAS     TTMP2

1507  REF  10  LAST  978  20,3474  53'614 1    DXCH    TTMP2
1508  REF  28  LAST  978  20,3475  21'612 1    DAS     TTMP1
1509  REF  29  LAST  978  20,3476  53'612 1    DXCH    TTMP1
1510                      20,3477  20 001 1    DDOUBL
1511  REF   6  LAST  973  20,3500  21'677 1    DAS     TMP4

1512  REF   7  LAST  978  20,3501  53'677 1    DXCH    TMP4
1513  REF   7  LAST  975  20,3502  53'675 0    DXCH    TMP3

1514  REF 161  LAST  977  20,3503  3 4772 1    CAF     ZERO
1515  REF  30  LAST  978  20,3504  55'611 1    TS      TTMP1
1516  REF   8  LAST  978  20,3505  55'676 0    TS      TMP4

1517  REF  14  LAST  978  20,3506  3 1616 1    CA      DAP1 +1     MULTIPLY INPUT  BY
1518                      20,3507  0 0006 1    EXTEND
1519  REF  28  LAST  978  20,3510  7 1714 0    MP      N10 +7          N22
1520  REF  31  LAST  978  20,3511  55'612 1    TS      TTMP1 +1
1521  REF  15  LAST  978  20,3512  3 1615 1    CA      DAP1
1522                      20,3513  0 0006 1    EXTEND
1523  REF  29  LAST  978  20,3514  7 1714 0    MP      N10 +7          N22
1524  REF  32  LAST  978  20,3515  21'612 1    DAS     TTMP1

1525  REF  11  LAST  978  20,3516  4 1620 0    CS      DAP2 +1     MULTIPLY OUTPUT BY
1526                      20,3517  0 0006 1    EXTEND
1527  REF  30  LAST  978  20,3520  7 1716 1    MP      N10 +9D         D22
1528  REF   9  LAST  978  20,3521  55'677 1    TS      TMP4 +1
1529  REF  12  LAST  978  20,3522  4 1617 1    CS      DAP2
1530                      20,3523  0 0006 1    EXTEND
1531  REF  31  LAST  978  20,3524  7 1716 1    MP      N10 +9D         D22
1532  REF  10  LAST  978  20,3525  21'677 1    DAS     TMP4

1533  REF  33  LAST  978  20,3526  53'612 1    DXCH    TTMP1
1534  REF  11  LAST  978  20,3527  21'677 1    DAS     TMP4
```

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```
1535  REF  63  LAST  975  20,3530  31'465 1          CAE    DAPDATR1      TEST FOR LEM ON OR OFF
1536  REF  32  LAST  956  20,3531  7 4754 1          MASK   BIT13
1537  REF 201  LAST  975  20,3532  10 000 0          CCS    A
1538  REF 164  LAST  976  20,3533  0 0002 0          TC     Q             EXIT IF LEM OFF

1539  REF 162  LAST  978  20,3534  3 4772 1  3CASFLTR CAF    ZERO          *****THIRD CASCADE FILTER*****
1540  REF  34  LAST  978  20,3535  55'611 1          TS     TTMP1
1541  REF  11  LAST  978  20,3536  55'613 0          TS     TTMP2

1542  REF  13  LAST  978  20,3537  3 1620 1          CA     DAP2 +1           MULTIPLY INPUT  BY (1/2)
1543                      20,3540  0 0006 1          EXTEND
1544  REF  32  LAST  978  20,3541  7 1720 1          MP     N10 +11D            N31/2
1545  REF  35  LAST  979  20,3542  55'612 1          TS     TTMP1 +1
1546  REF  14  LAST  979  20,3543  3 1617 0          CA     DAP2
1547                      20,3544  0 0006 1          EXTEND
1548  REF  33  LAST  979  20,3545  7 1720 1          MP     N10 +11D            N31/2
1549  REF  36  LAST  979  20,3546  21'612 1          DAS    TTMP1

1550  REF   9  LAST  976  20,3547  4 1622 1          CS     DAP3 +1
1551                      20,3550  0 0006 1          EXTEND
1552  REF  34  LAST  979  20,3551  7 1722 0          MP     N10 +13D            D31/2
1553  REF  12  LAST  979  20,3552  55'614 1          TS     TTMP2 +1
1554  REF  10  LAST  979  20,3553  4 1621 1          CS     DAP3
1555                      20,3554  0 0006 1          EXTEND
1556  REF  35  LAST  979  20,3555  7 1722 0          MP     N10 +13D            D31/2
1557  REF  13  LAST  979  20,3556  21'614 1          DAS    TTMP2

1558  REF  14  LAST  979  20,3557  53'614 1          DXCH   TTMP2
1559  REF  37  LAST  979  20,3560  21'612 1          DAS    TTMP1
1560  REF  38  LAST  979  20,3561  53'612 1          DXCH   TTMP1
1561                      20,3562  20 001 1          DDOUBL
1562  REF   6  LAST  973  20,3563  21'703 0          DAS    TMP6

1563  REF   7  LAST  979  20,3564  53'703 0          DXCH   TMP6
1564  REF   7  LAST  976  20,3565  53'701 1          DXCH   TMP5

1565  REF 163  LAST  979  20,3566  3 4772 1          CAF    ZERO
1566  REF  39  LAST  979  20,3567  55'611 1          TS     TTMP1
1567  REF   8  LAST  979  20,3570  55'702 1          TS     TMP6

1568  REF  15  LAST  979  20,3571  3 1620 1          CA     DAP2 +1           MULTIPLY INPUT  BY
1569                      20,3572  0 0006 1          EXTEND
1570  REF  36  LAST  979  20,3573  7 1721 0          MP     N10 +12D            N32
1571  REF  40  LAST  979  20,3574  55'612 1          TS     TTMP1 +1
1572  REF  16  LAST  979  20,3575  3 1617 0          CA     DAP2
1573                      20,3576  0 0006 1          EXTEND
1574  REF  37  LAST  979  20,3577  7 1721 0          MP     N10 +12D            N32
1575  REF  41  LAST  979  20,3600  21'612 1          DAS    TTMP1

1576  REF  11  LAST  979  20,3601  4 1622 1          CS     DAP3 +1
```

```
1577                          20,3602  0 0006 1     EXTEND
1578  REF  38  LAST  979      20,3603  7 1723 1     MP      N10 +14D          D32
1579  REF   9  LAST  979      20,3604  55'703 0     TS      TMP6 +1
1580  REF  12  LAST  979      20,3605  4 1621 1     CS      DAP3
1581                          20,3606  0 0006 1     EXTEND
1582  REF  39  LAST  980      20,3607  7 1723 1     MP      N10 +14D          D32
1583  REF  10  LAST  980      20,3610  21'703 0     DAS     TMP6

1584  REF  42  LAST  979      20,3611  53'612 1     DXCH    TTMP1
1585  REF  11  LAST  980      20,3612  21'703 0     DAS     TMP6

1586  REF 165  LAST  979      20,3613  0 0002 0     TC      Q
```

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P1587 CONSTANTS FOR AUTOPILOTS

R1588 NOTE....1 ASCREV (ACTUATOR CMD SCALING) = 85.41 ARCSEC/BIT OR 1.07975111 REVS (85.41X16384/3600/360)

R1590 1 SPASCREV (SPECIAL ACTUATOR CMD SCALING) = 1.04620942 REVS

```
1592                    20,3614  00375 0  ACTSAT   DEC    253           ACTUATOR LIMIT (6 DEG),  SC.AT 1ASCREV
1593                    20,3615  00101 1  1/ACTSAT DEC    .0039525692   RECIPROCAL (1/253)

1594  REF  33  LAST 979    4754           ERRLIM   EQUALS BIT13         FILTER INPUT LIMIT....B-3 REVS (45DEG),
1595  REF  36  LAST 946    4766           1/ERRLIM EQUALS BIT3              SC.AT B-1 REV, AND ITS RECIPROCAL

1596  REF   1               20,3616  02644 0  PITCHT5  GENADR PITCHDAP     UPPER WORDS OF T5 2CADRS, LOWER WORDS
1597  REF   2  LAST 949      20,3617  03227 0  DAPT5    GENADR DAPINIT          (BBCON) ALREADY THERE.  ORDER IS
1598  REF   1               20,3620  03042 1  YAWT5    GENADR YAWDAP           REQUIRED.

1599                    20,3621  00115 1  1/RTLIM  DEC    0.004715      .004715(CDUDIF) = 0 IF CDUDIF < 2.33 DEG
1600                    20,3622  00243 1  1-E(-AT) OCT    00243         AT = .01SEC....EITHER(1/A=4SEC, T=40MS),
1601                    20,3623  37535 0  E(-AT)   OCT    37535                              OR(1/A=8SEC, T=80MS)
```

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R1000   PROGRAM NAME...TVC ROLL AUTOPILOT
R1001   LCG SECTION...TVCROLLDAP                  SUBROUTINE...DAPCSM
R1002   MODIFIED BY SCHLUNDT                      21 OCTOBER 1968


R1005   FUNCTIONAL DESCRIPTION....

R1006       *AN ADAPTATION OF THE LEM P-AXIS CONTROLLER
R1007       *MAINTAIN OGA WITHIN 5 DEG DEADBND OF OGAD, WHERE OGAD = OGA AS SEEN
R1008        BY IGNITION (P40)
R1009       *MAINTAIN OGA RATE LESS THAN 0.1 DEG/SEC LIMIT CYCLE RATE
R1012       *SWITCHING LOGIC IN PHASE PLANE.... SEE GSOP CHAPTER 3
R1013       *USES T6 CLOCK TO TIME JET FIRINGS
R1014       *MAXIMUM JET FIRING TIME = 2.56 SECONDS, LIMITED TO 2.5 IF GREATER
R1015       *MINIMUM JET FIRING TIME = 15 MS
R1016       *JET PAIRS FIRE ALTERNATELY
R1017       *AT LEAST 1/2 SECOND DELAY BEFORE A NEW JET PAIR IS FIRED
R1018       *JET FIRINGS MAY NOT BE EXTENDED, ONLY SHORTENED, WHEN RE-EVALUATION
R1019        OF A JET FIRING TIME IS MADE ON A LATER PASS

R1020   CALLING SEQUENCE....

R1021       *ROLLDAP CALL VIA WAITLIST, IN PARTICULAR BY TVCEXEC (EVERY 1/2 SEC)
R1022        WITH A 3CS DELAY TO ALLOW FREE TIME FOR OTHER RUPTS (DWNRPT, ETC.)

R1023   NORMAL EXIT MODES.... ENDOFJOB

R1024   ALARM OR ABORT EXIT MODES.... NONE

R1025   SUBROUTINES CALLED.....NONE

R1026   OTHER INTERFACES....

R1027       *TVCEXEC SETS UP ROLLDAP TASK EVERY 1/2 SECOND AND UPDATES 1/CONACC
R1028        EVERY 10 SECONDS (VIA MASSPROP AND S40.15)
R1029       *RESTARTS SUSPEND ROLL DAP COMPUTATIONS UNTIL THE NEXT 1/2 SEC
R1030        SAMPLE PERIOD. (THE PART OF TVCEXECUTIVE THAT CALLS ROLL DAP IS
R1031        NOT RESTARTED.) THE OGAD FROM IGNITION IS MAINTAINED.

R1032   ERASABLE INITIALIZATION REQUIRED....

R1033       *1/CONACC   (S40.15)
R1034       *OGAD (CDUX AT IGNITION)
R1035       *OGANOW  (CDUX AT TVCINIT4 AND TVCEXECUTIVE)
R1036       *OGAPAST  (OGANOW AT TVCEXECUTIVE)
R10362      *ROLLFIRE = TEMREG = ROLLWORD = 0   (MRCLEAN LOOP IN TVCDAPON)
R1037   OUTPUT....

R1038       *ROLL JET PAIR FIRINGS
```

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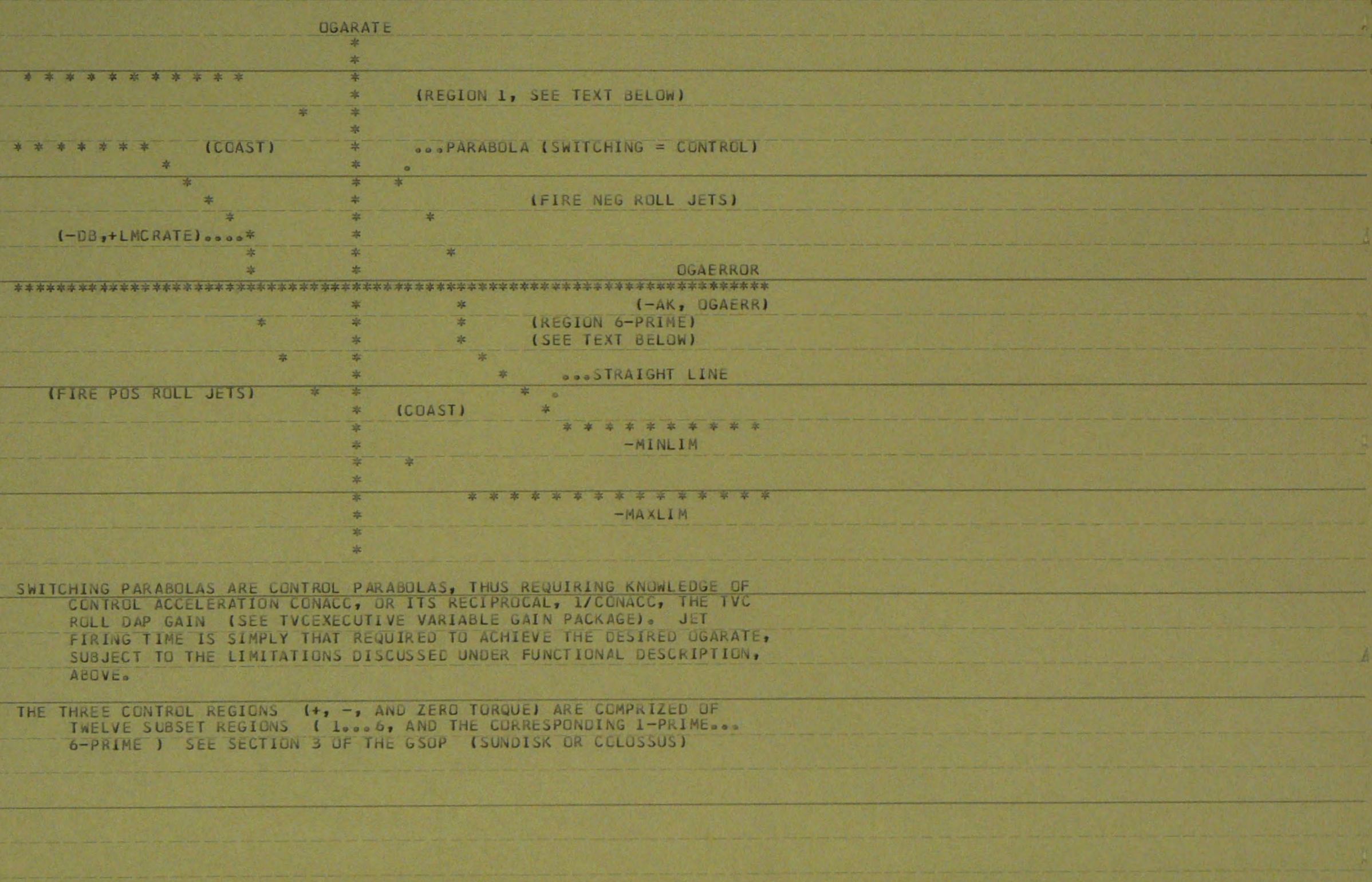
R1040 DEBRIS.... MISCELLANEOUS, SHAREABLE WITH RCS/ENTRY, IN EBANK6 ONLY

P1041 SOME NOTES ON THE ROLL AUTOPILOT, AND IN PARTICULAR, ON ITS SWITCHING
R1042 LOGIC. SEE SECTION THREE OF THE GSOP (SUNDISK/COLOSSUS) FOR DETAILS.

R1043 SWITCHING LOGIC IN THE PHASE PLANE....



R1075 SWITCHING PARABOLAS ARE CONTROL PARABOLAS, THUS REQUIRING KNOWLEDGE OF
R1076 CONTROL ACCELERATION CONACC, OR ITS RECIPROCAL, 1/CONACC, THE TVC
R1077 ROLL DAP GAIN (SEE TVCEXECUTIVE VARIABLE GAIN PACKAGE). JET
R1078 FIRING TIME IS SIMPLY THAT REQUIRED TO ACHIEVE THE DESIRED OGARATE,
R1079 SUBJECT TO THE LIMITATIONS DISCUSSED UNDER FUNCTIONAL DESCRIPTION,
R1080 ABOVE.

R1081 THE THREE CONTROL REGIONS (+, -, AND ZERO TORQUE) ARE COMPRIZED OF
R1082 TWELVE SUBSET REGIONS (1...6, AND THE CORRESPONDING 1-PRIME...
R1083 6-PRIME) SEE SECTION 3 OF THE GSOP (SUNDISK OR COLOSSUS)

```
P1084   GIVEN THE OPERATING POINT NOT IN THE COAST REGION, THE DESIRED OGARATE
R1085         IS AT THE POINT OF PENETRATION OF THE COAST REGION BY THE CONTROL
R1086         PARABOLA WHICH PASSES THROUGH THE OPERATING POINT. FOR REGION 3
R1087         DESIRED OGARATE IS SIMPLY +-MAXLIM. FOR REGIONS 1 OR 6 THE SOLUTION
R1088         TO A QUADRATIC IS REQUIRED (THE PENETRATION IS ALONG THE STRAIGHT
R1089         LINE OR MINLIM BOUNDRY SWITCH LINES). AN APPROXIMATION IS MADE
R1090         INSTEAD. TAKE AN OPERATING POINT IN REGION 6' . PASS A TANGENT TO
R1091         THE CONTROL PARABOLA THROUGH THE OPERATING POINT, AND FIND ITS
R1092         INTERSECTION WITH THE STRAIGHT LINE SECTION OF THE SWITCH CURVE...
R1093         THE INTERSECTION DEFINES DESIRED OGARATE. IF THE OPERATING POINT IS
R1094         CLOSE TO THE SWITCH LINE, THE APPROXIMATION IS QUITE GOOD (INDEED
R1095         THE APPROXIMATE AND QUADRATIC SOLUTIONS CONVERGE IN THE LIMIT AS
R1096         THE SWITCH LINE IS APPROACHED). IF THE OPERATING POINT IS NOT CLOSE
R1097         TO THE SWITCH LINE, THE APPROXIMATE SOLUTION GIVES VALID TREND
R1098         INFORMATION (DIRECTION OF DESIRED OGARATE) AT LEAST. THE
R1099         RE-EVALUATION OF DESIRED OGARATE IN SUBSEQUENT ROLL DAP PASSES (1/2
R1100         SECOND INTERVALS) WILL BENEFIT FROM THE CONVERGENT NATURE OF THE
R1101         APPROXIMATION.

R11021  FOR LARGE OGAERROR THE TANGENT INTERSECTS +-MINLIM SWITCH BOUNDRY BEFORE
R11022        INTERSECTING THE STRAIGHT LINE SWITCH. HOWEVER THE MINLIM IS
R11023        IGNORED IN COMPUTING THE FIRING TIME, SO THAT THE EXTENSION (INTO
R11024        THE COAST REGION) OF THE STRAIGHT LINE SWITCH IS WHAT IS FIRED TO.
R11025        IF THE ROLL DAP FINDS ITSELF IN THE COAST REGION BEFORE REACHING
R11026        THE DESIRED INTERSECTION (IE, IN THE REGION BETWEEN THE MINLIM
R11027        AND THE STRAIGHT LINE SWITCH) IT WILL EXIBIT NORMAL COAST-REGION
R11028        BEHAVIOR AND TURN OFF THE JETS. THE PURPOSE OF THIS FIRING POLICY
R11029        IS TO MAINTAIN STATIC ROLL STABILITY IN THE EVENT OF A JET
R1103         FAILED-ON.

R1113   WHEN THE OPERATING POINT IS IN REGION 1 THE SAME APPROXIMATION IS
R1114         MADE, BUT AT AN ARTIFICIALLY-CREATED OR DUMMY OPERATING POINT,
R1115         DEFINED BY.. OGAERROR = INTERSECTION OF CONTROL PARABOLA  AND
R1116         OGAERROR AXIS, OGARATE = +-LMCRATE WHERE SIGN IS OPPOSITE THAT OF
R1117         REAL OPERATING POINT RATE.  WHEN THE OPERATING POINT HAS PASSED
R1118         FROM REGION 1 TO REGION 6', THE DUMMY POINT IS NO LONGER REQUIRED,
R1119         AND THE SOLUTION REVERTS TO THAT OF A REGULAR REGION 6' POINT.


R1120   EQUATION FOR SWITCHING PARABOLA (SEE FIGURE ABOVE)....
R1121                                    2
R1122         SOGAERROR = (DB - (SOGARATE) (1/CONACC)/2) SGN(SOGARATE)


R1123   EQUATION FOR SWITCHING STRAIGHT LINE SEGMENT....

R1124         SOGARATE = -(-SLOPE)(SOGAERROR) - SGN(SOGARATE) INTERCEP

R1125                  WHERE  INTERCEP = DB(-SLOPE) - LMCRATE
```

```
R1126   EQUATION FOR INTERSECTION, CONTROL PARABOLA AND STRAIGHT SWITCH LINE....

R1127         DOGADOT = NUM/DEN, WHERE
R1128                                    2
R1129             NUM = (-SLOPE)(OGARATE) (1/CONACC)
R1130                   +SGN(DELOGA)(-SLOPE)(OGAERROR - SGN(DELOGA)(DB))
R1131                   +LMCRATE

R1132             DEN = (-SLOPE)(LMCRATE)(1/CONACC) - SGN(DELOGA)

R1133                                                 2
R1134             DELOGA = OGAERROR - (DB -  OGARATE (1/CONACC)/2) SGN(OGARATE)


R1135   FOR REGIONS 6 AND 6-PRIME  USE ACTUAL OPERATING POINT  (OGA, OGARATE)
R1136         FOR OGAERROR AND OGARATE IN THE INTERSECTION EQUATIONS ABOVE.
R1137         FOR REGIONS 1 AND 1-PRIME  USE DUMMY OPERATING POINT FOR OGAERROR
R1138         AND OGARATE,  WHERE THE DUMMY POINT IS GIVEN BY....
R1139         OGAERROR= DELOGA + DB SGN(OGARATE)
R1140         OGARATE= -LMCRATE SGN(OGARATE)

R1141   NOTE, OGAERROR = OGA - OGAD  USES DUMMY REGISTER  OGA IN ROLL DAP CODING
R1142          ALSO, AT POINT WHERE DOGARATE IS COMPUTED, REGISTER DELOGA IS USED
R1143          AS A DUMMY REGISTER FOR THE OGAERROR IN THE NUM EQUATION ABOVE
```

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P11432 ROLLDAP CODING....

```
2000  REF   3 LAST  961   16,2000                        SETLOC  DAPROLL
2001                      16,3342                        BANK
2002  REF   9 LAST  951   E6,1645                        EBANK=  CGANOW
2003  REF   1                                           COUNT*  $$/ROLL
2006  REF  10 LAST  987   16,3342  31'645 1  ROLLDAP     CAE     OGANOW        OGA RATE ESTIMATOR...SIMPLE FIRST-ORDER
2007                      16,3343  0 0006 1              EXTEND                      DIFFERENCE (SAMPLE TIME = 1/2 SEC)
2008  REF   3 LAST  951   16,3344  21'646 0              MSU     OGAPAST
2009                      16,3345  0 0006 1              EXTEND
2010  REF  26 LAST  941   16,3346  7 4764 1              MP      BIT5
2011  REF 202 LAST  979   16,3347  22 000 1              LXCH    A
2012  REF   3 LAST  182   16,3350  55'533 1              TS      OGARATE       SC.AT B-4 REV/SEC

R2017 COMPUTATIONS WHICH FOLLOW USE OGA FOR OGAERR (SAME REGISTER)
R2018 EXAMINE DURATION OF LAST JET FIRING IF JETS NOW ON.

2019  REF   2 LAST  109   16,3351  3 1571 0  DURATION    CA      ROLLFIRE      SAME SGN AS PRESENT TORQ,MAGN=POSMAX
2020                      16,3352  0 0006 1              EXTEND
2021                      16,3353  1 3355 0              BZF     +2            ROLL JETS ARE NOW OFF.
2022  REF   1             16,3354  1 3363 0              TCF     ROLLOGIC      ENTER LOGIC,JETS NOW ON.

2023  REF   2 LAST  109   16,3355  31'573 1              CAE     TEMREG        EXAMINE LAST FIRING INTERVAL
2024                      16,3356  0 0006 1              EXTEND                IF POSITIVE, DONT FIRE
2025  REF   2 LAST  987   16,3357  1 3363 0              BZF     ROLLOGIC      ENTER LOGIC, JETS NOW OFF.

2026  REF 164 LAST  979   16,3360  3 4772 1              CAF     ZERO          JETS HAVE NOT BEEN OFF FOR 1/2 SEC. WAIT
2027  REF   3 LAST  987   16,3361  55'573 0              TS      TEMREG        RESET TEMREG
2028  REF  44 LAST  953   16,3362  1 5314 0  WAIT1/2     TCF     TASKOVER      EXIT ROLL DAP

R2029 COMPUTE DB=(1/2 CONACC) (OGARATE)SQ (1/2 IN THE SCALING)

2030  REF   4 LAST  987   16,3363  4 1533 1  ROLLOGIC    CS      OGARATE       SCALED AT 2(-4) REV/SEC
2031                      16,3364  0 0006 1              EXTEND
2032  REF   3 LAST  948   16,3365  7 1631 0              MP      1/CONACC      SCALED AT 2(+9) SEC SQ /REV
2033                      16,3366  0 0006 1              EXTEND
2034  REF   5 LAST  987   16,3367  7 1533 1              MP      OGARATE
2035  REF   1             16,3370  6 3756 0              AD      DB            SCALED AT 2(+0) REV
2036  REF   4 LAST  987   16,3371  55'573 0              TS      TEMREG        QUANTITY SCALED AT 2(+0) REV.

R2037 GET SIGN OF OGARATE

2038  REF   6 LAST  987   16,3372  3 1533 0              CA      OGARATE
2039                      16,3373  0 0006 1              EXTEND
2040                      16,3374  6 3377 1              BZMF    +3            LET SGN(0) BE NEGATIVE
2041  REF  51 LAST  945   16,3375  3 4770 0              CA      BIT1
2042                      16,3376  1 3400 1              TCF     +2
2043  REF  52 LAST  987   16,3377  4 4770 1              CS      BIT1
2044  REF   2 LAST  110   16,3400  55'651 0              TS      SGNRT         + OR -  2(-14)
```

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```
R2045   CALCULATE DISTANCE FROM SWITCH PARABOLA (DELOGA)

 2046                          16,3401  0 0006 1             EXTEND
 2047   REF   5 LAST  987      16,3402  7 1573 0             MP      TEMREG      SGN(OGARATE) TEMREG NOW IN L
 2048   REF  88 LAST  974      16,3403  4 0001 1             CS      L
 2049   REF   3 LAST  110      16,3404  6 1647 0             AD      OGA         SCALED AT 2(+0) REV
 2050   REF   2 LAST  110      16,3405 55'652 0  DELOGAC    TS      DELOGA      SCALE B+0 REV, PLUS TO RIGHT OF C-PARAB

R2051   EXAMINE SGN(DELOGA) AND CREATE CA OR CS INSTR. DEPENDING UPON SIGN.

 2052                          16,3406  0 0006 1             EXTEND
 2053                          16,3407  6 3412 0             BZMF    +3
 2054   REF   8 LAST  720      16,3410  3 4346 1             CAF     PRIO30      =CA  (30000)
 2055                          16,3411  1 3413 0             TCF     +2
 2056   REF  34 LAST  422      16,3412  3 4752 0             CAF     BIT15       =CS  (40000)
 2057   REF   2 LAST  110      16,3413 55'653 1             TS      I

 2058   REF   3 LAST  988      16,3414 51'653 0             INDEX   I           TEST ON  I SGN(OGARATE)
 2059   REF   3 LAST  987      16,3415  0 1651 1             0       SGNRT       CA OR CS
 2060                          16,3416  4 0000 0             COM
 2061                          16,3417  0 0006 1             EXTEND
 2062   REF   1                16,3420  6 3471 0  REG1TST    BZMF    ROLLON      IF REGION 1 (DELOGA OGARATE SAME SIGN)

R2063   NO JET FIRE YET, TEST FOR MAX OGARATE

 2064   REF   4 LAST  988      16,3421 51'653 0             INDEX   I
 2065   REF   7 LAST  987      16,3422  0 1533 0             0       OGARATE     CA OR CS...BOTH MUST BE NEG. HERE
 2066   REF   2 LAST  110      16,3423 55'654 0             TS      IOGARATE    I.E. I OGARATE
 2067   REF   1                16,3424  6 3763 0             AD      MAXLIM      SCALED AT 2(-4) REV/SEC
 2068                          16,3425  0 0006 1             EXTEND
 2069   REF   1                16,3426  6 3550 1  REG3TST    BZMF    RATELIM     IF REGION 3 (RATES TOO HIGH, FIRE JETS)

R2070   COMPUTATION OF I((-SLOPE)OGA + OGARATE) - INTERCEPT..NOTE THAT STR. LINE
R2071   SWITCH SLOPE IS (SLOPE) DEG/SEC/DEG, A NEG QUANTITY

 2072   REF   8 LAST  988      16,3427  3 1533 0             CA      OGARATE
 2073                          16,3430  0 0006 1             EXTEND
 2074   REF  40 LAST  975      16,3431  7 4753 0             MP      BIT14
 2075   REF   6 LAST  988      16,3432 55'573 0             TS      TEMREG
 2076   REF   4 LAST  988      16,3433  3 1647 0             CA      OGA
 2077                          16,3434  0 0006 1             EXTEND
 2078   REF   1                16,3435  7 3757 0             MP      -SLOPE
 2079                          16,3436 20 001 1             DDOUBL
 2080                          16,3437 20 001 1             DDOUBL
 2081                          16,3440 20 001 1             DDOUBL      (OGA ERROR MUST BE LESS THAN +-225 DEG)
 2082   REF   7 LAST  988      16,3441  6 1573 1             AD      TEMREG

 2083   REF   5 LAST  988      16,3442 51'653 0             INDEX   I
 2084   REF 203 LAST  987      16,3443  0 0000 1             0       A           I((-SLOPE)OGA+OGARATE) AT 2(-3)REV/SEC
 2085                          16,3444  4 0000 0             COM
```

```
 2086   REF   1              16,3445  6 3761 1            AD      INTERCEP        SCALED AT 2(-3) REV.
 2087                        16,3446  4 0000 0            COM
 2088                        16,3447  0 0006 1            EXTEND
 2089   REF   1              16,3450  6 3661 0  REG2TST   BZMF    NOROLL          IF REGION 2 (COAST SIDE OF STRT LINE)

R2090   CHECK TO SEE IF OGARATE IS ABOVE MINLIM BOUNDARY

 2091   REF   3  LAST  988   16,3451  3 1654 1            CA      IOGARATE        ALWAYS NEGATIVE
 2092   REF   1              16,3452  6 3762 1            AD      MINLIM          SCALED AT 2(-4) REV/SEC
 2093                        16,3453  0 0006 1            EXTEND
 2094   REF   2  LAST  989   16,3454  6 3661 0  REG4TST   BZMF    NOROLL          IF REGION 4 (COAST SIDE OF MINLIM)

R2095   ALL AREAS CHECKED EXCEPT LAST AREA...NO FIRE IN THIS SMALL SEGMENT

 2096   REF   6  LAST  988   16,3455  51'653 0            INDEX   I
 2097   REF   5  LAST  988   16,3456  0 1647 0            0       OGA
 2098                        16,3457  4 0000 0            COM
 2099   REF   2  LAST  987   16,3460  6 3756 0            AD      DB
 2100                        16,3461  4 0000 0            COM
 2101                        16,3462  0 0006 1            EXTEND
 2102   REF   3  LAST  989   16,3463  6 3661 0  REG5TST   BZMF    NOROLL          IF REGION 5 (COAST SIDE OF DB)

R2103   JETS MUST FIRE NOW.OGARATE IS NEG.(OR VISA VERSA).USE DIRECT STR. LINE.
R2104   DELOGA AND DELOGART ARE USED AS DUMMY VARIABLES IN THE SOLUTION OF A
R2105   STRAIGHT LINE APPROXIMATION TO A QUADRATIC SOLUTION OF THE INTERSECTION
R2106   OF THE CONTROL PARABOLA AND THE STRAIGHT-LINE SWITCH LINE. THE STRAIGHT
R2107   LINE IS THE TANGENT TO THE CONTROL PARABOLA AT THE OPERATING POINT. (FOR
R2108   OPERATING POINTS IN REGIONS 6 OR 6')

 2109   REF   6  LAST  989   16,3464  31'647 0  REGION6   CAE     OGA             USE ACTUAL OPERATING POINT FOR TANGENT
 2110   REF   3  LAST  988   16,3465  55'652 0            TS      DELOGA          ACTUAL STATE
 2111   REF   9  LAST  988   16,3466  3 1533 0            CA      OGARATE
 2112   REF   2  LAST  110   16,3467  55'650 1            TS      DELOGART        ACTUAL STATE,I.E. DEL OGARATE
 2113   REF   1              16,3470  1 3500 0            TCF     ONROLL

R2114   JETS ALSO FIRE FROM HERE EXCEPT OGARATE IS POS(VISA VERSA),USE INDIRECT
R2115   STRAIGHT LINE ESTABLISHED BY TANGENT TO A CONTROL PARABOLA AT  ((DELOGA
R2116   + DB SGN(DELOGA) ), -LMCRATE SGN(DELOGA) )          (THIS IS THE DUMMY
R2117   OPERATING POINT FOR OPERATING POINTS IN REGIONS 1 AND  1' )

 2118   REF   7  LAST  989   16,3471  51'653 0  ROLLON    INDEX   I
 2119   REF   3  LAST  989   16,3472  0 3756 0            0       DB
 2120   REF   4  LAST  989   16,3473  27'652 0            ADS     DELOGA          DELOGA WAS DIST. FROM SWITCH PARABOLA

 2121   REF   1              16,3474  4 3760 1            CS      LMCRATE         LIMIT CYCLE RATE AT 2(-4) REV/SEC
 2122   REF   8  LAST  989   16,3475  51'653 0            INDEX   I
 2123   REF 204  LAST  988   16,3476  0 0000 1            0       A
 2124   REF   3  LAST  989   16,3477  55'650 1            TS      DELOGART        EVALUATE STATE FOR INDIRECT LINE.
```

R2125 SOLVE STRAIGHT LINES SIMULTANEOUSLY TO OBTAIN DESIRED OGARATE.

```
2126                                16,3500  0 0006 1  ONROLL   EXTEND                DELOGART IN ACC. ON ARRIVAL
2127  REF   4  LAST  987           16,3501  7 1631 0            MP       1/CONACC
2128                                16,3502  6 0000 1            DOUBLE
2129                                16,3503  0 0006 1            EXTEND
2130  REF   2  LAST  988           16,3504  7 3757 0            MP       -SLOPE
2131  REF   8  LAST  988           16,3505  55'573 0            TS       TEMREG       2(-SLOPE)RATE /CONACC
2132                                16,3506  0 0006 1            EXTEND
2133  REF   4  LAST  989           16,3507  7 1650 1            MP       DELOGART
2134  REF   5  LAST  990           16,3510  55'650 1            TS       DELOGART     2(-SLOPE)(RATESQ)/CONACC
2135  REF  22  LAST  967           16,3511  4 4756 0            CS       BIT11
2136  REF   9  LAST  989           16,3512  51'653 0            INDEX    I
2137  REF 205  LAST  989           16,3513  0 0000 1            0        A
2138  REF   9  LAST  990           16,3514  27'573 0  RATEDEN   ADS      TEMREG       DENOMINATOR COMPLETED

2139  REF  10  LAST  990           16,3515  51'653 0            INDEX    I
2140  REF   5  LAST  989           16,3516  0 1652 1            0        DELOGA
2141                                16,3517  4 0000 0            COM
2142  REF   4  LAST  989           16,3520  6 3756 0            AD       DB
2143                                16,3521  4 0000 0            COM
2144                                16,3522  0 0006 1            EXTEND
2145  REF   3  LAST  990           16,3523  7 3757 0            MP       -SLOPE
2146  REF   6  LAST  990           16,3524  27'650 1            ADS      DELOGART
2147  REF   2  LAST  989           16,3525  3 3760 0            CA       LMCRATE
2148                                16,3526  0 0006 1            EXTEND
2149  REF  23  LAST  990           16,3527  7 4756 0            MP       BIT11
2150  REF   7  LAST  990           16,3530  6 1650 0  RATENUM   AD       DELOGART     NUMERATOR COMPLETED

2151  REF  89  LAST  988           16,3531  56 001 0            XCH      L            PLACE NUMERATOR IN L FOR OVERFL. CHECK
2152  REF 165  LAST  987           16,3532  3 4772 1            CA       ZERO
2153                                16,3533  0 0006 1            EXTEND
2154  REF  10  LAST  990           16,3534  11'573 0            DV       TEMREG       OVERFLOW, IF ANYTHING, NOW APPEARS IN A
2155                                16,3535  0 0006 1            EXTEND
2156  REF   1                       16,3536  1 3544 0            BZF      DVOK         NO OVERFLOW....(0,L)/TEMREG = 0,L

2157  REF 206  LAST  990           16,3537  10 000 0  MINLIMAP  CCS      A
2158  REF  18  LAST  944           16,3540  3 4750 1            CAF      POSMAX           POSITIVE OVERFLOW
2159  REF   1                       16,3541  1 3553 0            TCF      ROLLSET
2160  REF  19  LAST  990           16,3542  4 4750 0            CS       POSMAX           NEGATIVE OVERFLOW
2161  REF   2  LAST  990           16,3543  1 3553 0            TCF      ROLLSET

2162  REF 207  LAST  990           16,3544  22 000 1  DVOK      LXCH     A            PUT NUMERATOR BACK INTO A, 0 IN L
2163                                16,3545  0 0006 1            EXTEND
2164  REF  11  LAST  990           16,3546  11'573 0            DV       TEMREG       RESULT OF DIVISION IS DESIRED OGARATE
2165  REF   3  LAST  990           16,3547  1 3553 0            TCF      ROLLSET          ( SCALED AT B-4 REV/SEC )


2173  REF   2  LAST  988           16,3550  4 3763 1  RATELIM   CS       MAXLIM
2174  REF  11  LAST  990           16,3551  51'653 0            INDEX    I
```

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 2175   REF 208  LAST  990   16,3552  0 0000 1            0       A          IF I = CA, DESIRED RATE IS   -MAXLIM

R2176   COMPUTE JET FIRE TIME, BASED ON DESIRED RATE MINUS PRESENT RATE

 2177   REF  12  LAST  990   16,3553  55'573 0  ROLLSET   TS      TEMREG     STORE DESIRED OGARATE (SCALED B-4)
21771                        16,3554  0 0006 1            EXTEND
 2178   REF  10  LAST  989   16,3555  61'533 0            SU      OGARATE    RATE DIFF. SCALED AT 2(-4) REV/SEC
21781   REF  13  LAST  991   16,3556  55'573 0            TS      TEMREG          OVERFLOW PROTECT
21782                        16,3557  1 3562 1            TCF     +3                   "       "
217821  REF 209  LAST  991   16,3560  50 000 1            INDEX   A                    "       "
217822  REF   2  LAST  895   16,3561  4 4751 1            CS      LIMITS               "       "
 2179                        16,3562  0 0006 1            EXTEND
 2180   REF   1              16,3563  7 7652 0            MP      T6SCALE    T6SCALE = 8/10.24
 2181                        16,3564  0 0006 1            EXTEND
 2182   REF   5  LAST  990   16,3565  7 1631 0            MP      1/CONACC   SCALED AT B+9 SECSQ/REV (MAX < .60)
 2183                        16,3566  20 001 1            DDOUBL
21831                        16,3567  20 001 1            DDOUBL
 2184   REF  14  LAST  991   16,3570  55'573 0            TS      TEMREG          OVERFLOW PROTECT
21841                        16,3571  1 3574 0            TCF     +3                   "       "
21842   REF 210  LAST  991   16,3572  50 000 1            INDEX   A                    "       "
21843   REF   3  LAST  991   16,3573  4 4751 1            CS      LIMITS               "       "
 2185   REF  15  LAST  991   16,3574  55'573 0            TS      TEMREG     JET FIRE TIME AT 625 MICROSEC/BIT
 2186                        16,3575  0 0006 1            EXTEND             POS MEANS POSITIVE ROLL TORQUE.
 2187   REF   4  LAST  989   16,3576  1 3661 1            BZF     NOROLL

R2188   JET FIRE TIME IS NZ, TEST FOR JETS NOW ON.

21881   REF  16  LAST  991   16,3577  31'573 1            CAE     TEMREG     DESIRED CHANGE IN OGARATE
 2189                        16,3600  0 0006 1            EXTEND
 2190   REF   3  LAST  987   16,3601  7 1571 1            MP      ROLLFIRE   (SGN OF TORQUE..ZERO IF JETS NOW OFF)
 2191   REF 211  LAST  991   16,3602  10 000 0            CCS     A
 2192   REF   1              16,3603  1 3607 1            TCF     MOREROLL   CONTINUE FIRING WITH PRESENT POLARITY
 2193   REF   1              16,3604  1 3612 0            TCF     NEWROLL    START NEW FIRING NOW, PLUS
 2194   REF   5  LAST  991   16,3605  1 3661 1            TCF     NOROLL     TERMINATE OLD FIRING, NEW SIGN REQUESTED
 2195   REF   2  LAST  991   16,3606  1 3612 0            TCF     NEWROLL    START NEW FIRING NOW, MINUS

R2196   CONTINUE PRESENT FIRING

 2197   REF 166  LAST  990   16,3607  3 4772 1  MOREROLL  CAF     ZERO
 2198   REF  12  LAST  990   16,3610  55'653 1            TS      I          USE TEMP. AS MOREROLL SWITCH
 2199   REF   1              16,3611  1 3623 1            TCF     MAXTFIRE

R2200   START NEW FIRING, BUT CHECK IF GREATER THAN MIN FIRE TIME.

 2201   REF  17  LAST  991   16,3612  11'573 0  NEWROLL   CCS     TEMREG     CALL THIS T6FIRE
 2202   REF  93  LAST  905   16,3613  6 4770 0            AD      ONE
 2203                        16,3614  1 3616 1            TCF     +2
 2204   REF  94  LAST  991   16,3615  6 4770 0            AD      ONE
 2205                        16,3616  4 0000 0            COM                -MAG(T6FIRE)
 2206   REF   1              16,3617  6 5001 0            AD      TMINFIRE   TMINFIRE-MAG(T6FIRE)
```

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2207                          16,3620  4 0000 0                COM
2208                          16,3621  0 0006 1                EXTEND
2209  REF   6 LAST  991       16,3622  6 3661 0  MINTST  BZMF   NOROLL          IF NOT GREATER THAN TMINFIRE (NEW FIRE)

R2210 PROCEED WITH NEW FIRING, BUT NOT LONGER THAN TMAXFIRE.

2211  REF  18 LAST  991       16,3623  3 1573 1  MAXTFIRE CA    TEMREG
2212                          16,3624  0 0006 1           EXTEND
2213  REF   1                 16,3625  7 4766 0           MP     1/TMXFIR        I.E. 1/TMAXFIRE
2214                          16,3626  0 0006 1           EXTEND
2215  REF   1                 16,3627  1 3635 0  MAXTST   BZF    NOMXFIRE        IF LESS THAN TMAXFIRE

2216  REF 212 LAST  991       16,3630 10 000 0           CCS    A
2217  REF   1                 16,3631  3 3764 1           CAF    TMAXFIRE        USE MAXIMUM
2218                          16,3632  1 3634 1           TCF    +2
2219  REF   2 LAST  992       16,3633  4 3764 0           CS     TMAXFIRE        USE MAXIMUM
2220  REF  19 LAST  992       16,3634 55'573 0           TS     TEMREG

R2221 SET UP SIGN OF REQUIRED TORQUE.

2222  REF  20 LAST  992       16,3635 11'573 0  NOMXFIRE CCS    TEMREG          FOR TORQUE SIGN
2223  REF  20 LAST  990       16,3636  3 4750 1           CA     POSMAX          POSITIVE TORQUE REQUIRED
2224                          16,3637  1 3641 0           TCF    +2
2225  REF   4 LAST  974       16,3640  3 4752 0           CA     NEGMAX          NEGATIVE TORQUE REQUIRED
2226  REF   4 LAST  991       16,3641 55'571 1           TS     ROLLFIRE        SET ROLLFIRE FOR + OR - TORQUE

2227                          16,3642  4 0000 0           COM                    COMPLEMENT... POS. FOR NEG. TORQUE
2228                          16,3643  0 0006 1           EXTEND
2229                          16,3644  6 3647 1           BZMF   +3              POSITIVE TORQUE REQUIRED
2230  REF  21 LAST  992       16,3645  4 1573 0           CS     TEMREG
2231  REF  22 LAST  992       16,3646 55'573 0           TS     TEMREG

2232  REF  13 LAST  991       16,3647  3 1653 0  FIRELOOK CA    I               IS IT MOREROLL
2233                          16,3650  0 0006 1           EXTEND
2234  REF   1                 16,3651  1 3653 0           BZF    FIREPLUG        YES
2235  REF   1                 16,3652  1 3664 1           TCF    JETROLL         MAG(T6FIRE) NOW IN TEMREG

2236  REF   1                 16,3653 30 031 0  FIREPLUG CAE    TIME6           CHECK FOR EXTENDED FIRING
2237                          16,3654  0 0006 1           EXTEND
2238  REF  23 LAST  992       16,3655 61'573 1           SU     TEMREG
2241                          16,3656  0 0006 1           EXTEND
2242  REF  45 LAST  987       16,3657  6 5314 1  EXTENTST BZMF   TASKOVER        IF EXTENSION WANTED, DONT, EXIT ROLL DAP
2243  REF   2 LAST  992       16,3660  1 3664 1           TCF    JETROLL

2244  REF 167 LAST  991       16,3661  4 4772 0  NOROLL   CS     ZERO            COAST....(NEG ZERO FOR TIME6)
2245  REF   5 LAST  992       16,3662 55'571 1           TS     ROLLFIRE        NOTE, JETS CAN FIRE NEXT PASS
2246  REF  24 LAST  992       16,3663 55'573 0           TS     TEMREG

2247                          16,3664  0 0006 1  JETROLL  EXTEND
2248  REF   1                 16,3665  3 3755 0           DCA    NOROLIT6
```

```
2249   REF   2  LAST  139   16,3666  52 111 1          DXCH   T6LOC
2250   REF  25  LAST  992   16,3667  3 1573 1          CA     TEMREG      ENTER JET FIRING TIME
2251   REF   2  LAST  992   16,3670  54 031 1          TS     TIME6

2252   REF  14  LAST  992   16,3671  3 1653 0          CA     I           I=0 IF MOREROLL,KEEP SAME JETS ON
2253                        16,3672  0 0006 1          EXTEND
2254   REF  46  LAST  992   16,3673  1 5314 0 SAMEJETS BZF    TASKOVER    IF JETS ON KEEP SAME JETS. EXIT ROLL DAP

2255   REF   6  LAST  992   16,3674  11'571 1          CCS    ROLLFIRE
2256   REF   1               16,3675  1 3701 0          TCF    +TORQUE
2257   REF   1               16,3676  1 3742 1          TCF    T6ENABL
2258   REF   1               16,3677  1 3722 1          TCF    -TORQUE
2259   REF   2  LAST  993   16,3700  1 3742 1          TCF    T6ENABL

R2260  PROCEED WITH PLUS TORQUE.

2261   REF   2  LAST  109   16,3701  3 1572 0 +TORQUE  CA     ROLLWORD     WHAT WAS THE LAST +TORQUE COMBINATION
2262   REF  53  LAST  987   16,3702  7 4770 1          MASK   BIT1        WAS IT NO.9-11
2263                        16,3703  0 0006 1          EXTEND
2264   REF   1               16,3704  1 3714 1          BZF    NO.9-11     NOT 9-11, SO USE IT THIS TIME

2265   REF  54  LAST  993   16,3705  4 4770 1 NO.13-15 CS     BIT1
2266   REF   3  LAST  993   16,3706  7 1572 1          MASK   ROLLWORD
2267   REF   4  LAST  993   16,3707  55'572 1          TS     ROLLWORD    CHANGE BIT 1 TO ZERO
2268   REF   1               16,3710  3 5014 1          CAF    +ROLL2
2269                        16,3711  0 0006 1          EXTEND
2270   REF   2  LAST  194   16,3712  01 006 0          WRITE  CHAN6
2271   REF   3  LAST  993   16,3713  1 3742 1          TCF    T6ENABL

2272   REF  55  LAST  993   16,3714  3 4770 0 NO.9-11  CAF    BIT1        1ST + JETS TO FIRE (MRCLEAN OS ROLLWORD)
2273   REF   5  LAST  993   16,3715  27'572 1          ADS    ROLLWORD    CHANGE BIT 1 TO ONE
2274   REF   1               16,3716  3 4773 0          CAF    +ROLL1
2275                        16,3717  0 0006 1          EXTEND
2276   REF   3  LAST  993   16,3720  01 006 0          WRITE  CHAN6
2277   REF   4  LAST  993   16,3721  1 3742 1          TCF    T6ENABL

2278   REF   6  LAST  993   16,3722  3 1572 0 -TORQUE  CA     ROLLWORD     WHAT WAS LAST -TORQUE COMBINATION
2279   REF  33  LAST  961   16,3723  7 4767 1          MASK   BIT2        WAS IT NO.12-10
2280                        16,3724  0 0006 1          EXTEND
2281   REF   1               16,3725  1 3735 1          BZF    NO.12-10    NOT 12-10, SO USE IT THIS TIME

2282   REF  34  LAST  993   16,3726  4 4767 1 NO.16-14 CS     BIT2
2283   REF   7  LAST  993   16,3727  7 1572 1          MASK   ROLLWORD
2284   REF   8  LAST  993   16,3730  55'572 1          TS     ROLLWORD    CHANGE BIT 2 TO ZERO
2285   REF   1               16,3731  3 3765 0          CAF    -ROLL2
2286                        16,3732  0 0006 1          EXTEND
2287   REF   4  LAST  993   16,3733  01 006 0          WRITE  CHAN6
2288   REF   5  LAST  993   16,3734  1 3742 1          TCF    T6ENABL

2289   REF  35  LAST  993   16,3735  3 4767 0 NO.12-10 CAF    BIT2        1ST -JETS TO FIRE (MRCLEAN OS ROLLWORD)
```

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```
2290   REF   9  LAST  993   16,3736  27'572 1            ADS     ROLLWORD      CHANGE BIT 2 TO ONE
2291   REF   1              16,3737  3 4355 0            CAF     -ROLL1
2292                        16,3740  0 0006 1            EXTEND
2293   REF   5  LAST  993   16,3741  01 006 0            WRITE   CHAN6

2294   REF  35  LAST  988   16,3742  3 4752 0  T6ENABL    CAF     BIT15
2295                        16,3743  0 0006 1            EXTEND
2296   REF   9  LAST  592   16,3744  05 013 0            WOR     CHAN13
2297   REF  47  LAST  993   16,3745  1 5314 0  RDAPEND   TCF     TASKOVER      EXIT ROLL DAP
```

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P2298 THIS T6 TASK SHUTS OFF ALL ROLL JETS

```
2299   REF  15  LAST  974   16,3746  22 016 0  NOROLL1  LXCH   BANKRUPT   SHUT OFF ALL (ROLL) JETS, (A T6 TASK
2300   REF 168  LAST  992   16,3747  3 4772 1           CAF    ZERO           CALLED BY ..JETROLL..)
2301   REF   7  LAST  993   16,3750  55'571 1           TS     ROLLFIRE   ZERO INDICATES JETS NOW OFF
2302                        16,3751  0 0006 1           EXTEND
2303   REF   6  LAST  994   16,3752  01 006 0  KILLJETS WRITE  CHANG
2304   REF   4  LAST  974   16,3753  1 5325 1           TCF    NOQRSM
```

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P2305 CONSTANTS FOR ROLL AUTOPILOT....

```
 2306   REF  36  LAST  965   E6,1446                          EBANK= CNTR
 2307   REF   1              16,3754   03746 1  NOROLLT6 2CADR  NOROLL1
 2307   REF   1              16,3755   34066 0

 2309                        16,3756   00344 1  DB       DEC    .01388889      DEAD BAND (5 DEG), SC.AT B+0 REV

 2310                        16,3757   06315 0  -SLOPE   DEC    0.2            -SWITCHLINE SLOPE(0.2 PER SEC) SC.AT B+0
A2311                                                                          PER SEC
 2312                        16,3760   00111 0  LMCRATE  DEC    .00027778 B+4  LIMIT CYCLE RATE (0.1 DEG/SEC) SC.AT
A2313                                                                          B-4 REV/SEC
 2314                        16,3761   00510 0  INTERCEP DEC    .0025 B+3      DB(-SLOPE) - LMCRATE,  SC.AT  B-3 REV/SC

 2315                        16,3762   01330 0  MINLIM   DEC    .00277778 B+4  RATELIM,MIN (1DEG/SEC), SC.AT B-4 REV/SC

 2317                        16,3763   07071 0  MAXLIM   DEC    .01388889 B+4  RATELIM,MAX (5DEG/SEC), SC.AT B-4 REV/SC

A2318                                          TMINFIRE DEC    1.5 B+4        15 MS  (14 MIN), SC.AT 16 BITS/CS
 23185  REF   7  LAST  354      5001          TMINFIRE =      BITS4&5
```

```
 2319                        16,3764   07640 1  TMAXFIRE DEC    250 B+4        2.5 SEC, SC.AT 16 BITS/CS

 2320   REF  37  LAST  981      4766          1/TMXFIR =      BITS            RECIPROCAL THEREOF, SHIFTED 14 RIGHT,
A23201                                                                         ROUNDS TO OCT00004, SO ALLOWS 2.56
A23202                                                                         SEC FIRINGS BEFORE APPLYING LIMIT
 23203  REF   4  LAST  838      7652          T6SCALE  =      PRIO31         (B+3) (16BITS/CS) (100CS/SEC)
```

```
 2321   REF  22  LAST  894      4773          +ROLL1   =      FIVE           ONBITS FOR JETS 9 AND 11
 2322   REF   1              5014          +ROLL2   =      OCT120         ONBITS FOR JETS 13 AND 15
 2323   REF   5  LAST  714      4355          -ROLL1   =      TEN            ONBITS FOR JETS 12 NAD 10
 2324                        16,3765   00240 1  -ROLL2   OCT    240            ONBITS FOR JETS 16 AND 14
```

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```
0002   REF   1                21,2000                        SETLOC MYSUBS
0003                            21,2060                        BANK

0004   REF   2  LAST  112      E6,1510                        EBANK= KMPAC
0005   REF   1                   5060          SPCOS1        EQUALS SPCOS
0006   REF   1                   5061          SPSIN1        EQUALS SPSIN
0007   REF   2  LAST  997        5060          SPCOS2        EQUALS SPCOS
0008   REF   2  LAST  997        5061          SPSIN2        EQUALS SPSIN

0009  *REF   1                                                COUNT* $$/DAPMS
R0010  ONE AND ONE HALF PRECISION MULTIPLICATION ROUTINE

0011   REF   2  LAST  112      21,2060  55'512 1  SMALLMP     TS     KMPTEMP          A(X+Y)
0012                            21,2061  0 0006 1              EXTEND
0013   REF   3  LAST  997      21,2062  7 1511 1              MP     KMPAC +1
0014   REF   4  LAST  997      21,2063  55'511 1              TS     KMPAC +1         AY
0015   REF 169  LAST  995      21,2064  3 4772 1              CAF    ZERO
0016   REF   5  LAST  997      21,2065  57'510 1              XCH    KMPAC
0017                            21,2066  0 0006 1              EXTEND
0018   REF   3  LAST  997      21,2067  7 1512 1              MP     KMPTEMP          AX
0019   REF   6  LAST  997      21,2070  21'511 1              DAS    KMPAC            AX+AY
0020   REF 166  LAST  980      21,2071  0 0002 0              TC     Q

R0021  SUBROUTINE FOR DOUBLE PRECISION ADDITIONS OF ANGLES
R0022  A AND L CONTAIN A DP(1S) ANGLE SCALED BY 180 DEGS TO BE ADDED TO KMPAC.
R0023  RESULT IS PLACED IN KMPAC.  TIMING = 6 MCT (22 MCT ON OVERFLOW)

0024   REF   7  LAST  997      21,2072  21'511 1  DPADD       DAS    KMPAC
0025                            21,2073  0 0006 1              EXTEND
0026   REF   1                 21,2074  1 2111 0              BZF    TSK +1           NO OVERFLOW
0027   REF   8  LAST  997      21,2075  11'510 0              CCS    KMPAC
0028   REF   1                 21,2076  1 2112 0              TCF    DPADD+           + OVERFLOW
0029                            21,2077  1 2101 1              TCF    +2
0030   REF   1                 21,2100  1 2114 0              TCF    DPADD-           - OVERFLOW
0031   REF   9  LAST  997      21,2101  11'511 1              CCS    KMPAC +1
0032   REF   1                 21,2102  1 2117 0              TCF    DPADD2+          UPPER = 0, LOWER +
0033                            21,2103  1 2105 0              TCF    +2
0034                            21,2104  4 0000 0              COM                     UPPER = 0, LOWER -
0035   REF  21  LAST  992      21,2105  6 4750 1              AD     POSMAX           LOWER = 0, A=0
0036   REF  10  LAST  997      21,2106  55'511 1              TS     KMPAC +1         CAN NOT OVERFLOW
0037   REF  22  LAST  997      21,2107  3 4750 1              CA     POSMAX           UPPER WAS = 0
0038   REF  11  LAST  997      21,2110  55'510 0  TSK         TS     KMPAC
0039  *REF 167  LAST  997      21,2111  0 0002 0    +1        TC     Q
0040   REF   5  LAST  992      21,2112  6 4752 0  DPADD+      AD     NEGMAX           KMPAC GREATER THAN 0
0041   REF   2  LAST  997      21,2113  1 2110 1              TCF    TSK

0042                            21,2114  4 0000 0  DPADD-      COM
0043   REF  23  LAST  997      21,2115  6 4750 1              AD     POSMAX           KMPAC LESS THAN 0
```

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```
0044   REF   3  LAST  997   21,2116  1 2110 1          TCF    TSK

0045   REF   6  LAST  997   21,2117  6 4752 0  DPADD2+ AD     NEGMAX        CAN NOT OVERFLOW
0046   REF  12  LAST  997   21,2120  55'511 1          TS     KMPAC +1
0047   REF   7  LAST  998   21,2121  3 4752 0          CA     NEGMAX        UPPER WAS = 0
0048   REF   4  LAST  998   21,2122  1 2110 1          TCF    TSK
```

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P0001 T5 INTERRUPT PROGRAM FOR THE RCS-CSM AUTOPILOT
R0002 START OF T5 INTERRUPT PROGRAM

```
C004   REF   2  LAST  734   21,2000                          SETLOC  DAPS3
C005                        21,2123                          BANK

C006  *REF   1                                               COUNT*  $$/DAPRC
C007   REF  13  LAST  998   E6,1510                           EBANK=  KMPAC
C008   REF  16  LAST  995   21,2123  22 016 0  REDORCS       LXCH    BANKRUPT      RESTART OF AUTOPILOT COMES HERE
C009   REF   2  LAST  735   21,2124  3 1464 0                CA      T5PHASE       ON A T5 RUPT.
C010                        21,2125  0 0006 1                EXTEND
C0101                       21,2126  6 2130 1                BZMF    +2            IF T5PHASE +0, -0, OR -, RESET TO -
C0102                       21,2127  1 2132 1                TCF     +3            IF T5PHASE +, LEAVE IT +.  DO A FRESHDAP
C0103  REF  95  LAST  991   21,2130  4 4770 1                CS      ONE
C0104  REF   3  LAST 1000   21,2131  55'464 1               TS      T5PHASE
C011                        21,2132  0 0006 1                EXTEND
C012   REF   1              21,2133  3 2137 0                DCA     RCSLOC
C013   REF  18  LAST  974   21,2134  52 113 0               DXCH    T5LOC         HOOK UP T5RUPT TO AUTOPILOT
C014   REF   2  LAST  734   21,2135  1 2141 0               TCF     RCSATT +1
C015   REF  14  LAST 1000   E6,1510                          EBANK=  KMPAC
C016   REF   3  LAST 1000   21,2136   02140 0  RCSLOC       2CADR   RCSATT
C016                        21,2137   42066 1

C017   REF  17  LAST 1000   21,2140  22 016 0  RCSATT       LXCH    BANKRUPT      SAVE BB
C018   *                    21,2141  0 0006 1     +1        EXTEND                SAVE Q
C019   REF  13  LAST  970   21,2142  22 012 1               QXCH    QRUPT
C020   REF  36  LAST  994   21,2143  3 4752 0               CAF     BIT15         BIT15 CHAN31 = 0 IF IMU POWER IS ON AND
C021   REF   3  LAST  597   21,2144  0 5654 0               TC      C31BTCHK      S/C CONT SW IS IN CMC (I.E. IF G/C DAP
C022   REF   1              21,2145  1 2170 1               TCF     SETT5         IS FULLY ENABLED).     IF S08
A0025                                                                             GO TO SETT5

C026   REF  17  LAST  946   21,2146  4 1501 0               CS      RCSFLAGS      IF G/C AUTOPILOT IS NOT FULLY ENABLED,
C027   REF  41  LAST  988   21,2147  7 4753 0               MASK    BIT14
C028   REF  18  LAST 1000   21,2150  27'501 0               ADS     RCSFLAGS      SET NORATE FLAG,
C029   REF  24  LAST  997   21,2151  3 4750 1               CAF     POSMAX
C030   REF   9  LAST  600   21,2152  55'340 0               TS      HOLDFLAG      SET HOLDFLAG +,
C0301  REF 170  LAST  997   21,2153  3 4772 1               CAF     ZERO          ZERO ERRORX, ERRORY, AND ERRORZ,
C0302  REF   7  LAST  187   21,2154  55'567 0               TS      ERRORX
C0303  REF   8  LAST  703   21,2155  55'570 0               TS      ERRORY
C0304  REF   5  LAST  188   21,2156  55'571 1               TS      ERRORZ
C031   REF  42  LAST 1000   21,2157  3 4753 1               CAF     BIT14
C032   REF   4  LAST 1000   21,2160  0 5654 0               TC      C31BTCHK      AND CHECK FREE FUNCTION (BIT14 CHAN31)
C033   REF   2  LAST 1000   21,2161  1 2170 1               TCF     SETT5
C0332  REF   4  LAST 1000   21,2162  55'464 1              TS      T5PHASE       IF NOT IN FREE MODE,
C0333  REF   2  LAST  551   21,2163  3 7661 1               CAF     OCT37766      SCHEDULE REINITIALIZATION (FRESHDAP)
C0334  REF  15  LAST  974   21,2164  54 030 0               TS      TIME5         IN 100 MS VIA T5RUPT

C0335  REF   3  LAST  262   21,2165  0 2642 0               TCR     ZEROJET       ZERO JET CHANNELS IN 14 MS VIA ZEROJET
```

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```
 0034   REF   1                21,2166  1 2355 1            TCF    KMATRIX
 0035                          21,2167   37770 0  DELTATT   OCT    37770          80MS (TIME5)
 0036   REF   4  LAST  961       7663             DELTATT2 =      OCT37776       20 MS (TIME5)
R0044             CHECK PHASE OF T5 PROGRAM

R0045         BECAUSE OF THE LENGTH OF THE T5 PROGRAM, IT HAS BEEN DIVIDED INTO
R0046    THREE PARTS, T5PHASE1, T5PHASE2, AND THE JET SELECTION LOGIC,
R0047    TO ALLOW FOR THE EXECUTION OF OTHER
R0048    INTERRUPTS.  T5PHASE IS ALSO USED IN THE INITIALIZATION OF THE AUTOPILOT
R0049    VARIABLES AT TURN ON.
R0050    THE CODING OF T5PHASE IS...

R0051                  + = INITIALIZE T5 RCS-CSM AUTOPILOT
R0052    T5PHASE = +0  = PHASE2 OF THE T5 PROGRAM
R0053                  -  = RESTART DAP
R0054                  -0 = PHASE1 OF THE T5 PROGRAM

 0055   REF   5  LAST 1000    21,2170  11'464 1  SETT5    CCS    T5PHASE
 0056   REF   1                21,2171  1 2551 0           TCF    FRESHDAP       TURN ON AUTOPILOT
 0057   REF   1                21,2172  1 2674 1           TCF    T5PHASE2       BRANCH TO PHASE2 OF PROGRAM
 0058   REF   1                21,2173  1 2553 1           TCF    REDAP          RESTART AUTOPILOT


 0059   REF   6  LAST 1001    21,2174  55'464 1           TS     T5PHASE        PHASE 1  RESET  FOR PHASE 2
 0060   REF  16  LAST 1000    21,2175  3 0030 1           CA     TIME5
 0061   REF   2  LAST  113    21,2176  55'634 0           TS     T5TIME         USED IN COMPENSATING FOR DELAYS IN T5
 0062   REF   1                21,2177  3 7663 0           CAF    DELTATT2       RESET FOR T5RUPT IN 20MS FOR PHASE2
 0063   REF  17  LAST 1001    21,2200  54 030 0           TS     TIME5          OF PROGRAM
```

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P0064 IMU STATUS CHECK

```
 0065  REF  30  LAST  392   21,2201  4 1334 0          CS      IMODES33        CHECK IMU STATUS
 0066  REF   5  LAST  199   21,2202  7 4763 0          MASK    NOIMUDAP        BIT 6 = 0 IMU OK
 0067  REF 213  LAST  992   21,2203  10 000 0          CCS     A               BIT6 = 1 NO IMU
 0068  REF   1              21,2204  1 2215 1          TCF     RATEFILT
 0069  REF  19  LAST 1000   21,2205  4 1501 0 FREECHK  CS      RCSFLAGS        BIT14 INDICATES THAT RATES HAVE NOT BEEN
 0070  REF  43  LAST 1000   21,2206  7 4753 0          MASK    BIT14           INITIALIZED
 0071  REF  20  LAST 1002   21,2207  27'501 0          ADS     RCSFLAGS
 0072  REF  44  LAST 1002   21,2210  3 4753 1          CAF     BIT14           NO ATTITUDE REFERENCE
 0073  REF  10  LAST 1000   21,2211  55'340 0          TS      HOLDFLAG        STOP ANY AUTOMATIC STEERING AND PREPARE
A0074                                                                         TO PICK UP CDU ANGLES UPON RESUMPTION OF
A0075                                                                         ATTITUDE HOLD
 0076  REF   5  LAST 1000   21,2212  0 5654 0          TC      C31BTCHK        CHECK FOR FREE MODE
 0077  REF   1              21,2213  1 2424 0          TCF     KRESUME1        IN FREE, PROVIDE FREE CONTROL ONLY
 0080  REF   1              21,2214  1 2541 1          TCF     REINIT          .....TILT.....................................
 0081  REF   8  LAST  996     5001          BITS4,5     =      BITS4&5


 0082  REF  21  LAST 1002   21,2215  3 1501 1 RATEFILT CA      RCSFLAGS        SEE IF RATEFILTER HAS BEEN INITIALIZED
 0083  REF  45  LAST 1002   21,2216  7 4753 0          MASK    BIT14
 0084                       21,2217  0 0006 1          EXTEND                  IF SO, PROCEED WITH RATE DERIVATION
 0085                       21,2220  1 2222 0          BZF     +2
 0086  REF   2  LAST 1001   21,2221  1 2355 1          TCF     KMATRIX         IF NOT, SKIP RATE DERIVATION
```

```
R0087            RATE FILTER     TIMING = 7.72MS

R0088   RATE FILTER EQUATIONS
R0089   DRHO = DELRHO - (.1)ADOT + (1 - GAIN1)DRHO
R0090                                          -1
R0091   ADOT = ADOT    + GAIN2 DRHO + KMJ DFT
R0092          -1
R0093        -       *     -     -
R0094   WHERE DELRHO = AMGB (CDU - CDU  )
R0095                              -1
```

```
 0096 *REF  34  LAST  952   21,2222  3 4767 0    +2      CAF     TWO
 0097  REF   3  LAST  116   21,2223  55'506 1  DRHOLOOP  TS      SPNDX
 0098                       21,2224  6 0000 1            DOUBLE
 0099  REF   2  LAST  112   21,2225  55'507 0            TS      DPNDX
 0100  REF   3  LAST 1002   21,2226  51'507 1            INDEX   DPNDX
 0101  REF   2  LAST  112   21,2227  4 1552 0            CS      DRHO            DRHO SCALED 180 DEGS
 0102                       21,2230  0 0006 1            EXTEND
 0103  REF   2  LAST  113   21,2231  5 1617 0            INDEX   ATTKALMN        PICK UP DESIRED FILTER GAIN
 0104  REF   1              21,2232  7 3121 1            MP      GAIN1
 0105  REF   4  LAST 1002   21,2233  51'507 1            INDEX   DPNDX
 0106  REF   3  LAST 1002   21,2234  21'553 1            DAS     DRHO            (1 -.064)DRHO
 0107                       21,2235  0 0006 1            EXTEND
 0108  REF   5  LAST 1002   21,2236  5 1507 1            INDEX   DPNDX
 0109  REF   8  LAST  181   21,2237  4 1534 0            DCS     ADOT
```

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```
 0110   REF  15  LAST 1000   21,2240  53'511 1      DXCH   KMPAC        -(.1)ADOT
 0111   REF   2  LAST  297   21,2241  3 4754 0      CA     QUARTER
 0112   REF   1              21,2242  0 2060 0      TC     SMALLMP
 0113   REF  16  LAST 1003   21,2243  53'511 1      DXCH   KMPAC
 0114   REF   6  LAST 1002   21,2244  51'507 1      INDEX  DPNDX
 0115   REF   4  LAST 1002   21,2245  21'553 1      DAS    DRHO
 0116   REF   4  LAST 1002   21,2246  11'506 1      CCS    SPNDX
 0117   REF   1              21,2247  1 2223 1      TCF    DRHOLOOP

 0118   REF  20  LAST  951   21,2250  3 0032 0      CA     CDUX           MEASURED BODY RATES--
 0119   REF   2  LAST  113   21,2251  57'635 0      XCH    RHO
 0120                        21,2252  0 0006 1      EXTEND
 0121   REF   3  LAST 1003   21,2253  21'635 1      MSU    RHO            -       *     -     -
 0122                        21,2254  4 0000 0      COM                   DELRHO = AMGB (CDU - CDU  )
A0123                                                                                        -1
 0124                        21,2255  22 007 0      ZL
 01241  REF   2  LAST  112   21,2256  53'516 0      DXCH   DELTEMPX
 0125   REF  12  LAST  974   21,2257  3 0033 1      CA     CDUY
 0126   REF   2  LAST  113   21,2260  57'636 0      XCH    RHO1
 0127                        21,2261  0 0006 1      EXTEND
 0128   REF   3  LAST 1003   21,2262  21'636 1      MSU    RHO1
 0129                        21,2263  4 0000 0      COM
 0130   REF   1              21,2264  55'502 0      TS     T5TEMP         (CDUY - RHO1)    SCALED 90 DEGS
 0131                        21,2265  0 0006 1      EXTEND
 0132   REF   2  LAST  113   21,2266  7 1640 0      MP     AMGB1
 0133   REF   3  LAST 1003   21,2267  21'516 0      DAS    DELTEMPX       DELTEMPX = (CDUX-RHO) + AMGB1(CDUY-RHO1)
A0134                                                                     MUST BE DOUBLE PRECISION OR WILL LOSE
A0135                                                                     PULSES
 0136   REF   2  LAST  114   21,2270  3 1641 0      CA     AMGB4
 0137                        21,2271  0 0006 1      EXTEND
 0138   REF   2  LAST 1003   21,2272  7 1502 0      MP     T5TEMP
 0139   REF   2  LAST  112   21,2273  53'520 0      DXCH   DELTEMPY
 0140   REF   2  LAST  114   21,2274  3 1643 1      CA     AMGB7
 0141                        21,2275  0 0006 1      EXTEND
 0142   REF   3  LAST 1003   21,2276  7 1502 0      MP     T5TEMP
 0143   REF   1              21,2277  53'522 1      DXCH   DELTEMPZ
 0144   REF  16  LAST  974   21,2300  3 0034 0      CA     CDUZ
 0145   REF   2  LAST  113   21,2301  57'637 1      XCH    RHO2
 0146                        21,2302  0 0006 1      EXTEND
 0147   REF   3  LAST 1003   21,2303  21'637 0      MSU    RHO2
 0148                        21,2304  4 0000 0      COM
 0149   REF   4  LAST 1003   21,2305  55'502 0      TS     T5TEMP         (CDUZ - RHO2)    SCALED 90 DEGS
 0150                        21,2306  0 0006 1      EXTEND
 0151   REF   2  LAST  114   21,2307  7 1642 1      MP     AMGB5
 0152   REF   3  LAST 1003   21,2310  21'520 0      DAS    DELTEMPY       DELTEMPY =AMGB4(CDUY-RHO1)
A01521                                                                                  + AMGB5(CDUZ-RHO2)
 0153   REF   2  LAST  114   21,2311  3 1644 0      CA     AMGB8
 0154                        21,2312  0 0006 1      EXTEND
 0155   REF   5  LAST 1003   21,2313  7 1502 0      MP     T5TEMP
 0156   REF   2  LAST 1003   21,2314  21'522 1      DAS    DELTEMPZ       DELTEMPZ =AMGB7(CDUY-RHO1)
```

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```
A01561                                                                  + AMGB8(CDUZ-RHO2)
 0157   REF  35  LAST 1002   21,2315  3 4767 0          CAF     TWO
 0158   REF   5  LAST 1003   21,2316  55'506 1  ADOTLOOP TS      SPNDX
 0159                        21,2317  6 0000 1          DOUBLE
 0160   REF   7  LAST 1003   21,2320  55'507 0          TS      DPNDX
 01601                       21,2321  0 0006 1          EXTEND
 01602  REF   8  LAST 1004   21,2322  5 1507 1          INDEX   DPNDX
 01603  REF   4  LAST 1003   21,2323  3 1516 1          DCA     DELTEMPX
 01604  REF   9  LAST 1004   21,2324  51'507 1          INDEX   DPNDX
 01605  REF   5  LAST 1003   21,2325  21'553 1          DAS     DRHO
 01606                       21,2326  0 0006 1          EXTEND
 01607  REF  10  LAST 1004   21,2327  5 1507 1          INDEX   DPNDX
 01608  REF   5  LAST 1004   21,2330  3 1516 1          DCA     DELTEMPX
 01609  REF  11  LAST 1004   21,2331  51'507 1          INDEX   DPNDX
 016091 REF   2  LAST  112   21,2332  21'542 1          DAS     MERRORX
 0161   REF  12  LAST 1004   21,2333  51'507 1          INDEX   DPNDX
 0162   REF   6  LAST 1004   21,2334  3 1552 1          CA      DRHO
 0163                        21,2335  6 0000 1          DOUBLE          N.B.
 0164                        21,2336  6 0000 1          DOUBLE          N.B.
 0165                        21,2337  0 0006 1          EXTEND
 0166   REF   3  LAST 1002   21,2340  5 1617 0          INDEX   ATTKALMN        PICK UP DESIRED FILTER GAINS
 0167   REF   1              21,2341  7 3137 0          MP      GAIN2
 0168   REF  13  LAST 1004   21,2342  51'507 1          INDEX   DPNDX           ADOT  + (.16)(.1)DRHO
 0169   REF   9  LAST 1002   21,2343  21'534 0          DAS     ADOT                  -1
 0170   REF   6  LAST 1004   21,2344  51'506 0          INDEX   SPNDX           S/C TORQUE TO INERTIA RATIO
 0171   REF   3  LAST  734   21,2345  3 1620 1          CA      KMJ             SCALED (450)(1600)/(57.3)(16384)=1/1.3
 0172                        21,2346  0 0006 1          EXTEND
 0173   REF   7  LAST 1004   21,2347  5 1506 0          INDEX   SPNDX
 0174   REF   2  LAST  112   21,2350  7 1547 1          MP      DFT
 0175   REF  14  LAST 1004   21,2351  51'507 1          INDEX   DPNDX
 0176   REF  10  LAST 1004   21,2352  21'534 0          DAS     ADOT            KMJ(DFT)
 0177   REF   8  LAST 1004   21,2353  11'506 1          CCS     SPNDX
 0178   REF   1              21,2354  1 2316 0          TCF     ADOTLOOP        END CALCULATION OF VEHICLE RATES
 0179   REF   2  LAST  113   21,2355  3 1560 0  KMATRIX CA      ATTSEC
 0180   REF   4  LAST  887   21,2356  7 4777 0          MASK    LOW4
 0181   REF 214  LAST 1002   21,2357  10 000 0          CCS     A
 0182   REF   1              21,2360  1 2366 1          TCF     TENTHSEK
 0183   REF   1              21,2361  3 7656 0          CAF     PRIO34          CALL FOR 1 SEC UPDATE OF TRANSFORMATION
 0184   REF  19  LAST  883   21,2362  0 5121 0          TC      NOVAC           MATRIX FROM GIMBAL AXES TO BODY AXES
 0185   REF  17  LAST 1003   E6,1510                    EBANK=  KMPAC
 0186   REF   1              21,2363   03560 1         2CADR   AMBGUPDT
 0186   REF   1              21,2364   44066 1
 0187   REF   4  LAST  961   21,2365  3 4322 0          CAF     NINE

 0188   REF   3  LAST 1004   21,2366  55'560 1  TENTHSEK TS      ATTSEC
```

```
R0189   WHEN AUTOMATIC MANEUVERS ARE BEING PERFORMED, THE FOLLOWING ANGLE ADDITION MUST BE MADE TO PROVIDE A SMOOTH
R0191   SEQUENCE OF ANGULAR COMMANDS TO THE AUTOPILOT--

R0192           CDUXD = CDUXD + DELCDUX     (DOUBLE PRECISION)
R0193           CDUYD = CDUYD + DELCDUY     (DOUBLE PRECISION)
R0194           CDUZD = CDUZD + DELCDUZ     (DOUBLE PRECISION)

R0195   THE STEERING PROGRAMS-
R0196           1) ATTITUDE MANEUVER ROUTINE
R0198           2) LEM TRACKING

R0199   SHOULD GENERATE THE DESIRED ANGLES (CDUXD, CDUYD, CDUZD) AS WELL AS THE INCREMENTAL ANGLES (DELCDUX, DELCDUY,
R0201   DELCDUZ) SO THAT THE GIMBAL ANGLE COMMANDS CAN BE INTERPOLATED BETWEEN UPDATES.

R0203   HOLDFLAG CODING-

R0204       +  = GRAB PRESENT CDU ANGLES AND STORE IN THETADX, THETADY, THETADZ
R0205          AND PERFORM ATTITUDE HOLD ABOUT THESE ANGLES
R0206          ALSO IGNORE AUTOMATIC STEERING
R0207          SET = + BY
R0208                1) INITIALIZATION PHASE OF AUTOPILOT
R0209                2) OCCURANCE OF RHC COMMANDS
R0210                3) FREE MODE
R0211                4) SWITCH OVER TO ATTITUDE HOLD FROM AUTO
R0212                   WHILE DOING AUTOMATIC STEERING (IN THIS CASE
R021203                HOLDFLAG IS NOT ACTUALLY SET TO +, BUT THE LOGIC
R021205                FUNCTIONS AS IF IT WERE.)
R02121               5) S/C CONTROL SWITCH IN SCS
R02122               6) IMU POWER OFF
R0213       +0 = IN ATTITUDE HOLD ABOUT A PREVIOUSLY ESTABLISHED REFERENCE
R0214       -  = PERFORMING AUTOMATIC MANEUVER
R0215       -0 = NOT USED AT PRESENT

R0216          NOTE THAT THIS FLAG MUST BE  SET = -  BY THE STEERING PROGRAM IF IT IS TO COMMAND THE AUTOPILOT.
R0218   SINCE ASTRONAUT ACTION MAY CHANGE THE HOLDFLAG SETTING, IT SHOULD BE MONITORED BY THE STEERING PROGRAM TO
R0220   DETERMINE IF THE AUTOMATIC SEQUENCE HAS BEEN INTERRUPTED AND IF SO, TAKE APPROPRIATE ACTION.

 0222   REF  11  LAST 1002   21,2367  4 1340 0          CS      HOLDFLAG
 0223                        21,2370  0 0006 1          EXTEND
 0224   REF   1              21,2371  6 2416 0          BZMF    DACNDLS        IF HOLDFLAG +0,-0,+, BYPASS AUTOMATIC
A0225                                                                          COMMANDS
 0226   REF  36  LAST 1004   21,2372  3 4767 0 DCDUINCR CAF     TWO
 0227   REF   9  LAST 1004   21,2373  55'506 1 DELOOP   TS      SPNDX
 0228                        21,2374  6 0000 1          DOUBLE
 0229   REF  15  LAST 1004   21,2375  55'507 0          TS      DPNDX
 0230                        21,2376  0 0006 1          EXTEND
 0231   REF 215  LAST 1004   21,2377  5 0000 1          INDEX   A
 0232   REF   8  LAST  599   21,2400  3 1647 0          DCA     CDUXD
```

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```
0233   REF  18  LAST 1004   21,2401  53'511 1        DXCH    KMPAC
0234                        21,2402  0 0006 1        EXTEND
0235   REF  16  LAST 1005   21,2403  5 1507 1        INDEX   DPNDX
0236   REF   6  LAST  600   21,2404  3 1576 1        DCA     DELCDUX
0237   REF   1              21,2405  0 2072 0        TC      DPADD
0238                        21,2406  0 0006 1        EXTEND
0239   REF  19  LAST 1006   21,2407  3 1511 0        DCA     KMPAC
0240   REF  10  LAST 1005   21,2410  51'506 0        INDEX   SPNDX
0241   REF  12  LAST  708   21,2411  55'572 1        TS      THETADX
0242   REF  17  LAST 1006   21,2412  51'507 1        INDEX   DPNDX
0243   REF   9  LAST 1005   21,2413  53'647 1        DXCH    CDUXD
0244   REF  11  LAST 1006   21,2414  11'506 1        CCS     SPNDX
0245   REF   1              21,2415  1 2373 0        TCF     DELOOP
```

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P0246 RCS-CSM AUTOPILOT ATTITUDE ERROR DISPLAY

R0247 THREE TYPES OF ATTITUDE ERRORS MAY BE DISPLAYED ON THE FDAI-

R0248 MODE 1) AUTOPILOT FOLLOWING ERRORS SELECTED BY V61E
R0250 GENERATED INTERNALLY BY THE AUTOPILOT

R0251 MODE 2) TOTAL ATTITUDE ERRORS SELECTED BY V62E
R0253 WITH RESPECT TO THE CONTENTS OF N22

R02531 MODE 3) TOTAL ASTRONAUT ATTITUDE ERRORS SELECTED BY V63E
R02533 WITH RESPECT TO THE CONTENTS OF N17

R0254 MODE 1 IS PROVIDED AS A MONITOR OF THE RCS DAP AND ITS ABILITY TO TRACK AUTOMATIC STEERING COMMANDS. IN THIS
R0256 MODE THE ATTITUDE ERRORS WILL BE ZEROED WHEN THE CMC MODE SWITCH IS IN FREE

R0259 MODE 2 IS PROVIDED TO ASSIST THE CREW IN MANUALLY MANEUVERING THE S/C TO THE ATTITUDE (GIMBAL ANGLES) SPECIFIED
R0261 IN N22. THE ATTITUDE ERRORS WRT THESE ANGLES AND THE CURRENT CDU ANGLES ARE RESOLVED INTO S/C CONTROL AXES
R0263 AS A FLY-TO INDICATOR.

R02631 MODE 3 IS PROVIDED TO ASSIST THE CREW IN MANUALLY MANEUVERING THE S/C TO THE ATTITUDE (GIMBAL ANGLES) SPECIFIED
R02633 IN N17. THE ATTITUDE ERRORS WRT THESE ANGLES AND THE CURRENT CDU ANGLES ARE RESOLVED INTO S/C CONTROL AXES
R02635 AS A FLY-TO INDICATOR.

R0264 V60 IS PROVIDED TO LOAD N17 WITH A SNAPSHOT OF THE CURRENT CDU ANGLES, THUS SYNCHRONIZING THE MODE 3 DISPLAY
R0266 WITH THE CURRENT S/C ATTITUDE. THIS VERB MAY BE USED AT ANY TIME.

R0269 THESE DISPLAYS WILL BE AVAILIABLE IN ANY MODE (AUTO, HOLD, FREE, G+N, OR SCS) ONCE THE RCS DAP HAS BEEN
R0271 INITIATED VIA V46E. MODE 1, HOWEVER, WILL BE MEANINGFUL ONLY IN G+N AUTO OR HOLD. THE CREW MAY PRESET (VIA
R0273 V25N17) AN ATTITUDE REFERENCE (DESIRED GIMBAL ANGLES) INTO N17 AT ANY TIME.

```
0278   REF  22  LAST 1002   21,2416  4 1501 0  DACNDLS  CS      RCSFLAGS        ALTERNATE  BETWEEN FDAIDSP1 AND FDAIDSP2
0279   REF  29  LAST  722   21,2417  7 4765 0            MASK    BIT4
0280                        21,2420  0 0006 1            EXTEND
0281   REF   1              21,2421  1 3202 0            BZF     FDAIDSP2

0282   REF  23  LAST 1007   21,2422  27'501 0  FDAIDSP1  ADS     RCSFLAGS
0283   REF   8  LAST  951   21,2423  0 2425 0            TC      NEEDLER
0284   REF  31  LAST  972   21,2424  1 5323 1  KRESUME1  TCF     RESUME          END PHASE 1
```

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P0285 FDAI ATTITUDE ERROR DISPLAY SUBROUTINE

R0286 PROGRAM DESCRIPTION: D. KEENE 5/24/67

R0287 THIS SUBROUTINE IS USED TO DISPLAY ATTITUDE ERRORS ON THE FDAI VIA THE DIGITAL TO ANALOG CONVERTERS (DACS)
R0289 IN THE CDUS. CARE IS TAKEN TO METER OUT THE APPROPRIATE NUMBER OF PULSES TO THE IMU ERROR COUNTERS AND PREVENT
R0291 OVERFLOW, TO CONTROL THE RELAY SEQUENCING, AND TO AVOID INTERFERENCE WITH THE COARSE ALIGN LOOP WHICH ALSO USES
R0293 THE DACS.

R0294 CALLING SEQUENCE:

R0295 DURING THE INITIALIZATION SECTION OF THE USER'S PROGRAM, BIT3 OF RCSFLAGS SHOULD BE SET TO INITIATE THE
R0297 TURN-ON SEQUENCE WITHIN THE NEEDLES PROGRAM:

```
R0298           CS      RCSFLAGS        IN EBANK6
R0299           MASK    BIT3
R0300           ADS     RCSFLAGS
```

R0301 THEREAFTER, THE ATTITUDE ERRORS GENERATED BY THE USER SHOULD BE TRANSFERED TO THE FOLLOWING LOCATIONS IN EBANK6:

```
R0303           AK      SCALED 180 DEGREES  NOTE: THESE LOCATIONS ARE SUBJECT
R0304           AK1     SCALED 180 DEGREES        TO CHANGE
R0305           AK2     SCALED 180 DEGREES
```

R0306 FULL SCALED DEFLECTION CORRESPONDS TO 16 7/8 DEGREES OF ATTITUDE ERROR
R0307 (= 384 BITS IN IMU ERROR COUNTER)

R0308 A CALL TO NEEDLER WILL THEN UPDATE THE DISPLAY:

```
R0309           INHINT
R0310           TC      IBNKCALL        NOTE: EBANK SHOULD BE SET TO E6
R0311           CADR    NEEDLER
R0312           RELINT
```

R0313 THIS PROCESS SHOULD BE REPEATED EACH TIME THE ERRORS ARE UPDATED. AT LEAST 3 PASSES THRU THE PROGRAM ARE
R0315 REQUIRED BEFORE ANYTHING IS ACTUALLY DISPLAYED ON THE ERROR METERS.
R0316 NOTE: EACH CALL TO NEEDLER MUST BE SEPARATED BY AT LEAST 50MS TO ASSURE PROPER RELAY SEQUENCING.

R0318 ERASABLE USED:

```
R0319                           AK          CDUXCMD
R0320                           AK1         CDUYCMD
R0321                           AK2         CDUZCMD
R0322                           EDRIVEX     A,L,Q
R0323                           EDRIVEY     T5TEMP
R0324                           EDRIVEZ     SPNDX
```

R0325 SWITCHES: RCSFLAGS BITS 3,2

R0326 I/O CHANNELS: CHAN12 BIT 4 (COARSE ALIGN - READ ONLY)

```
R0327                          CHAN12     BIT 6 (IMU ERROR COUNTER ENABLE)
R0328                          CHAN14     BIT 13,14,15 (DAC ACTIVITY)

R0329   SIGN CONVENTION<   AK = THETAC - THETA
R0330             WHERE    THETAC = COMMAND ANGLE
R0331                      THETA  = PRESENT ANGLE

 0332   REF  30  LAST 1007  21,2425  3 4765 1  NEEDLER  CAF     BIT4          CHECK FOR COARSE ALIGN ENABLE
 0333                       21,2426  0 0006 1           EXTEND                IF IN COARSE ALIGN DO NOT USE IMU
 0334   REF  41  LAST  961  21,2427  02 012 0           RAND    CHAN12        ERROR COUNTERS. DONT USE NEEDLES
 0335                       21,2430  0 0006 1           EXTEND
 0336   REF   1             21,2431  1 2436 0           BZF     NEEDLER1
 0337   REF  24  LAST 1007  21,2432  4 1501 0  RCSINT   CS      RCSFLAGS      SET BIT 3 FOR INITIALIZATION PASS
 0338   REF  38  LAST  996  21,2433  7 4766 0           MASK    BIT3
 0339   REF  25  LAST 1009  21,2434  27'501 0           ADS     RCSFLAGS
 0340   REF 168  LAST  997  21,2435  0 0002 0           TC      Q

 0341   REF  26  LAST 1009  21,2436  3 1501 1  NEEDLER1 CA      RCSFLAGS
 0342   REF  22  LAST  781  21,2437  7 6211 1           MASK    SIX
 0343                       21,2440  0 0006 1           EXTEND
 0344   REF   1             21,2441  1 2476 1           BZF     NEEDLES3
 0345   REF  39  LAST 1009  21,2442  7 4766 0           MASK    BIT3
 0346                       21,2443  0 0006 1           EXTEND
 0347   REF   2  LAST  260  21,2444  1 2467 1           BZF     NEEDLER2      BIT3 = 0, BIT2 = 1

 0348   REF  29  LAST  781  21,2445  4 4763 0           CS      BIT6          FIRST PASS BIT3 = 1
 0349                       21,2446  0 0006 1           EXTEND                DISABLE IMU ERROR COUNTER TO ZERO DACS
 0350   REF  42  LAST 1009  21,2447  03 012 1           WAND    CHAN12        MUST WAIT AT LEAST 60 MS BEFORE
 0351   REF 171  LAST 1000  21,2450  4 4772 0  NEEDLE11 CS      ZERO          ENABLING COUNTERS.
 0352   REF  17  LAST  951  21,2451  55'476 1           TS      AK            ZERO THE INPUTS ON FIRST PASS
 0353   REF   8  LAST  969  21,2452  55'477 0           TS      AK1
 0354   REF   8  LAST  973  21,2453  55'500 1           TS      AK2
 0355   REF   1             21,2454  55'503 1           TS      EDRIVEX       ZERO THE DISPLAY REGISTERS
 0356   REF   1             21,2455  55'504 0           TS      EDRIVEY
 0357   REF   1             21,2456  55'505 1           TS      EDRIVEZ
 0358   REF   2  LAST  160  21,2457  54 050 0           TS      CDUXCMD       ZERO THE OUT COUNTERS
 0359   REF   2  LAST  160  21,2460  54 051 1           TS      CDUYCMD
 0360   REF   2  LAST  160  21,2461  54 052 1           TS      CDUZCMD
 0361   REF  23  LAST 1009  21,2462  4 6211 1           CS      SIX           RESET RCSFLAGS FOR PASS2
 0362   REF  27  LAST 1009  21,2463  7 1501 0           MASK    RCSFLAGS
 0363   REF  36  LAST  993  21,2464  6 4767 0           AD      BIT2
 0364   REF  28  LAST 1009  21,2465  55'501 0           TS      RCSFLAGS
 0365   REF 169  LAST 1009  21,2466  0 0002 0           TC      Q             END PASS1

 0366   REF  30  LAST 1009  21,2467  3 4763 1  NEEDLER2 CAF     BIT6          ENABLE IMU ERROR COUNTERS
 0367                       21,2470  0 0006 1           EXTEND
 0368   REF  43  LAST 1009  21,2471  05 012 1           WOR     CHAN12
 0369   REF  24  LAST 1009  21,2472  4 6211 1           CS      SIX           RESET RCSFLAGS TO DISPLAY ATTITUDE
```

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```
0370   REF  29  LAST 1009   21,2473  7 1501 0          MASK    RCSFLAGS      ERRORS    WAIT ATLEAST 4 MS FOR
0371   REF  30  LAST 1010   21,2474  55'501 0          TS      RCSFLAGS      RELAY CLOSURE
0372   REF 170  LAST 1009   21,2475  0 0002 0          TC      Q

0373   REF  31  LAST 1009   21,2476  3 4763 1  NEEDLES3 CAF     BIT6          CHECK TO SEE IF IMU ERROR COUNTER
0374                        21,2477  0 0006 1           EXTEND                 IS ENABLED
0375   REF  44  LAST 1009   21,2500  02 012 0           RAND    CHAN12
0376                        21,2501  0 0006 1           EXTEND                 IF NOT RECYCLE NEEDLES
0377   REF   1              21,2502  1 2432 1           BZF     RCSINT
0378   REF  37  LAST 1005   21,2503  3 4767 0  NEEDLES  CAF     TWO
0379   REF  12  LAST 1006   21,2504  55'506 1  DACLOOP  TS      SPNDX
0380   REF   3  LAST 1003   21,2505  4 4754 1           CS      QUARTER
0381                        21,2506  0 0006 1           EXTEND
0382   REF  13  LAST 1010   21,2507  5 1506 0           INDEX   SPNDX
0383   REF  18  LAST 1009   21,2510  7 1476 1           MP      AK
0384   REF  90  LAST  990   21,2511  54 001 1           TS      L
0385   REF 216  LAST 1005   21,2512  10 000 0           CCS     A
0386   REF   1              21,2513  3 2547 0           CA      DACLIMIT
0387                        21,2514  1 2516 0           TCF     +2
0388   REF   2  LAST 1010   21,2515  4 2547 1           CS      DACLIMIT
0389   REF  91  LAST 1010   21,2516  6 0001 0           AD      L
0390   REF   6  LAST 1003   21,2517  55'502 0           TS      T5TEMP        OVFLO CHK
0391   REF   1              21,2520  1 2524 1           TCF     OVSPOT
0392   REF 217  LAST 1010   21,2521  50 000 1           INDEX   A             ON OVERFLOW LIMIT OUTPUT TO +-384
0393   REF   3  LAST 1010   21,2522  3 2547 0           CAF     DACLIMIT
0394   REF  92  LAST 1010   21,2523  54 001 1           TS      L
0395   REF  14  LAST 1010   21,2524  51'506 0  OVSPOT   INDEX   SPNDX
0396   REF   2  LAST 1009   21,2525  4 1503 1           CS      EDRIVEX       CURRENT VALUE OF DAC
0397   REF  93  LAST 1010   21,2526  6 0001 0           AD      L
0398   REF  15  LAST 1010   21,2527  51'506 0           INDEX   SPNDX
0399   REF   3  LAST 1009   21,2530  26 050 0           ADS     CDUXCMD
0400   REF  16  LAST 1010   21,2531  51'506 0           INDEX   SPNDX
0401   REF   3  LAST 1010   21,2532  23'503 0           LXCH    EDRIVEX
0402   REF  17  LAST 1010   21,2533  11'506 1           CCS     SPNDX
0403   REF   1              21,2534  1 2504 0           TCF     DACLOOP
0404   REF   4  LAST  608   21,2535  3 7673 1           CAF     13,14,15
0405                        21,2536  0 0006 1           EXTEND
0406   REF  10  LAST  971   21,2537  05 014 1  DRIVEDAC WOR     CHAN14        SET DAC ACTIVITY BITS
0407   REF 171  LAST 1010   21,2540  0 0002 0           TC      Q

0408   REF   1              21,2541  3 2545 1  REINIT   CAF     DELAY200      ........TILT LOGIC
0409   REF  18  LAST 1001   21,2542  54 030 0           TS      TIME5         REINITIALIZE DAP IN 200MS
0410   REF   7  LAST 1001   21,2543  55'464 1           TS      T5PHASE
0411   REF  32  LAST 1007   21,2544  1 5323 1           TCF     RESUME
0412                        21,2545   37754 0  DELAY200 DEC     16364         200MS

0413                        21,2546   77177 0           DEC     -384
0414                        21,2547   37200 1  DACLIMIT DEC     16000
```

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0415 21,2550 00600 1 DEC 384

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PD416 INITIALIZATION PROGRAM FOR RCS-CSM AUTOPILOT

RD417 THE FOLLOWING QUANTITIES WILL BE ZEROED AND SHOULD APPEAR IN CONSECUTIVE LOCATIONS IN MEMORY AFTER WBODY

RD419 WBODY (+1) DFT TAU2
RD420 WBODY1 (+1) DFT1 BIAS
RD421 WBODY2 (+1) DFT2 BIAS1
RD422 ADOT (+1) DRHO (+1) BIAS2
RD423 ADOT1 (+1) DRHO1 (+1) ERRORX
RD424 ADOT2 (+1) DRHO2 (+1) ERRORY
RD425 MERRORX (+1) ATTSEC ERRORZ
RD426 MERRORY (+1) TAU
RD427 MERRORZ (+1) TAU1

```
  0428  REF  96  LAST 1000   21,2551  3 4770 0  FRESHDAP CAF   ONE          RESET HOLDFLAG TO STOP AUTOMATIC
  0429  REF  12  LAST 1005   21,2552  55'340 0           TS    HOLDFLAG     STEERING AND PREPARE TO PICK UP AN
A0430                                                                      ATTITUDE HOLD REFERENCE

  0431  REF  34  LAST  962   21,2553  0 4714 1  REDAP    TC    IBNKCALL     DECODE DAPDATR1, DAPDATR2 FOR DEADBANDS
  0432  REF   2  LAST  265   21,2554   40463 1           CADR  S41.2        RATES, QUADFAILS, QUAD MANAGEMENT

  0433  REF  35  LAST 1012   21,2555  0 4714 1           TC    IBNKCALL     DECODE IXX, IAVG AND CONVERT
  0434  REF   2  LAST  266   21,2556   40614 0           CADR  S40.14       TO AUTOPILOT GAINS

  0436  REF   1              21,2557  3 2633 0           CAF   NO.T5VAR     NO. LOCATIONS TO BE ZEROED MINUS 2
A0436                                                                      NO.T5VAR MUST BE ODD ************
  0437  REF 218  LAST 1010   21,2560  10 000 0  ZEROT5   CCS   A
  0438  REF  18  LAST 1010   21,2561  55'506 1           TS    SPNDX
  0439  REF 172  LAST 1009   21,2562  3 4772 1           CAF   ZERO
  0440  REF  94  LAST 1010   21,2563  54 001 1           TS    L
  0441  REF  19  LAST 1012   21,2564  51'506 0           INDEX SPNDX
  0442  REF  12  LAST  599   21,2565  53'527 1           DXCH  WBODY +1
  0422  REF  20  LAST 1012   21,2566  11'506 1           CCS   SPNDX
  0424  REF   1              21,2567  1 2560 1           TCF   ZEROT5
  0426  REF  13  LAST 1012   21,2570  55'525 0           TS    WBODY        ZERO LAST (FIRST) ONE

  0443  REF   4  LAST 1000   21,2571  0 2642 0           TC    ZEROJET
  0444  REF 173  LAST 1012   21,2572  4 4772 0           CS    ZERO
  0445  REF   2  LAST  113   21,2573  55'633 1           TS    CHANTEMP     INITIALIZE MINIMUM IMPULSE CONTROL

  0445  REF   2  LAST  113   21,2574  55'632 0           TS    CH31TEMP     INITIALIZE RHC POSITION MEMORY FOR
A0445                                                                      MANUAL RATE MODES
  0446  REF   1              21,2575  3 2634 1           CAF   =.24
  0447  REF   2  LAST  114   21,2576  55'654 0           TS    SLOPE        INITIALIZE SWITCHING LOGIC SLOPE

  0448  REF  12  LAST  951   21,2577  3 4766 1           CAF   FOUR
  0449  REF   3  LAST 1001   21,2600  55'634 0           TS    T5TIME       PHASE 0 RESETS FOR PHASE 2 INTERRUPT IN
A0450                                                                      60MS. PHASE 2 RESETS FOR PHASE 1 RUPT
A0451                                                                      IN (80MS - T5TIME(40MS)). THEREFORE
A0452                                                                      PHASE 1 (RATEFILTER) BEGINS CYCLING 100
A0453                                                                      MS FROM NOW AND EVERY 100MS THEREAFTER
```

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```
 0451   REF   6  LAST  835   21,2601  3 4775 0          CAF     ELEVEN
 0452   REF   4  LAST 1004   21,2602  55'617 1          TS      ATTKALMN        RESET TO PICK UP KALMAN FILTER GAINS
A0453                                                                           TO INITIALIZE THE S/C ANGULAR RATES

 0473   REF  21  LAST 1003   21,2603  3 0032 0          CA      CDUX
 0474   REF   4  LAST 1003   21,2604  55'635 1          TS      RHO
 0475   REF  13  LAST 1003   21,2605  3 0033 1          CA      CDUY
 0476   REF   4  LAST 1003   21,2606  55'636 1          TS      RHO1
 0477   REF  17  LAST 1003   21,2607  3 0034 0          CA      CDUZ
 0478   REF   4  LAST 1003   21,2610  55'637 0          TS      RHO2
 0479   REF 174  LAST 1012   21,2611  3 4772 1          CAF     ZERO            RESET AUTOPILOT TO BEGIN EXECUTING
 0480   REF   8  LAST 1010   21,2612  55'464 1          TS      T5PHASE         PHASE2 OF PROGRAM

 0481   REF  31  LAST 1002   21,2613  4 1334 0          CS      IMODES33        CHECK IMU STATUS
 0482   REF   6  LAST 1002   21,2614  7 4763 0          MASK    NOIMUDAP        IF BIT6 =0 IMU IN FINE ALIGN
 0483   REF 219  LAST 1012   21,2615  10 000 0          CCS     A               IF BIT6 = 1 IMU NOT READY
 0484   REF   1               21,2616  1 2622 1          TCF     IMUAOK
 0485   REF   5  LAST 1013   21,2617  55'617 1          TS      ATTKALMN        CANNOT USE IMU
 0486   REF   1               21,2620  3 2635 0          CAF     RCSINITB        PROVIDE FREE CONTROL ONLY
 0487   REF   1               21,2621  1 2627 1          TCF     RCSSWIT         DONT START UP RATE FILTER
A0488                                                                           SIGNAL NO RATE FILTER

 0489   REF   2  LAST 1004   21,2622  3 7656 0  IMUAOK  CAF     PRIO34          START MATRIX INITIALIZATION
 0490   REF  20  LAST 1004   21,2623  0 5121 0          TC      NOVAC           BYPASS IF IMU NOT IN FINE ALIGN
 0491   REF  20  LAST 1006   E6,1510                    EBANK=  KMPAC
 0492   REF   2  LAST 1004   21,2624   03560 1          2CADR   AMBGUPDT
 0492                        21,2625   44066 1
 0493   REF   1               21,2626  3 4766 1          CAF     RCSINIT         CLEAR BIT14 -ASSUME WE HAVE A GOOD IMU
 0494   REF  31  LAST 1010   21,2627  55'501 0  RCSSWIT TS      RCSFLAGS        CLEAR BIT1  -INITIALIZE T6 PROGRAM
A0495                                                                             SET BIT3  -INITIALIZE NEEDLES
A0496                                                                           CLEAR BIT4  -RESET FOR FDAIDSP1
 0497   REF   1               21,2630  3 2636 0          CAF     T5WAIT60        NEXT T5RUPT 60 MS FROM NOW TO ALLOW IMU
A0498                                                                           ERROR COUNTER TO ZERO.
A0499                                                                           (MINIMUM DELAY = 15 MS)
 0500   REF  19  LAST 1010   21,2631  54 030 0          TS      TIME5           SINCE ATTKALMN IS +11, PROGRAM WILL THEN
 0501   REF  33  LAST 1010   21,2632  0 5323 0          TC      RESUME          PICK UP THE KALMAN FILTER GAINS. RATE
A0502                                                                           FILTER WILL BEGIN OPERATING ZOOMS FROM
A0503                                                                           NOW

R0504   CONSTANTS USED IN INITIALIZATION PROGRAM

 0505                        21,2633   00043 0  NO.T5VAR DEC     35              NO. OF LOCATIONS TO BE ZEROED
A05051                                                                          MINUS 2...MUST BE ODD
R05052  FOR AN EVEN NUMBER OF VARIABLES TO BE ZEROED....
R05053   * SET NO.T5VAR EQUAL TO NUMBER OF VARIABLES MINUS 1
R05054   * DO DXCH WBODY INSTEAD OF WBODY + 1
R05055   * DELETE TS WBODY
 0506                        21,2634   07534 1  =.24     DEC     .24             = SLOPE OF 0.6/SEC
 0507   REF  40  LAST 1009     4766                 RCSINIT =       BIT3
 0508                        21,2635   20004 1  RCSINITB OCT     20004
```

```
0509                                21,2636   37772 1  T5WAIT60 DEC     16378          = 6 CS
0510   REF   21  LAST 1013          E6,1510                     EBANK=  KMPAC
0511   REF    1                     21,2637   03606 1  T6ADDR   2CADR   T6START
0511   REF    1                     21,2640   36066 1

0512                                21,2641   62524 0  -75DEGS  DEC     -.41666        -75 DEGS IN REVS * 2
053001 REF    7  LAST 1013          21,2642   3 4775 0 ZEROJET  CAF     ELEVEN         ZERO  BLAST2, BLAST1, BLAST, YWORD2,
053002*REF   21  LAST 1012          21,2643   55'506 1   +1     TS      SPNDX          YWORD1,PWORD2,PWORD1,RWORD2,
053003 REF  175  LAST 1013          21,2644   3 4772 1          CAF     ZERO           AND RWORD1.
053004 REF   22  LAST 1014          21,2645   51'506 0          INDEX   SPNDX
053005 REF    2  LAST  107          21,2646   55'450 0          TS      RWORD1
053006 REF   23  LAST 1014          21,2647   11'506 1          CCS     SPNDX
053007 REF    5  LAST 1012          21,2650   1 2643 0          TCF     ZEROJET +1

053008 REF   13  LAST 1012          21,2651   3 4766 1          CAF     FOUR
053009 REF    2  LAST  107          21,2652   55'461 1          TS      BLAST1 +1
05301  REF    8  LAST 1014          21,2653   3 4775 0          CAF     ELEVEN
0531   REF    2  LAST  107          21,2654   55'463 0          TS      BLAST2 +1

0532   REF   56  LAST  993          21,2655   4 4770 1          CS      BIT1
0533   REF   32  LAST 1013          21,2656   7 1501 0          MASK    RCSFLAGS
0534   REF   33  LAST 1014          21,2657   55'501 0          TS      RCSFLAGS       RESET BIT1 OF RCSFLAGS TO 0

0535                                21,2660   0 0006 1          EXTEND
0536   REF    1                     21,2661   3 2640 1          DCA     T6ADDR
0537   REF    3  LAST  993          21,2662   52 111 1          DXCH    T6LOC
0538   REF    1                     21,2663   3 3075 0          CAF     =+14MS         ENABLE T6RUPT TO SHUT OFF JETS IN 14 MS.
05381  REF    3  LAST  993          21,2664   54 031 1          TS      TIME6
05385                               21,2665   0 0006 1          EXTEND
05386  REF   26  LAST  832          21,2666   22 070 0          QXCH    RUPTREG1
05387  REF    2  LAST  392          21,2667   0 4542 0          TC      C13STALL
0540   REF   37  LAST 1000          21,2670   3 4752 0          CAF     BIT15
0541                                21,2671   0 0006 1          EXTEND
0542   REF   10  LAST  994          21,2672   05 013 0          WOR     CHAN13

0543   REF   27  LAST 1014          21,2673   0 0070 0          TC      RUPTREG1

0544   REF    6  LAST 1013          21,2674   11'617 1 T5PHASE2 CCS     ATTKALMN       IF (+) INITIALIZE RATE ESTIMATE
0545   REF    1                     21,2675   1 3170 0          TCF     KALUPDT

0546                                21,2676   1 2700 0          TCF     +2             ONLY IF ATTKALMN POSITIVE
0547                                21,2677   1 2700 0          TCF     +1
0548   REF    2  LAST 1001          21,2700   3 7663 0          CA      DELTATT2       RESET FOR PHASE3 IN 20 MS
0549   REF   20  LAST 1013          21,2701   56 030 1          XCH     TIME5          (JET SELECTION LOGIC )
0550   REF    4  LAST 1012          21,2702   27'634 0          ADS     T5TIME         TO COMPENSATE FOR DELAYS IN T5RUPT

055001 REF   18  LAST 1013          21,2703   10 034 1          CCS     CDUZ
```

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```
C55002 REF   1              21,2704  1 2710 1          TCF     GIMBY      +(
C55003 REF   1              21,2705  1 2717 0          TCF     OKGIMB     +0
C55004 REF   2  LAST 1015   21,2706  1 2710 1          TCF     GIMBY      -N
C55005 REF   2  LAST 1015   21,2707  1 2717 0          TCF     OKGIMB     -0
C55006 REF   1              21,2710  6 2641 0  GIMBY   AD      -75DEGS
C55007                      21,2711  0 0006 1          EXTEND
C55008 REF   3  LAST 1015   21,2712  6 2717 1          BZMF    OKGIMB

C55009 REF  66  LAST  833   21,2713  0 5547 1          TC      UPFLAG     ATTITUDE HOLD WHEN MIDDLE GIMBAL ANGLE
C55010 REF   4  LAST  557   21,2714  00020  0          ADRES   STIKFLAG      GREATER THAN 75 DEGREES
C55011 REF 176  LAST 1014   21,2715  3 4772 1          CAF     ZERO
C55012 REF  13  LAST 1012   21,2716  55'340 0          TS      HOLDFLAG

C55013 REF  34  LAST 1014   21,2717  3 1501 1  OKGIMB  CA      RCSFLAGS   IF A HIGH RATE AUTO MANEUVER IS IN
C55014 REF  38  LAST 1014   21,2720  7 4752 1          MASK    BIT15      PROGRESS (BIT 15 OF RCSFLAGS SET), SET
C55015                      21,2721  0 0006 1          EXTEND             ATTKALMN TO -1
C55016 REF   1              21,2722  1 2724 0          BZF     NOHIAUTO   OTHERWISE SET ATTKALMN TO 0.
C55017 REF  97  LAST 1012   21,2723  4 4770 1          CS      ONE
C55020 REF   7  LAST 1014   21,2724  55'617 1  NOHIAUTO TS      ATTKALMN
```

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```
P0551                MANUAL ROTATION COMMANDS
 0552   REF   1                  21,2725  4 3057 1        CS      OCT01760        RESET FORCED FIRING BITS (BITS 10 TO 5
 0553   REF  35  LAST 1015       21,2726  7 1501 0        MASK    RCSFLAGS        OF RCSFLAGS) TO ZERO
 0554   REF  36  LAST 1016       21,2727  55'501 0        TS      RCSFLAGS

 0555                            21,2730  0 0006 1        EXTEND
 0556   REF   4  LAST  737       21,2731  00 031 0        READ    CHAN31
 0557   REF  95  LAST 1012       21,2732  54 001 1        TS      L
 0558   REF   3  LAST 1012       21,2733  3 1632 1        CA      CH31TEMP
 0559                            21,2734  0 0006 1        EXTEND
 0560   REF  11  LAST  278       21,2735  06 001 0        RXOR    LCHAN
 0561   REF   1                  21,2736  7 3063 0        MASK    MANROT          = OCT00077
 0562                            21,2737  0 0006 1        EXTEND
 0563   REF   1                  21,2740  6 2753 1        BZMF    NOCHANGE

 0564   REF 220  LAST 1013       21,2741  22 000 1        LXCH    A
 0565   REF   4  LAST 1016       21,2742  55'632 0        TS      CH31TEMP        SAVE CONTENTS OF CHANNEL 31 IN CH31TEMP

 0566   REF  96  LAST 1016       21,2743  3 0001 0        CA      L
 0567                            21,2744  0 0006 1        EXTEND
 0568   REF  27  LAST  987       21,2745  7 4764 1        MP      BIT5            PUT BITS 6-1 OF A IN BITS 10-5 OF L
 0569   REF  97  LAST 1016       21,2746  3 0001 0        CA      L
 0570   REF  37  LAST 1016       21,2747  27'501 0        ADS     RCSFLAGS        SET FORCED FIRING BITS FOR AXES WITH
A0571                                                                            WITH CHANGES IN COMMAND. BITS 10,9 FOR
A0572                                                                            ROLL, BITS 8,7 FOR YAW, BITS 6,5 FOR
A0573                                                                            PITCH

 0574   REF  38  LAST 1016       21,2750  4 1501 0        CS      RCSFLAGS        SET RATE DAMPING FLAGS (BITS 13,12,AND
 0575   REF   1                  21,2751  7 3064 1        MASK    OCT16000        11 OF RCSFLAGS)
 0576   REF  39  LAST 1016       21,2752  27'501 0        ADS     RCSFLAGS

 0577   REF   5  LAST 1016       21,2753  4 1632 0 NOCHANGE CS    CH31TEMP
 0578   REF   2  LAST 1016       21,2754  7 3063 0        MASK    MANROT
 0579                            21,2755  0 0006 1        EXTEND
 0580   REF   1                  21,2756  6 3272 0        BZMF    AHFNOROT        IF NO MANUAL COMMANDS, GO TO AHFNOROT

 0581   REF  14  LAST 1015       21,2757  55'340 0        TS      HOLDFLAG        SET HOLDFLAG +

 0582   REF   2  LAST  550       21,2760  0 3152 1        TC      STICKCHK        WHEN THE RHC IS OUT OF DETENT, PMANNDX,
A0583                                                                            YMANNDX, AND RMANNDX ARE ALL SET, BY
A0584                                                                            MEANS OF STICKCHK, TO 0, 1, OR 2 FOR NO,
A0585                                                                            +, OR - ROTATION RESPECTIVELY AS
A0586                                                                            COMMANDED BY THE RHC.

A0587                                                                            HOWEVER, IT IS WELL TO NOTE THAT AFTER
A0588                                                                            THE RHC IS RETURNED TO DETENT, THE
A0589                                                                            PROGRAM BRANCHES TO AHFNOROT AND AVOIDS
A0590                                                                            STICKCHK SO PMANNDX, YMANNDX, AND
A0591                                                                            RMANNDX ARE NOT RESET TO ZERO BUT RATHER
A0592                                                                            LEFT SET TO THEIR LAST OUT OF DETENT
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A0593                                                                   VALUES.

 0594   REF  38  LAST  829   21,2761  4 0075 1          CS      FLAGWRD1     SET STIKFLAG TO INFORM STEERING
 0595   REF   2  LAST  597   21,2762  7 4753 0          MASK    STIKBIT      PROGRAMS (P20) THAT ASTRONAUT HAS
 0596   REF  39  LAST 1017   21,2763  26 075 1          ADS     FLAGWRD1     ASSUMED ROTATIONAL CONTROL OF SPACECRAFT

 0597   REF  46  LAST 1002   21,2764  3 4753 1          CAF     BIT14
 0598   REF   6  LAST 1002   21,2765  0 5654 0          TC      C31BTCHK
 0599   REF   1              21,2766  1 3076 1          TCF     FREEFUNC
 0602   REF  40  LAST 1016   21,2767  3 1501 1          CA      RCSFLAGS     EXAMINE RCSFLAGS TO SEE IF RATE FILTER
 0603   REF  47  LAST 1017   21,2770  7 4753 0          MASK    BIT14        HAS BEEN INITIALIZED
 0604   REF 221  LAST 1016   21,2771  10 000 0          CCS     A            IF SO, PROCEED WITH MANUAL RATE COMMANDS
 0605   REF   2  LAST 1002   21,2772  1 2541 1          TCF     REINIT       .....TILT, RECYCLE TO INITIALIZE FILTER

 0606   REF  23  LAST  996   21,2773  4 4773 1          CS      FIVE         IF MANUAL MANEUVER IS AT HIGH RATE, SET
 0607   REF   4  LAST  720   21,2774  6 0774 0          AD      RATEINDX     ATTKALMN TO -1.
 0608                        21,2775  0 0006 1          EXTEND               OTHERWISE, LEAVE ATTKALMN ALONE.
 0609                        21,2776  6 3001 0          BZMF    +3
 0610   REF  98  LAST 1015   21,2777  4 4770 1          CS      ONE
 0611   REF   8  LAST 1015   21,3000  55'617 1          TS      ATTKALMN

 0614   REF  38  LAST 1010   21,3001  3 4767 0          CAF     TWO          AUTO-HOLD MANUAL ROTATION
 0615   REF  24  LAST 1014   21,3002  55'506 1 SETWBODY TS      SPNDX
 0616                        21,3003  6 0000 1          DOUBLE
 0617   REF  18  LAST 1006   21,3004  55'507 0          TS      DPNDX
 0618   REF  25  LAST 1017   21,3005  51'506 0          INDEX   SPNDX        RMANNDX = 0 NO ROTATION
 0619   REF   3  LAST  550   21,3006  3 1656 0          CA      RMANNDX              = 1  + ROTATION
 0620                        21,3007  0 0006 1          EXTEND               = 2  - ROTATION
 0621   REF   1              21,3010  1 3032 1          BZF     NORATE       IF NO ROTATION COMMAND ON THIS AXIS,
A0622                                                                       GO TO NORATE.

 0623   REF   5  LAST 1017   21,3011  6 0774 0          AD      RATEINDX     RATEINDX = 0  0.05 DEG/SEC
 0624   REF 172  LAST 1010   21,3012  54 002 1          TS      Q                     = 2  0.2 DEG/SEC
 0625   REF 173  LAST 1017   21,3013  50 002 0          INDEX   Q                     = 4  0.5 DEG/SEC
 0626   REF   1              21,3014  3 3064 0          CA      MANTABLE -1           = 6  2.0 DEG/SEC
 0627                        21,3015  0 0006 1          EXTEND
 0628   REF  23  LAST  834   21,3016  7 4760 0          MP      BIT9         MULTIPLY MANTABLE BY 2 TO THE -6
 0629   REF  19  LAST 1017   21,3017  51'507 1          INDEX   DPNDX        TO GET COMMANDED RATE.
 0630   REF  14  LAST 1012   21,3020  53'526 0          DXCH    WBODY        SET WBODY TO COMMANDED RATE.

 0631   REF  41  LAST 1017   21,3021  3 1501 1          CA      RCSFLAGS
 0632   REF   2  LAST 1016   21,3022  7 3064 1          MASK    OCT16000     IS RATE DAMPING COMPLETED (BITS 13,12AND
 0633                        21,3023  0 0006 1          EXTEND               11 OF RCSFLAGS ALL ZERO.) IF SO, GO TO
 0634   REF   1              21,3024  1 3042 0          BZF     MERUPDAT     MERUPDAT TO UPDATE CUMULATIVE ATTITUDE
A0635                                                                       ERROR.

 0636   REF 177  LAST 1015   21,3025  3 4772 1 ZERDER   CA      ZERO         ZERDER ZEROS MERRORS
 0637                        21,3026  22 007 0          ZL
 0638   REF  20  LAST 1017   21,3027  51'507 1          INDEX   DPNDX
```

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0639   REF   3  LAST 1004   21,3030  53'542 1          DXCH   MERRORX
0640   REF   1              21,3031  1 3050 0          TCF    SPNDXCHK

0641                        21,3032  22 007 0  NORATE  ZL
0642   REF  21  LAST 1017   21,3033  51'507 1          INDEX  DPNDX
0643   REF  15  LAST 1017   21,3034  53'526 0          DXCH   WBODY     ZERO WBODY FOR THIS AXIS
0644   REF  42  LAST 1017   21,3035  3 1501 1          CA     RCSFLAGS
0645   REF   3  LAST 1017   21,3036  7 3064 1          MASK   OCT16000
0646                        21,3037  0 0006 1          EXTEND           IS RATE DAMPING COMPLETED
0647   REF   2  LAST 1018   21,3040  1 3050 0          BZF    SPNDXCHK  YES, KEEP CURRENT MERRORX GO TO SPNDXCHK
0648   REF   1              21,3041  1 3025 1          TCF    ZERODER   NO,GO TO ZERODER

0649   REF 174  LAST 1017   21,3042  50 002 0  MERUPDAT INDEX  Q        MERRORX=MERRORX+MEASURED CHANGE IN ANGLE
0650   REF   2  LAST 1017   21,3043  4 3064 1          CS     MANTABLE -1  -COMMANDED CHANGE IN ANGLE
0651                        21,3044  0 0006 1          EXTEND           THE ADDITION OF MEASURED CHANGE IN ANGLE
0652   REF  27  LAST  732   21,3045  7 4762 1          MP     BIT7      HAS ALREADY BEEN DONE IN THE RATE FILTER
0653   REF  22  LAST 1018   21,3046  51'507 1          INDEX  DPNDX     COMMANDED CHANGE IN ANGLE = WBODY TIMES
0654   REF   4  LAST 1018   21,3047  21'542 1          DAS    MERRORX   .1SEC = MANTABLE ENTRY TIMES 2 TO THE -8

0655   REF  23  LAST 1018   21,3050  51'507 1  SPNDXCHK INDEX  DPNDX
0656   REF   5  LAST 1018   21,3051  3 1541 0          CA     MERRORX
0657   REF  26  LAST 1017   21,3052  51'506 0          INDEX  SPNDX
0658   REF   8  LAST 1000   21,3053  55'567 0          TS     ERRORX    ERRORX = HIGH ORDER WORD OF MERRORX
0659   REF  27  LAST 1018   21,3054  11'506 1          CCS    SPNDX
0660   REF   1              21,3055  1 3002 1          TCF    SETWBODY
0661   REF   1              21,3056  1 3452 0          TCF    JETS

0662                        21,3057  01760 1   OCT01760 OCT    01760     FORCED FIRING BITS MASK

0663                        21,3060  01400 1   OCT01400 OCT    01400     ROLL FORCED FIRING MASK     ORDER OF
0664                        21,3061  00060 1   OCT00060 OCT    00060     PITCH FORCED FIRING MASK    DEFINITION
0665                        21,3062  00300 1   OCT00300 OCT    00300     YAW FORCED FIRING MASK      MUST BE
A0666                                                                                              PRESERVED
A0667                                                                                            FOR INDEXING
0668                        21,3063  00077 1   MANROT   OCT    77
0669                        21,3064  16000 0   OCT16000 OCT    16000     RATE DAMPING FLAGS MASK
0670                        21,3065  00165 0   MANTABLE DEC    .0071111
0671                        21,3066  77612 1             DEC    -.0071111
0672                        21,3067  00722 0             DEC     028444
0673                        21,3070  77055 1             DEC    -.028444
0674                        21,3071  02215 0             DEC    .071111
0675                        21,3072  75562 1             DEC    -.071111
0676                        21,3073  11064 0             DEC    .284444
0677                        21,3074  66713 1             DEC    -.284444
0678                        21,3075  00027 1   =+14MS   DEC    23
0679   REF  43  LAST 1018   21,3076  3 1501 1  FREEFUNC CA     RCSFLAGS
0680                        21,3077  0 0006 1          EXTEND
0681   REF  24  LAST  990   21,3100  7 4756 0          MP     BIT11     SHIFT RIGHT 4 BITS
0682   REF   7  LAST 1010   21,3101  55'502 0          TS     TSTEMP
```

```
C683   REF   6  LAST 1016   21,3102  4 1632 0          CS     CH31TEMP
C684   REF   8  LAST 1018   21,3103  7 1502 0          MASK   T5TEMP      A= COMPLEMENT OF NEW CH 31 COMMANDS
C685   REF   1              21,3104  1 3320 1          TCF    RHCMINP
C693   REF 178  LAST 1017   21,3105  3 4772 1 T6PROGM  CAF    ZERO        FOR MANUAL ROTATIONS
C694   REF   9  LAST 1018   21,3106  55'567 0          TS     ERRORX
C695   REF   9  LAST 1000   21,3107  55'570 0          TS     ERRORY
C696   REF   6  LAST 1000   21,3110  55'571 1          TS     ERRORZ
C697   REF   1              21,3111  1 3763 1          TCF    T6PROG
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06971                  21,3112   00000 1  FREETAU  DEC     0
06972                  21,3113   00740 1           DEC     480
06973                  21,3114   77037 0           DEC     -480
06974                  21,3115   00000 1           DEC     0


06975                  21,3116   06604 0           DEC     .2112      FILTER GAIN FOR TRANSLATION, LEM ON
0698                   21,3117   32703 1           DEC     .8400      FILTER GAIN FOR TRANSLATION 2(ZETA)WN DT
0699                   21,3120   06604 0           DEC     .2112      FILTER GAIN FOR 2 DEGREES/SEC MANEUVERS
0700                   21,3121   02031 1  GAIN1    DEC     .0640      KALMAN FILTER GAINS FOR INITIALIZATION
0701                   21,3122   12132 1           DEC     .3180      OF ATTITUDE RATES
0702                   21,3123   13030 0           DEC     .3452
0703                   21,3124   14047 1           DEC     .3774
0704                   21,3125   15241 1           DEC     .4161
0705                   21,3126   16650 0           DEC     .4634
0706                   21,3127   20555 0           DEC     .5223
0707                   21,3130   23065 0           DEC     .5970
0708                   21,3131   26137 0           DEC     .6933
0709                   21,3132   32053 0           DEC     .8151
0710                   21,3133   35712 0           DEC     .9342

07105                  21,3134   00435 0           DEC     .0174      FILTER GAIN FOR TRANSLATION, LEM ON
0711                   21,3135   13412 1           DEC     .3600      FILTER GAIN FOR TRANSLATION (WN)(WN)DT
0712                   21,3136   00435 0           DEC     .0174      FILTER GAIN FOR 2 DEGREES/SEC MANEUVERS
0713                   21,3137   00032 0  GAIN2    DEC     .0016      SCALED 10
0714                   21,3140   01350 0           DEC     .0454
0715                   21,3141   01575 1           DEC     .0545
0716                   21,3142   02103 1           DEC     .0666
0717                   21,3143   02523 1           DEC     .0832
0718                   21,3144   03327 1           DEC     .1069
0719                   21,3145   04432 0           DEC     .1422
0720                   21,3146   06264 1           DEC     .1985
0721                   21,3147   11351 0           DEC     .2955
0722                   21,3150   17324 1           DEC     .4817
0723                   21,3151   33622 1           DEC     .8683
0724  REF   9 LAST 1019 21,3152  55'502 0  STICKCHK TS      TSTEMP
0725  REF  31 LAST  951 21,3153  7 6214 1           MASK    THREE      INDECES FOR MANUAL ROTATION
0726  REF   3 LAST  551 21,3154  55'657 0           TS      PMANNDX
0727  REF  10 LAST 1020 21,3155  3 1502 1           CA      TSTEMP
0728                   21,3156  0 0006 1           EXTEND             MAN RATE 0    0 RATE (DP)
0729  REF   4 LAST 1010 21,3157  7 4754 1           MP      QUARTER            +1   +RATE (DP)
0730  REF  11 LAST 1020 21,3160  55'502 0           TS      TSTEMP             +2   -RATE (DP)
0731  REF  32 LAST 1020 21,3161  7 6214 1           MASK    THREE             (+3)  0 RATE (DP)
0732  REF   3 LAST  551 21,3162  55'660 1           TS      YMANNDX
0733  REF  12 LAST 1020 21,3163  3 1502 1           CA      TSTEMP
0734                   21,3164  0 0006 1           EXTEND
0735  REF   5 LAST 1020 21,3165  7 4754 1           MP      QUARTER
0736  REF   4 LAST 1017 21,3166  55'656 1           TS      RMANNDX
0737  REF 175 LAST 1018 21,3167  0 0002 0           TC      Q
```

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```
 0738   REF   9  LAST 1017   21,3170  55'617 1  KALUPDT  TS      ATTKALMN        INITIALIZATION OF ATTITUDE RATES USING
AC0739                                                                          KALMAN FILTER TAKES 1.1 SEC

 0740   REF   1               21,3171  3 2167 0           CA      DELTATT         =1SEC - 80MS
 0741   REF   5  LAST 1014   21,3172  6 1634 1           AD      T5TIME          + DELAYS
 0742   REF  21  LAST 1014   21,3173  54 030 0           TS      TIME5
 0743                        21,3174  1 3177 1           TCF     +3
 0744   REF   3  LAST 1014   21,3175  3 7663 0           CAF     DELTATT2        SAFETY PLAY TO ASSURE
 0745   REF  22  LAST 1021   21,3176  54 030 0           TS      TIME5           A T5RUPT

 0752   REF 179  LAST 1019   21,3177  4 4772 0  KRESUME2 CS      ZERO            RESET FOR PHASE1
 0753   REF   9  LAST 1013   21,3200  55'464 1           TS      T5PHASE         RESUME INTERRUPTED PROGRAM
 0754   REF  34  LAST 1013   21,3201  1 5323 1           TCF     RESUME

 0755   REF  31  LAST 1009   21,3202  4 4765 0  FDAIDSP2 CS      BIT4            RESET FOR FDAIDSP1
 0756   REF  44  LAST 1018   21,3203  7 1501 0           MASK    RCSFLAGS
 0757   REF  45  LAST 1021   21,3204  55'501 0           TS      RCSFLAGS

 0758   REF  20  LAST  834   21,3205  4 0074 0           CS      FLAGWRD0        ON - DISPLAY ONE OF THE TOTAL ATTITUDE
 0759   REF   1               21,3206  7 4760 0           MASK    NEEDLBIT        ERRORS
 0760                        21,3207  0 0006 1           EXTEND
 0761   REF   1               21,3210  1 3217 1           BZF     FDAITOTL
 0762                        21,3211  0 0006 1           EXTEND
 0763   REF  10  LAST 1019   21,3212  4 1570 0           DCS     ERRORX          OFF -DISPLAY AUTOPILOT FOLLOWING ERROR
 0764   REF  19  LAST 1010   21,3213  53'477 0           DXCH    AK
 0765   REF   7  LAST 1019   21,3214  4 1571 1           CS      ERRORZ
 0766   REF   9  LAST 1009   21,3215  55'500 1           TS      AK2
 0767   REF  35  LAST 1021   21,3216  1 5323 1           TCF     RESUME          END PHASE 1

 0768   REF  12  LAST  947   21,3217  3 0105 0  FDAITOTL CA      FLAGWRD9
 07681  REF   1               21,3220  7 4763 0           MASK    N22178IT
 07682                       21,3221  0 0006 1           EXTEND
 07683  REF   1               21,3222  1 3265 1           BZF     WRTN17          IS N22ORN17 (BIT6 OF FLAGWRD9) = 0
AC7684                                                                          IF SO, GO TO WRTN17
 07685                       21,3223  0 0006 1  WRTN22   EXTEND                  OTHERWISE, CONTINUE ON TO WRTN22 AND
 0769   REF   2  LAST  423   21,3224  3 1311 0           DCA     CTHETA          GET SET TO COMPUTE TOTAL ATTITUDE
 0770   REF   2  LAST  112   21,3225  53'514 1           DXCH    WTEMP           ERROR WRT N22 BY PICKING UP THE THREE
 0771   REF   7  LAST  423   21,3226  3 1307 1           CA      CPHI            COMPONENTS OF N22

 0772                        21,3227  0 0006 1  GETAKS   EXTEND                  COMPUTE TOTAL ATTITUDE ERROR FOR
 0773   REF  22  LAST 1013   21,3230  20 032 1           MSU     CDUX            DISPLAY ON FDAI ERROR NEEDLES
 0774   REF  20  LAST 1021   21,3231  55'476 1           TS      AK
 0775   REF   3  LAST 1021   21,3232  3 1513 1           CA      WTEMP
 0776                        21,3233  0 0006 1           EXTEND
 0777   REF  14  LAST 1013   21,3234  20 033 0           MSU     CDUY
 0778   REF  13  LAST 1020   21,3235  55'502 0           TS      T5TEMP
 0779                        21,3236  0 0006 1           EXTEND
```

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```
0780   REF   3  LAST 1003   21,3237  7 1640 0          MP      AMGB1
0781   REF  21  LAST 1021   21,3240  27'476 1          ADS     AK
0782   REF  14  LAST 1021   21,3241  3 1502 1          CA      T5TEMP
0783                        21,3242  0 0006 1          EXTEND
0784   REF   3  LAST 1003   21,3243  7 1641 1          MP      AMGB4
0785   REF   9  LAST 1009   21,3244  55'477 0          TS      AK1
0786   REF  15  LAST 1022   21,3245  3 1502 1          CA      T5TEMP
0787                        21,3246  0 0006 1          EXTEND
0788   REF   3  LAST 1003   21,3247  7 1643 0          MP      AMGB7
0789   REF  10  LAST 1021   21,3250  55'500 1          TS      AK2
0790   REF   4  LAST 1021   21,3251  3 1514 0          CA      WTEMP +1
0791                        21,3252  0 0006 1          EXTEND
0792   REF  19  LAST 1014   21,3253  20 034 1          MSU     CDUZ
0793   REF  16  LAST 1022   21,3254  55'502 0          TS      T5TEMP
0794                        21,3255  0 0006 1          EXTEND
0795   REF   3  LAST 1003   21,3256  7 1642 1          MP      AMGB5
0796   REF  10  LAST 1022   21,3257  27'477 0          ADS     AK1
0797   REF  17  LAST 1022   21,3260  3 1502 1          CA      T5TEMP
0798                        21,3261  0 0006 1          EXTEND
0799   REF   3  LAST 1003   21,3262  7 1644 1          MP      AMGB8
0800   REF  11  LAST 1022   21,3263  27'500 1          ADS     AK2
0801   REF  36  LAST 1021   21,3264  1 5323 1          TCF     RESUME          END PHASE1 OF RCS DAP

0802                        21,3265  0 0006 1  WRTN17  EXTEND                  GET SET TO COMPUTE TOTAL ASTRONAUT
0803   REF   4  LAST  283   21,3266  3 1015 1          DCA     CPHIX +1        ATTITUDE ERROR WRT N17 BY PICKING UP
0804   REF   5  LAST 1022   21,3267  53'514 1          DXCH    WTEMP           THE THREE COMPONENTS OF N17
0805   REF   5  LAST 1022   21,3270  3 1013 1          CA      CPHIX
0806   REF   1              21,3271  1 3227 1          TCF     GETAKS
```

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```
0002   REF   3  LAST 1000   21,2000                        SETLOC DAPS3
0003                        21,3272                        BANK
-------------------------------------------------------------------------------
0004  *REF   1                                            COUNT* $$/DAPAM
0005   REF  22  LAST 1014   E6,1510                        EBANK= KMPAC
0006   REF  48  LAST 1017   21,3272  3 4753 1  AHFNOROT   CAF    BIT14
0007   REF   7  LAST 1017   21,3273  0 5654 0              TC     C31BTCHK
0008   REF   1              21,3274  1 3310 1              TCF    FREECONT
0011   REF  46  LAST 1021   21,3275  3 1501 1              CA     RCSFLAGS      SEE IF RATE FILTER HAS BEEN INITIALIZED
-------------------------------------------------------------------------------
0012   REF  49  LAST 1024   21,3276  7 4753 0              MASK   BIT14
0013   REF 222  LAST 1017   21,3277  10 000 0              CCS    A             IF SO, PROCEED WITH ATTITUDE CONTROL
0014   REF   3  LAST 1017   21,3300  1 2541 1              TCF    REINIT        IF NOT, RECYCLE TO INITIALIZE FILTER
A0015                                                                          AUTOMATIC CONTROL YET
0016   REF  34  LAST  981   21,3301  3 4754 0              CAF    BIT13
0017   REF   8  LAST 1024   21,3302  0 5654 0              TC     C31BTCHK
-------------------------------------------------------------------------------
0018   REF   1              21,3303  1 3404 0              TCF    HOLDFUNC
0021   REF  15  LAST 1016   21,3304  3 1340 1  AUTOCONT    CA     HOLDFLAG      IF HOLDFLAG IS +, GO TO GRABANG.
0022                        21,3305  0 0006 1              EXTEND                OTHERWISE, GO TO ATTHOLD.
0023   REF   1              21,3306  6 3334 0              BZMF   ATTHOLD
0024   REF   1              21,3307  1 3410 0              TCF    GRABANG
-------------------------------------------------------------------------------
RC026          MINIMUM IMPULSE CONTROL

0027   REF  99  LAST 1017   21,3310  3 4770 0  FREECONT    CAF    ONE
0028   REF  16  LAST 1024   21,3311  55'340 0              TS     HOLDFLAG      RESET HOLDFLAG
A0029                                                                          INHIBIT AUTOMATIC STEERING
0030                        21,3312  0 0006 1              EXTEND
0031   REF   2  LAST  144   21,3313  00 032 0              READ   CHAN32
0032   REF  98  LAST 1016   21,3314  54 001 1              TS     L
0033                        21,3315  4 0000 0              COM
0035   REF   3  LAST 1012   21,3316  7 1633 1              MASK   CHANTEMP
0036   REF   4  LAST 1024   21,3317  23'633 0              LXCH   CHANTEMP
00365  REF   3  LAST 1016   21,3320  7 3063 0  RHCMINP     MASK   MANROT
-------------------------------------------------------------------------------
0037   REF   3  LAST 1016   21,3321  0 3152 1              TC     STICKCHK
0038   REF   5  LAST 1020   21,3322  51'656 0              INDEX  RMANNDX
0039   REF   1              21,3323  3 4614 0              CA     MINTAU        MINTAU  +0
0040   REF   2  LAST  113   21,3324  55'561 0              TS     TAU                   +1    +14MS MINIMUM IMPULSE
0041   REF   4  LAST 1020   21,3325  51'657 1              INDEX  PMANNDX               +2    -14MS TIME
0042   REF   2  LAST 1024   21,3326  3 4614 0              CA     MINTAU                +3    +0
-------------------------------------------------------------------------------
0043   REF   2  LAST  113   21,3327  55'562 0              TS     TAU1
0044   REF   4  LAST 1020   21,3330  51'660 0              INDEX  YMANNDX
0045   REF   3  LAST 1024   21,3331  3 4614 0              CA     MINTAU
0046   REF   2  LAST  113   21,3332  55'563 1              TS     TAU2
0047   REF   1              21,3333  1 3105 1              TCF    T6PROGM
-------------------------------------------------------------------------------

00475  REF   5  LAST  713       4000                       SETLOC FFTAG12
00476                            4614                       BANK

00478 *REF   1                                            COUNT* $$/DAPAM
-------------------------------------------------------------------------------
```

```
C0048                          4614   00000 1  MINTAU    DEC     0
C0049                          4615   00027 1  DEC23     DEC     23          = 14 MS
C0050                          4616   77750 0  DECNEG23  DEC     -23         = -14 MS
C0051                          4617   00000 1           DEC     0

C0515  REF    4  LAST 1024    21,2000                   SETLOC  DAPS3
C0516                        21,3334                   BANK

C0518 *REF    2 LAST 1024 TO 1024:     34     34*       COUNT*  $$/DAPAM
```

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PC052 CALCULATION OF ATTITUDE ERRORS-

```
RC053          -    *     -      -          -
RC054          AK = AMGB (CDUX - THETADX) + BIAS

RC055  IE      *AK *   * 1   SIN(PSI)              0     ** CDUX - THETADX *    *BIAS *
RC057          *   *   *                                 **                *    *     *
RC059          *AK1* = * 0   COS(PSI)COS(PHI)   SIN(PHI)** CDUY - THETADY *  + *BIAS1*
RC061          *   *   *                                 **                *    *     *
RC063          *AK2*   * 0  -COS(PSI)SIN(PHI)   COS(PHI)** CDUZ - THETADZ *    *BIAS2*
```

RC065 THE BIASES ARE ADDED ONLY WHILE PERFORMING AUTOMATIC MANEUVERS (ESP KALCMANU) TO PROVIDE ADDITIONAL LEAD
RC067 AND PREVENT OVERSHOOT WHEN STARTING AN AUTOMATIC MANEUVER. NORMALLY THE REQUIRED LEAD IS ONLY 1-2 DEGREES.
RC069 BUT DURING HIGH RATE MANEUVERS IT CAN BE AS MUCH AS 7 DEGREES. THE BIASES ARE COMPUTED BY KALCMANU AND REMAIN
RC071 FIXED UNTIL THE MANEUVER IS COMPLETED AT WHICH TIME THEY ARE RESET TO ZERO.

```
 0075  REF  23  LAST 1021   21,3334  3 0032 0  ATTHOLD  CA      CDUX
 0076                      21,3335  0 0006 1           EXTEND
 0077  REF  13  LAST 1006   21,3336  21'572 1           MSU     THETADX
 0078  REF  11  LAST 1021   21,3337  55'567 0           TS      ERRORX
 0079  REF  15  LAST 1021   21,3340  3 0033 1           CA      CDUY
 0080                      21,3341  0 0006 1           EXTEND
 0081  REF  10  LAST  708   21,3342  21'573 0           MSU     THETADY
 0082  REF  18  LAST 1022   21,3343  55'502 0           TS      T5TEMP
 0083                      21,3344  0 0006 1           EXTEND
 0084  REF   4  LAST 1022   21,3345  7 1640 0           MP      AMGB1
 0085  REF  12  LAST 1026   21,3346  27'567 0           ADS     ERRORX
 0086  REF  19  LAST 1026   21,3347  3 1502 1           CA      T5TEMP
 0087                      21,3350  0 0006 1           EXTEND
 0088  REF   4  LAST 1022   21,3351  7 1641 1           MP      AMGB4
 0089  REF  10  LAST 1019   21,3352  55'570 0           TS      ERRORY
 0090  REF  20  LAST 1026   21,3353  3 1502 1           CA      T5TEMP
 0091                      21,3354  0 0006 1           EXTEND
 0092  REF   4  LAST 1022   21,3355  7 1643 0           MP      AMGB7
 0093  REF   8  LAST 1021   21,3356  55'571 1           TS      ERRORZ
 0094  REF  20  LAST 1022   21,3357  3 0034 0           CA      CDUZ
 0095                      21,3360  0 0006 1           EXTEND
 0096  REF   9  LAST  599   21,3361  21'574 1           MSU     THETADZ
 0097  REF  21  LAST 1026   21,3362  55'502 0           TS      T5TEMP
 0098                      21,3363  0 0006 1           EXTEND
 0099  REF   4  LAST 1022   21,3364  7 1642 1           MP      AMGB5
 0100  REF  11  LAST 1026   21,3365  27'570 0           ADS     ERRORY
 0101  REF  22  LAST 1026   21,3366  3 1502 1           CA      T5TEMP
 0102                      21,3367  0 0006 1           EXTEND
 0103  REF   4  LAST 1022   21,3370  7 1644 1           MP      AMGB8
 0104  REF   9  LAST 1026   21,3371  27'571 1           ADS     ERRORZ
 0105  REF  17  LAST 1024   21,3372  4 1340 0           CS      HOLDFLAG
 0106                      21,3373  0 0006 1           EXTEND
```

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```
0107   REF   2  LAST 1018   21,3374  6 3452 1          BZMF   JETS
0108   REF   4  LAST  422   21,3375  3 1564 1          CA     BIAS      AD BIASES ONLY IF PERFORMING AUTOMATIC
0109   REF  13  LAST 1026   21,3376  27'567 0          ADS    ERRORX
0110   REF   4  LAST  422   21,3377  3 1565 0          CA     BIAS1
0111   REF  12  LAST 1026   21,3400  27'570 0          ADS    ERRORY
0112   REF   4  LAST  422   21,3401  3 1566 0          CA     BIAS2
0113   REF  10  LAST 1026   21,3402  27'571 1          ADS    ERRORZ
0114   REF   3  LAST 1027   21,3403  1 3452 0          TCF    JETS

0115   REF  18  LAST 1026   21,3404  11'340 0 HOLDFUNC CCS    HOLDFLAG
0116                        21,3405  1 3410 0          TCF    +3
0117   REF   2  LAST 1024   21,3406  1 3334 1          TCF    ATTHOLD
0118                        21,3407  1 3410 0          TCF    +1
0119   REF 180  LAST 1021   21,3410  3 4772 1 GRABANG  CAF    ZERO      ZERO WBODYS AND BIASES
01191  REF  16  LAST 1018   21,3411  55'525 0          TS     WBODY
01192  REF  17  LAST 1027   21,3412  55'526 0          TS     WBODY +1
01193  REF   6  LAST  599   21,3413  55'527 1          TS     WBODY1
01194  REF   7  LAST 1027   21,3414  55'530 1          TS     WBODY1 +1
01195  REF   6  LAST  599   21,3415  55'531 0          TS     WBODY2
01196  REF   7  LAST 1027   21,3416  55'532 0          TS     WBODY2 +1
01197  REF   5  LAST 1027   21,3417  55'564 0          TS     BIAS
01198  REF   5  LAST 1027   21,3420  55'565 1          TS     BIAS1
01199  REF   5  LAST 1027   21,3421  55'566 1          TS     BIAS2

0120   REF  47  LAST 1024   21,3422  3 1501 1          CA     RCSFLAGS
01201  REF   4  LAST 1018   21,3423  7 3064 1          MASK   OCT16000
01211                       21,3424  0 0006 1          EXTEND            IS RATE DAMPING COMPLETED
01202  REF   1              21,3425  1 3433 1          BZF    ENDDAMP    IF SO, GO TO ENDDAMP
01203  REF 181  LAST 1027   21,3426  3 4772 1          CAF    ZERO       OTHERWISE, ZERO ERRORS
01204  REF  14  LAST 1027   21,3427  55'567 0          TS     ERRORX
01205  REF  13  LAST 1027   21,3430  55'570 0          TS     ERRORY
01206  REF  11  LAST 1027   21,3431  55'571 1          TS     ERRORZ
01207  REF   4  LAST 1027   21,3432  1 3452 0          TCF    JETS

01208  REF  19  LAST 1027   21,3433  55'340 0 ENDDAMP  TS     HOLDFLAG  SET HOLDFLAG +0
01209                       21,3434  0 0006 1          EXTEND
0121   REF  24  LAST 1026   21,3435  3 0033 1          DCA    CDUX      PICK UP CDU ANGLES FOR ATTITUDE HOLD
01211  REF  14  LAST 1026   21,3436  53'573 0          DXCH   THETADX   REFERENCES
01212  REF  21  LAST 1026   21,3437  3 0034 0          CA     CDUZ
01213  REF  10  LAST 1026   21,3440  55'574 1          TS     THETADZ
01214  REF   3  LAST 1027   21,3441  1 3334 1          TCF    ATTHOLD
```

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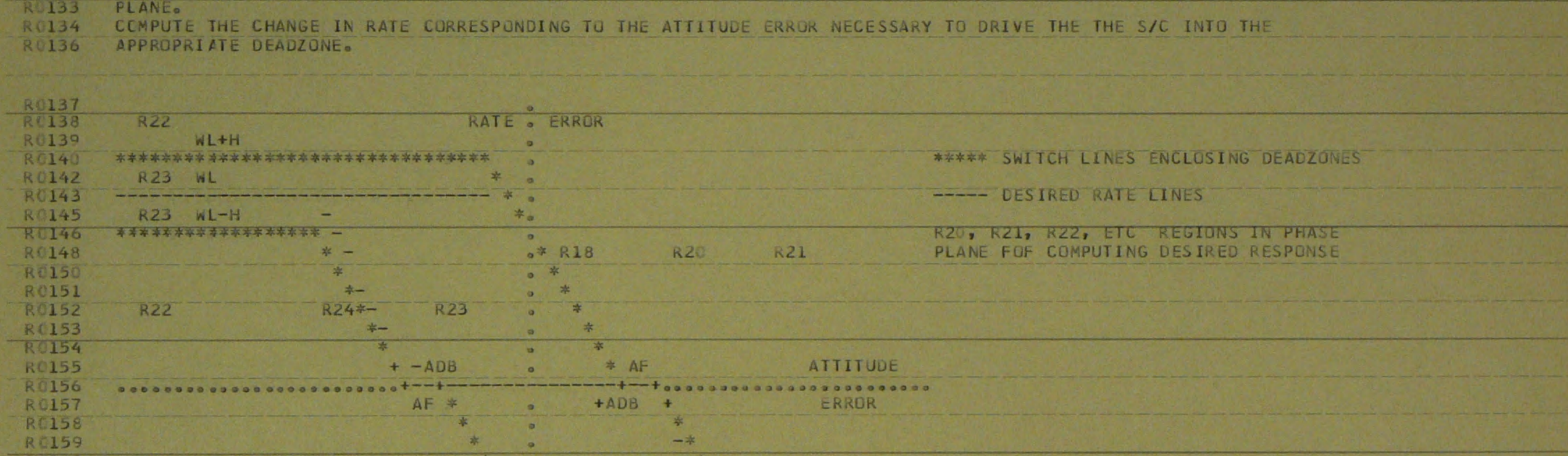
P0130 JET SWITCHING LOGIC AND CALCULATION OF REQUIRED ROTATION COMMANDS

R0131 DETERMINE THE LOCATION OF THE RATE ERROR AND THE ATTITUDE ERROR RELATIVE TO THE SWITCHING LOGIC IN THE PHASE
R0133 PLANE.
R0134 COMPUTE THE CHANGE IN RATE CORRESPONDING TO THE ATTITUDE ERROR NECESSARY TO DRIVE THE THE S/C INTO THE
R0136 APPROPRIATE DEADZONE.



***** SWITCH LINES ENCLOSING DEADZONES
----- DESIRED RATE LINES
R20, R21, R22, ETC REGIONS IN PHASE PLANE FOR COMPUTING DESIRED RESPONSE

FIG. 1 PHASE PLANE SWITCHING LOGIC

R0171 CONSTANTS FOR JET SWITCHING LOGIC

```
0172                21,3442  00114 0  WLH/SLOP DEC    .00463          = WL+H/SLOPE = .83333 DEG     $180
0173  REF   1          5006           WL-H/SLP =      DEC45           = WL-H/SLOPE = .5 DEC         $180
0174                21,3443  00022 1  WLH       2DEC  .0011111111     = WL+H = 0.5 DEG/SEC          $450
0174                21,3444  06426 1
0175                21,3445  00012 1  WLMH      2DEC  .0006666666     = WL-H = 0.3 DEG/SEC          $450
0175                21,3446  35415 1
0176                21,3447  00016 0  WL        2DEC  .0008888888     = WL   = 0.4 DEG/SEC          $450
0176                21,3450  22021 1
```

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```
0177                          21,3451   12173 1  SLOPE2   DEC     .32          = 0.8 DEG/SEC/DEG                $450/180
0178  REF  10  LAST  721      21,3452   3 1655 0 JETS     CA      ADB
0179  REF  14  LAST 1014      21,3453   6 4766 1          AD      FOUR         AF = FLAT REGION = .044 DEG
0180  REF  23  LAST 1026      21,3454   55'502 0          TS      TSTEMP       ADB+AF
0181  REF  39  LAST 1017      21,3455   3 4767 0          CAF     TWO
0182  REF  28  LAST 1018      21,3456   55'506 1 JLOOP    TS      SPNDX
0183                          21,3457   6 0000 1          DOUBLE
0184  REF  24  LAST 1018      21,3460   55'507 0          TS      DPNDX
0185                          21,3461   0 0006 1          EXTEND
0186  REF 223  LAST 1024      21,3462   5 0000 1          INDEX   A
0187  REF  11  LAST 1004      21,3463   3 1534 1          DCA     ADOT
0188  REF   2  LAST  112      21,3464   53'516 0          DXCH    EDOT
0189  REF  20  LAST 1027      21,3465   3 1340 1          CA      HOLDFLAG     HOLDFLAG = +0 MEANS THAT DAP IS IN
0190                          21,3466   0 0006 1          EXTEND               ATTITUDE HOLD AND RATE DAMPING IS OVER.
0191  REF   1                 21,3467   1 3474 1          BZF     INHOLD       IF THIS IS THE CASE, BYPASS ADDITION
AC1911                                                                         OF WBODY AND GO TO INHOLD
0192                          21,3470   0 0006 1          EXTEND
0193  REF  25  LAST 1029      21,3471   5 1507 1          INDEX   DPNDX
0194  REF  18  LAST 1027      21,3472   4 1526 0          DCS     WBODY
0195  REF   3  LAST 1029      21,3473   21'516 0          DAS     EDOT         = ADOT-WBODY
0196  REF  29  LAST 1029      21,3474   51'506 0 INHOLD   INDEX   SPNDX
0197  REF  15  LAST 1027      21,3475   3 1567 1          CA      ERRORX
0198  REF   2  LAST  112      21,3476   55'517 1          TS      AERR         AERR = BIAS + AK
0199  REF   4  LAST 1029      21,3477   11'515 0          CCS     EDOT
0200  REF   1                 21,3500   1 3510 1          TCF     POSVEL
0201  REF   1                 21,3501   1 3503 0          TCF     SIGNCK1
0202  REF   1                 21,3502   1 3520 1          TCF     NEGVEL
0203  REF   5  LAST 1029      21,3503   11'516 0 SIGNCK1  CCS     EDOT +1
0204  REF   2  LAST 1029      21,3504   1 3510 1          TCF     POSVEL
0205  REF   3  LAST 1029      21,3505   1 3510 1          TCF     POSVEL
0206  REF   2  LAST 1029      21,3506   1 3520 1          TCF     NEGVEL
0207  REF   3  LAST 1029      21,3507   1 3520 1          TCF     NEGVEL
0208                          21,3510   0 0006 1 POSVEL   EXTEND
0209  REF   6  LAST 1029      21,3511   3 1516 1          DCA     EDOT
0210  REF   2  LAST  112      21,3512   53'521 1          DXCH    EDOTVEL
0211  REF  24  LAST 1029      21,3513   3 1502 1          CA      TSTEMP
0212  REF   1                 21,3514   55'523 0          TS      ADBVEL       +(ADB+AF)
0213  REF   3  LAST 1029      21,3515   3 1517 0          CA      AERR
0214  REF   2  LAST  112      21,3516   55'522 1          TS      AERRVEL
0215  REF   1                 21,3517   0 3527 1          TC      J6.
0216                          21,3520   0 0006 1 NEGVEL   EXTEND
0217  REF   7  LAST 1029      21,3521   4 1516 0          DCS     EDOT
0218  REF   3  LAST 1029      21,3522   53'521 1          DXCH    EDOTVEL
0219  REF  25  LAST 1029      21,3523   4 1502 0          CS      TSTEMP
0220  REF   2  LAST 1029      21,3524   55'523 0          TS      ADBVEL       -(ADB+AF)
0221  REF   4  LAST 1029      21,3525   4 1517 1          CS      AERR
0222  REF   3  LAST 1029      21,3526   55'522 1          TS      AERRVEL

0223                          21,3527   0 0006 1 J6.      EXTEND
```

```
0224   REF  11  LAST 1029   21,3530  61'655 0          SU      ADB
0225   REF   1              21,3531  6 3442 0          AD      WLH/SLOP
0226                        21,3532  0 0006 1          EXTEND
0227   REF   1              21,3533  6 3562 0          BZMF    J8

0228   REF  26  LAST 1029   21,3534  4 1502 0          CS      T5TEMP          (ADB+AF)
0229   REF   4  LAST 1029   21,3535  6 1522 0          AD      AERRVEL
0230                        21,3536  0 0006 1          EXTEND
0231                        21,3537  6 3541 1          BZMF    +2
0232   REF   1              21,3540  1 3553 0          TCF     J7
0233                        21,3541  0 0006 1          EXTEND
0234   REF   4  LAST 1029   21,3542  4 1521 1          DCS     EDOTVEL
0235                        21,3543  0 0006 1          EXTEND
0236   REF   3  LAST 1012   21,3544  11'654 0          DV      SLOPE
0237                        21,3545  0 0006 1          EXTEND
0238   REF   5  LAST 1030   21,3546  61'522 0          SU      AERRVEL
0239   REF  12  LAST 1030   21,3547  6 1655 0          AD      ADB
0240                        21,3550  0 0006 1          EXTEND
0241   REF   1              21,3551  6 3641 1          BZMF    J18
0242   REF   1              21,3552  1 3715 0          TCF     J23

0243   REF   1              21,3553  4 5006 0  J7      CS      WL-H/SLP
0244                        21,3554  0 0006 1          EXTEND
0245   REF  27  LAST 1030   21,3555  61'502 1          SU      T5TEMP          (ADB+AF)
0246   REF   6  LAST 1030   21,3556  6 1522 0          AD      AERRVEL
0247                        21,3557  0 0006 1          EXTEND
0248   REF   1              21,3560  6 3645 0          BZMF    J20
0249   REF   1              21,3561  1 3656 0          TCF     J21

0250                        21,3562  0 0006 1  J8      EXTEND
0251   REF   1              21,3563  4 3444 1          DCS     WLH
0252   REF   6  LAST 1022   21,3564  53'514 1          DXCH    WTEMP
0253                        21,3565  0 0006 1          EXTEND
0254   REF   5  LAST 1030   21,3566  3 1521 0          DCA     EDOTVEL
0255   REF   7  LAST 1030   21,3567  21'514 1          DAS     WTEMP
0256   REF   8  LAST 1030   21,3570  11'513 0          CCS     WTEMP
0257   REF   1              21,3571  1 3704 0          TCF     J22
0258   REF   1              21,3572  1 3574 0          TCF     SIGNCK2
0259   REF   1              21,3573  1 3600 0          TCF     NJ22
0260   REF   9  LAST 1030   21,3574  11'514 1  SIGNCK2 CCS     WTEMP +1
0261   REF   2  LAST 1030   21,3575  1 3704 0          TCF     J22
0262   REF   3  LAST 1030   21,3576  1 3704 0          TCF     J22
0263   REF   2  LAST 1030   21,3577  1 3600 0          TCF     NJ22

0264                        21,3600  0 0006 1  NJ22    EXTEND
0265   REF   6  LAST 1030   21,3601  3 1521 0          DCA     EDOTVEL
0266                        21,3602  0 0006 1          EXTEND
0267   REF   4  LAST 1030   21,3603  11'654 0          DV      SLOPE
0268   REF  28  LAST 1030   21,3604  6 1502 1          AD      T5TEMP          (ADB+AF)
0269   REF   7  LAST 1030   21,3605  6 1522 0          AD      AERRVEL
```

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```
0270   REF 224  LAST 1029   21,3606  10 000 0          CCS    A
0271   REF   2  LAST 1030   21,3607  1 3715 0          TCF    J23
0272   REF   3  LAST 1031   21,3610  1 3715 0          TCF    J23
0273                        21,3611  1 3613 1          TCF    +2
0274   REF   4  LAST 1031   21,3612  1 3715 0          TCF    J23

0275                        21,3613  0 0006 1          EXTEND
0276   REF   1               21,3614  4 3446 0          DCS    WLMH          WL - H
0277   REF  10  LAST 1030   21,3615  53'514 1          DXCH   WTEMP
0278                        21,3616  0 0006 1          EXTEND
0279   REF   7  LAST 1030   21,3617  3 1521 0          DCA    EDOTVEL
0280   REF  11  LAST 1031   21,3620  21'514 1          DAS    WTEMP
0281   REF  12  LAST 1031   21,3621  11'513 0          CCS    WTEMP
0282   REF   5  LAST 1031   21,3622  1 3715 0          TCF    J23
0283   REF   1               21,3623  1 3625 1          TCF    SIGNCK3
0284   REF   1               21,3624  1 3631 1          TCF    NJ23
0285   REF  13  LAST 1031   21,3625  11'514 1  SIGNCK3 CCS    WTEMP +1
0286   REF   6  LAST 1031   21,3626  1 3715 0          TCF    J23
0287   REF   7  LAST 1031   21,3627  1 3715 0          TCF    J23
0288   REF   2  LAST 1031   21,3630  1 3631 1          TCF    NJ23

0289   REF   8  LAST 1030   21,3631  3 1522 0  NJ23    CA     AERRVEL
0290   REF  29  LAST 1030   21,3632  6 1502 1          AD     TSTEMP        (ADB+AF)
0291   REF   2  LAST 1030   21,3633  6 5006 1          AD     WL-H/SLP
0292   REF 225  LAST 1031   21,3634  10 000 0          CCS    A
0293   REF   1               21,3635  1 3727 1          TCF    J24
0294   REF   2  LAST 1031   21,3636  1 3727 1          TCF    J24
0295   REF   4  LAST 1030   21,3637  1 3704 0          TCF    J22
0296   REF   5  LAST 1031   21,3640  1 3704 0          TCF    J22

0297                        21,3641  0 0006 1  J18     EXTEND
0298   REF   8  LAST 1029   21,3642  4 1516 0          DCS    EDOT
0299   REF  23  LAST 1024   21,3643  53'511 1          DXCH   KMPAC
0300   REF   1               21,3644  1 3740 0          TCF    JTIME

0301   REF   5  LAST 1029   21,3645  4 1517 1  J20     CS     AERR
0302   REF   3  LAST 1029   21,3646  6 1523 1          AD     ADBVEL
0303                        21,3647  0 0006 1          EXTEND
0304   REF   1               21,3650  7 3451 0          MP     SLOPE2        (HYSTERESIS SLOPE)
0305   REF  24  LAST 1031   21,3651  53'511 1          DXCH   KMPAC
0306                        21,3652  0 0006 1          EXTEND
0307   REF   9  LAST 1031   21,3653  4 1516 0          DCS    EDOT
0308   REF  25  LAST 1031   21,3654  21'511 1          DAS    KMPAC
0309   REF   2  LAST 1031   21,3655  1 3740 0          TCF    JTIME

0310   REF  10  LAST 1031   21,3656  11'515 0  J21     CCS    EDOT
0311   REF   1               21,3657  1 3675 1          TCF    JP
0312   REF   1               21,3660  1 3662 1          TCF    SIGNCK4
0313   REF   1               21,3661  1 3666 0          TCF    JN
0314   REF  11  LAST 1031   21,3662  11'516 0  SIGNCK4 CCS    EDOT +1
```

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```
0315   REF   2  LAST 1031   21,3663  1 3675 1          TCF     JP
0316   REF   3  LAST 1032   21,3664  1 3675 1          TCF     JP
0317   REF   2  LAST 1031   21,3665  1 3666 0          TCF     JN
0318                        21,3666  0 0006 1  JN      EXTEND
0319   REF  12  LAST 1031   21,3667  4 1516 0          DCS     EDOT
0320   REF  26  LAST 1031   21,3670  53'511 1          DXCH    KMPAC
0321                        21,3671  0 0006 1          EXTEND
0322   REF   1              21,3672  3 3450 0          DCA     WL
0323   REF  27  LAST 1032   21,3673  21'511 1          DAS     KMPAC
0324   REF   3  LAST 1031   21,3674  1 3740 0          TCF     JTIME

0325                        21,3675  0 0006 1  JP      EXTEND
0326   REF  13  LAST 1032   21,3676  4 1516 0          DCS     EDOT
0327   REF  28  LAST 1032   21,3677  53'511 1          DXCH    KMPAC
0328                        21,3700  0 0006 1          EXTEND
0329   REF   2  LAST 1032   21,3701  4 3450 1          DCS     WL
0330   REF  29  LAST 1032   21,3702  21'511 1          DAS     KMPAC
0331   REF   4  LAST 1032   21,3703  1 3740 0          TCF     JTIME

0332   REF  14  LAST 1032   21,3704  11'515 0  J22     CCS     EDOT
0333   REF   3  LAST 1032   21,3705  1 3666 0          TCF     JN
0334   REF   1              21,3706  1 3710 0          TCF     SIGNCK5
0335   REF   4  LAST 1032   21,3707  1 3675 1          TCF     JP
0336   REF  15  LAST 1032   21,3710  11'516 0  SIGNCK5 CCS     EDOT +1
0337   REF   4  LAST 1032   21,3711  1 3666 0          TCF     JN
0338   REF   5  LAST 1032   21,3712  1 3666 0          TCF     JN
0339   REF   5  LAST 1032   21,3713  1 3675 1          TCF     JP
0340   REF   6  LAST 1032   21,3714  1 3675 1          TCF     JP

0341   REF  30  LAST 1029   21,3715  51'506 0  J23     INDEX   SPNDX
034151 REF  35  LAST 1024   21,3716  4 4754 1          CS      BIT13       RESET RATE DAMPING FLAG
034152 REF  48  LAST 1027   21,3717  7 1501 0          MASK    RCSFLAGS    BIT13 FOR ROLL  (SPNDX = 0)
034153 REF  49  LAST 1032   21,3720  55'501 0          TS      RCSFLAGS    BIT12 FOR PITCH (SPNDX = 1)
A034154                                                                   BIT11 FOR YAW   (SPNDX = 2)

034155 REF  31  LAST 1032   21,3721  51'506 0          INDEX   SPNDX
034156 REF   1              21,3722  3 3060 1          CAF     OCT01400    IS THERE TO BE A FORCED FIRING ON THIS
034157 REF  50  LAST 1032   21,3723  7 1501 0          MASK    RCSFLAGS    AXIS
034158                      21,3724  0 0006 1          EXTEND
034159 REF   1              21,3725  1 3761 0          BZF     DOJET +2    NO, GO TO DOJET +2 AND DO NOTHING

03416  REF   2  LAST 1030   21,3726  1 3641 0          TCF     J18         YES, GO TO J18 AND FORCE A FIRING

0342   REF   6  LAST 1031   21,3727  4 1517 1  J24     CS      AERR
0343                        21,3730  0 0006 1          EXTEND
0344   REF   4  LAST 1031   21,3731  61'523 1          SU      ADBVEL
0345                        21,3732  0 0006 1          EXTEND
0346   REF   2  LAST 1031   21,3733  7 3451 0          MP      SLOPE2      (HYSTERESIS SLOPE)
0347   REF  30  LAST 1032   21,3734  53'511 1          DXCH    KMPAC
0348                        21,3735  0 0006 1          EXTEND
```

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```
0349   REF  16  LAST 1032   21,3736  4 1516 0          DCS    EDOT
0350   REF  31  LAST 1032   21,3737  21'511 1          DAS    KMPAC
```

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```
P0351       COMPUTE THE JET ON TIME NECESSARY TO ACCOMPLISH THE DESIRED CHANGE IN RATE, IE

R0353            T   = J/M(DELTA W)
R0354             J

R0355      DELTA W = DESIRED CHANGE IN S/C ANGULAR RATE AS DETERMINED BY THE
R0356                SWITCHING LOGIC,  AT THIS POINT STORED IN KMPAC.

R0357          J/M  = S/C INERTIA TO TORQUE RATIO  SCALED BY
R0358                   (57.3/450)(B24/1600)(1/.8)
R0359                FOR 1 JET OPERATION  (M = 700 FT-LB).
R0360                IE  J/M = J(SLUG-FTFT) X 0.000000085601606

R0361                THE CORRESPONDING COMPUTER VARIABLES ESTABLISHED BY
R0362                KEYBOARD ENTRY ARE
R0363                   J/M (ROLL)
R0364                   J/M1 (PITCH)
R0365                   J/M2 (YAW)

R0366            T   = JET ON-TIME      SCALED 16384/1600 SEC
R0367             J

R0368                THE COMPUTER VARIABLES ARE
R0369                   TAU  (ROLL)
R0370                   TAU1 (PITCH)
R0371                   TAU2 (YAW)

0372   REF  32  LAST 1032   21,3740  51'506 0  JTIME    INDEX  SPNDX    PICK UP S/C INERTIA/TORQUE RATIO
0373   REF   3  LAST  734   21,3741  3 1623 1           CA     J/M      SCALED (57.3/450)(B24/1600)
0374   REF   2  LAST 1003   21,3742  0 2060 0           TC     SMALLMP  FOR 1-JET OPERATION
0375   REF  25  LAST 1018   21,3743  3 4756 1           CA     BIT11
0376   REF   3  LAST 1034   21,3744  0 2060 0           TC     SMALLMP
0377   REF  32  LAST 1033   21,3745  11'510 0           CCS    KMPAC
0378                        21,3746  1 3752 0           TCF    +4
0379   REF   1              21,3747  1 3756 1           TCF    TAUNORM
0380                        21,3750  1 3754 0           TCF    +4
0381   REF   2  LAST 1034   21,3751  1 3756 1           TCF    TAUNORM
0382   REF  25  LAST 1000   21,3752  3 4750 1           CA     POSMAX
0383   REF   2  LAST 1032   21,3753  1 3757 0           TCF    DOJET
0384   REF   8  LAST  998   21,3754  3 4752 0           CA     NEGMAX
0385   REF   3  LAST 1034   21,3755  1 3757 0           TCF    DOJET

0386   REF  33  LAST 1034   21,3756  3 1511 0  TAUNORM  CA     KMPAC +1
0387   REF  33  LAST 1034   21,3757  51'506 0  DOJET    INDEX  SPNDX
0388   REF   3  LAST 1024   21,3760  55'561 0           TS     TAU
0389  *REF  34  LAST 1034   21,3761  11'506 1    +2     CCS    SPNDX
0390   REF   1              21,3762  1 3456 1           TCF    JLOOP
0396                        21,3763  0 0006 1  T6PROG   EXTEND                WHEN THE ROTATION COMMANDS (TAUS)
0397   REF   1              21,3764  3 3770 1           DCA    JETADDR        HAVE BEEN DETERMINED
```

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```
0398  REF  19  LAST 1000   21,3765   52 113 0            DXCH   T5LOC      RESET T5LOC FOR PHASE3
0399  REF  37  LAST 1022   21,3766   1 5323 1            TCF    RESUME

0400  REF  34  LAST 1034   E6,1510                       EBANK= KMPAC
0401  REF   1              21,3767   02541 0  JETADDR   2CADR  JETSLECT
0401  REF   1              21,3770   36066 1
```

L RCS-CSM DAP EXECUTIVE PROGRAMS USER'S PAGE NO. 1 E0 S3

R0001 CALCULATION OF AMGB, AMBG ONCE EVERY SECOND

R0002 AMGB = 1 SIN(PSI) 0
R0003 0 COS(PSI)COS(PHI) SIN(PHI)
R0004 0 -COS(PSI)SIN(PHI) COS(PHI)
R0005
R0006 AMBG = 1 -TAN(PSI)COS(PHI) TAN(PSI)SIN(PHI)
R0007 0 COS(PHI)/COS(PSI) -SIN(PHI)/COS(PSI)
R0008 0 SIN(PHI) COS(PHI)
R0009
R0010 WHERE PHI AND PSI ARE CDU ANGLES
R0011
R0012

```
0014  REF   1                  22,2000                        SETLOC  DAPS8
0015                           22,3560                        BANK

0016  REF   1                                                 COUNT*  $$/DAPEX
0017  REF  35  LAST 1035       E6,1510                        EBANK=  KMPAC
0018  REF  26  LAST  951       22,3560   3 0102 1  AMBGUPDT  CA      FLAGWRD6      CHECK FOR RCS AUTOPILOT
00185 REF  16  LAST  951       22,3561   7 4076 0            MASK    DAPCONFIG
0019                           22,3562   0 0006 1            EXTEND
0020  REF  86  LAST  941       22,3563   6 5205 0            BZMF    ENDOFJOB      BIT15 = 0, BIT14 = 1
0021  REF   2  LAST  735       22,3564   7 4753 0            MASK    DAP2BIT       IF NOT RCS, EXIT
0022                           22,3565   0 0006 1            EXTEND
0023  REF  87  LAST 1036       22,3566   1 5205 1            BZF     ENDOFJOB      TO PROTECT TVC DAP ON SWITCHOVER

0024  REF  22  LAST 1027       22,3567   3 0034 0            CA      CDUZ
0025  REF   1                  22,3570   0 5061 0            TC      SPSIN2
0026  REF   5  LAST 1026       22,3571  55'640 0             TS      AMGB1         CALCULATE AMGB
0027  REF  23  LAST 1036       22,3572   3 0034 0            CA      CDUZ
0028  REF   1                  22,3573   0 5060 1            TC      SPCOS2
0029  REF   2  LAST  114       22,3574  55'645 0             TS      CAPSI         MUST CHECK FOR GIMBAL LOCK
0030  REF   1                  22,3575   3 4620 1            CAF     QUADANGL      = 7.25  DEGREES JET QUAD ANGULAR OFFSET
0031                           22,3576   0 0006 1            EXTEND
0032  REF  25  LAST 1027       22,3577  20 0032 1            MSU     CDUX
0033                           22,3600   4 0000 0            COM                   CDUX - 7.25 DEG
0034  REF   1                  22,3601   0 5060 1            TC      SPCOS1
0035  REF   5  LAST 1026       22,3602  55'644 1             TS      AMGB8
0036                           22,3603   0 0006 1            EXTEND
0037  REF   3  LAST 1036       22,3604   7 1645 0            MP      CAPSI
0038  REF   5  LAST 1026       22,3605  55'641 1             TS      AMGB4
0039  REF   2  LAST 1036       22,3606   3 4620 1            CAF     QUADANGL
0040                           22,3607   0 0006 1            EXTEND
0041  REF  26  LAST 1036       22,3610  20 0032 1            MSU     CDUX
0042                           22,3611   4 0000 0            COM                   CDUX - 7.25 DEG
0043  REF   1                  22,3612   0 5061 0            TC      SPSIN1
0044  REF   5  LAST 1026       22,3613  55'642 1             TS      AMGB5
0045                           22,3614   0 0006 1            EXTEND
0046  REF   4  LAST 1036       22,3615   7 1645 0            MP      CAPSI
0047                           22,3616   4 0000 0            COM
```

```
0048   REF    5  LAST 1026   22,3617  55'643 0          TS      AMGB7
0049   REF   88  LAST 1036   22,3620  1 5205 1          TCF     ENDOFJOB
00491  REF    6  LAST 1024      4000                    SETLOC  FFTAG12
00492                          4620                    BANK

00493 *REF    1                                         COUNT*  $$/DAPEX
0050                           4620    01224 1  QUADANGL DEC    660          = 7.25 DEGREES
```

L JET SELECTION LOGIC USER'S PAGE NO. 1 E0 S3

```
0002   REF   1                 17,2000                    SETLOC DAPS4
0003                           17,2541                    BANK

0004  *REF   1                                            COUNT* $$/DAPJS
0005   REF  36  LAST 1036      E6,1510                    EBANK= KMPAC
R0006  EXAMINE CHANNEL 31 FOR TRANSLATION COMMANDS

0007   REF  18  LAST 1000      17,2541  22 016 0  JETSLECT LXCH   BANKRUPT
0008   REF   1                 17,2542  3 2624 0          CAF    DELTATT3      = 60 MS   RESET TO EXECUTE PHASE1
0009   REF   6  LAST 1021      17,2543  6 1634 1          AD     T5TIME
0010   REF  23  LAST 1021      17,2544  54 030 0          TS     TIME5
0011                           17,2545  1 2550 1          TCF    +3
0012   REF   1                 17,2546  3 7663 0          CAF    DELATT20      = 20 MS   TO ASSURE A T5RUPT
0013   REF  24  LAST 1038      17,2547  54 030 0          TS     TIME5
0014   REF   1                 17,2550  3 3302 0          CAF    =14MS         RESET T6 TO INITIALIZE THE JET CHANNELS
0015   REF   4  LAST 1014      17,2551  54 031 1          TS     TIME6         IN 14 MS
00153                          17,2552  0 0006 1          EXTEND
00155  REF  14  LAST 1000      17,2553  22 012 1          QXCH   QRUPT
00157  REF   3  LAST 1014      17,2554  0 4542 0          TC     C13STALL
0016   REF   9  LAST 1034      17,2555  3 4752 0          CAF    NEGMAX
0017                           17,2556  0 0006 1          EXTEND
0018   REF  11  LAST 1014      17,2557  05 013 0          WOR    CHAN13
0021   REF   1                 17,2560  3 2623 1          CAF    XLNMASK       = 7700 OCT
0022                           17,2561  0 0006 1          EXTEND                EXAMINE THE TRANSLATION
0023   REF   5  LAST 1016      17,2562  06 031 0          RXOR   CHAN31        HAND CONTROLLER
0024   REF   2  LAST 1038      17,2563  7 2623 0          MASK   XLNMASK
0025                           17,2564  0 0006 1          EXTEND
0026   REF   1                 17,2565  1 2625 0          BZF    NOXLNCMD
0027   REF  30  LAST 1031      17,2566  55'502 0          TS     T5TEMP
0028                           17,2567  0 0006 1          EXTEND
0029   REF  24  LAST 1017      17,2570  7 4760 0          MP     BIT9
0030   REF  33  LAST 1020      17,2571  7 6214 1          MASK   THREE
0031   REF   3  LAST  112      17,2572  55'513 0          TS     XNDX1         AC QUAD  X-TRANSLATION INDEX
0032   REF   2  LAST  112      17,2573  55'514 1          TS     XNDX2         BD QUAD  X-TRANSLATION INDEX
0033   REF  31  LAST 1038      17,2574  3 1502 1          CA     T5TEMP
0034                           17,2575  0 0006 1          EXTEND                1 = + XLN
0035   REF  28  LAST 1018      17,2576  7 4762 1          MP     BIT7          2 = - XLN
0036   REF  34  LAST 1038      17,2577  7 6214 1          MASK   THREE         3 = NO XLN
0037   REF   3  LAST  112      17,2600  55'515 0          TS     YNDX          Y-TRANSLATION INDEX

0038   REF  32  LAST 1038      17,2601  3 1502 1          CA     T5TEMP
0039                           17,2602  0 0006 1          EXTEND
0040   REF  28  LAST 1016      17,2603  7 4764 1          MP     BIT5
0041   REF  35  LAST 1038      17,2604  7 6214 1          MASK   THREE
0042   REF   2  LAST  112      17,2605  55'516 0          TS     ZNDX          Z-TRANSLATION INDEX

0043   REF  64  LAST  979      17,2606  3 1465 1          CA     DAPDATR1      SET ATTKALMN TO PICK UP FILTER GAINS FOR
00432  REF  50  LAST 1024      17,2607  7 4753 0          MASK   BIT14         TRANSLATIONS.
00434                          17,2610  0 0006 1          EXTEND                CHECK DAPDATR1 BIT 14 FOR LEM ATTACHED.
00436  REF   1                 17,2611  1 2614 1          BZF    NOLEM
```

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```
 0438  REF  36  LAST 1038   17,2612  4 6214 1          CS     THREE      IF LEM IS ON, SET ATTKALMN = -3
 0440                       17,2613  1 2615 0          TCF    +2
 0442  REF  40  LAST 1029   17,2614  4 4767 1  NOLEM   CS     TWO        IF LEM IS OFF, SET ATTKALMN = -2.
 0444  REF  10  LAST 1021   17,2615  55'617 1          TS     ATTKALMN
 0445  REF   4  LAST  721   17,2616  11'631 0          CCS    XTRANS     (+, -1, 0)
 0446  REF   4  LAST 1038   17,2617  55'513 0          TS     XNDX1      USING BD-X  ZERO XNDX1
 0447  REF   1             17,2620  1 2631 0          TCF    PWORD
 0448  REF   3  LAST 1038   17,2621  55'514 1          TS     XNDX2      USING AC-X  ZERO XNDX2
 0449  REF   2  LAST 1039   17,2622  1 2631 0          TCF    PWORD
 0450                       17,2623   07700 1  XLNMASK OCT    7700

 0451                       17,2624   37772 1  DELTATT3 DEC   16378      = 60 MS
 0452  REF   5  LAST 1001     7663             DELATT20 =     OCT37776   = 20 MS
 0453  REF   5  LAST 1039   17,2625  55'513 0  NOXLNCMD TS    XNDX1      ZERO ALL REQUESTS FOR TRANSLATION
 0454  REF   4  LAST 1039   17,2626  55'514 1          TS     XNDX2
 0455  REF   4  LAST 1038   17,2627  55'515 0          TS     YNDX
 0456  REF   3  LAST 1038   17,2630  55'516 0          TS     ZNDX

R0057  PITCH COMMANDS  TIMING(NO X-TRANS, NO QUAD FAILS) 32MCT

 0458  REF   3  LAST 1024   17,2631  11'562 0  PWORD   CCS    TAU1       CHECK FOR PITCH COMMANDS
 0459  REF 100  LAST 1024   17,2632  3 4770 0          CAF    ONE
 0460                       17,2633  1 2635 1          TCF    +2          0 = NO PITCH
 0461  REF  41  LAST 1039   17,2634  3 4767 0          CAF    TWO        +1 =  + PITCH
 0462  REF   2  LAST  112   17,2635  55'520 0          TS     PINDEX     +2 =  - PITCH

 0463  REF   5  LAST  722   17,2636  11'626 0          CCS    RACFAIL    FLAG FOR REAL AC QUAD FAILURES
 0464  REF   1             17,2637  1 2643 0          TCF    AFAILP
 0465  REF   1             17,2640  1 2653 1          TCF    TABPCOM    0 = NO REAL AC FAILURES
 0466  REF   1             17,2641  1 2645 0          TCF    CFAILP     + = A QUAD FAILED
 0467  REF   2  LAST 1039   17,2642  1 2653 1          TCF    TABPCOM    - = C QUAD FAILED
A0468                                                                   IF FAILURES ARE PRESENT IGNORE
A0469                                                                   X-TRANSLATIONS ON THIS AXIS

 0470  REF   5  LAST 1004   17,2643  3 4322 0  AFAILP  CAF    NINE       IF FAILURE IS PRESENT IJET OPERATION
 0471  REF   3  LAST 1039   17,2644  1 2655 1          TCF    TABPCOM +2 IS ASSUMED. IGNORE X-TRANSLATION
 0472  REF   3  LAST  878   17,2645  3 5775 1  CFAILP  CAF    TWELVE
 0473  REF   4  LAST 1039   17,2646  1 2655 1          TCF    TABPCOM +2

 0474                       17,2647   00000 1  XLNNDX  DEC    0          INDECES FOR TRANSLATION COMMANDS
 0475                       17,2650   00003 1           DEC    3          FOR USE IN TABLE LOOK UP
 0476                       17,2651   00006 1           DEC    6
 0477                       17,2652   00000 1           DEC    0

 0478  REF   3  LAST  755      5775             TWELVE  =      CCI14
R0079  TABLE LOCK UP FOR PITCH COMMANDS WITH AND WITHOUT X-TRANSLATION AND AC QUAD FAILURES PRESENT.
R0081  BITS 9, 10 CONTAIN THE NUMBER OF PITCH JETS USED TO PERFORM THE PITCH ROTATION

 0483  REF   6  LAST 1039   17,2653  51'513 1  TABPCOM  INDEX  XNDX1
```

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```
0084   REF    1                 17,2654  3 2647 0          CA      XLNNDX
0085  *REF    3  LAST 1039      17,2655  6 1520 1    +2    AD      PINDEX
0086   REF  226  LAST 1031      17,2656  50 000 1          INDEX   A
0087   REF    1                 17,2657  3 2703 1          CA      PYTABLE
0088   REF    1                 17,2660  7 2722 0          MASK    PJETS      =1417 OCT
0089   REF    2  LAST  107      17,2661  55'452 1          TS      PWORD1
0090                            17,2662  0 0006 1          EXTEND
0091   REF   29  LAST 1038      17,2663  7 4762 1          MP      BIT7
0092   REF    2  LAST  112      17,2664  55'523 0          TS      NPJETS     = NO. OF PITCH JETS

R0093  YAW JET COMMANDS  TIMING(NO X-TRANS, NO QUAD FAILURES)  32MCT

0094   REF    3  LAST 1024      17,2665  11'563 1  YWORD   CCS     TAU2       CHECK FOR YAW COMMANDS
0095   REF  101  LAST 1039      17,2666  3 4770 0          CAF     ONE
0096                            17,2667  1 2671 1          TCF     +2
0097   REF   42  LAST 1039      17,2670  3 4767 0          CAF     TWO
0098   REF    2  LAST  112      17,2671  55'521 1          TS      YINDEX     YAW ROTATION INDEX

0099   REF    5  LAST  722      17,2672  11'627 1          CCS     RBDFAIL    FLAG FOR B OR D QUAD FAILURES
0100   REF    1                 17,2673  1 2677 1          TCF     BFAILY     0  = NO BD FAILURE
0101   REF    1                 17,2674  1 2724 0          TCF     TABYCOM    +  = B QUAD FAILED
0102   REF    1                 17,2675  1 2701 1          TCF     DFAILY     -  = D QUAD FAILED
0103   REF    2  LAST 1040      17,2676  1 2724 0          TCF     TABYCOM

0104   REF    6  LAST 1039      17,2677  3 4322 0  BFAILY  CAF     NINE
0105   REF    3  LAST 1040      17,2700  1 2726 1          TCF     TABYCOM +2
0106   REF    4  LAST 1039      17,2701  3 5775 1  DFAILY  CAF     TWELVE
0107   REF    4  LAST 1040      17,2702  1 2726 1          TCF     TABYCOM +2
```

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```
P0108   TABLE FOR PITCH(YAW) COMMANDS
R0109   BITS 4,3,2,1 = PITCH, X-TRANSLATION JETS SELECTED
R0110   BITS     10,9 = NO. PITCH JETS USED TO PERFORM ROTATION
R0111   BITS 8,7,6,5 = YAW, X-TRANSLATION JETS SELECTED
R0112   BITS 12,11 : NO. YAW JETS USED TO PERFORM ROTATION

AC113                                                          ROT  TRANS  QUAD  BIAS
 0114                  17,2703  00000 1  PYTABLE  OCT  0        0     0            0
 0115                  17,2704  05125 1           OCT  5125     +     0            0
 0116                  17,2705  05252 1           OCT  5252     -     0            0
 0117                  17,2706  00231 1           OCT  0231     0     +            3
 0118                  17,2707  02421 1           OCT  2421     +     +            3
 0119                  17,2710  02610 1           OCT  2610     -     +            3
 0120                  17,2711  00146 1           OCT  0146     0     -            6
 0121                  17,2712  02504 1           OCT  2504     +     -            6
 0122                  17,2713  02442 1           OCT  2442     -     -            6
 0123                  17,2714  00000 1           OCT  0        0           A(B)  9
 0124                  17,2715  02421 1           OCT  2421     +           A(B)  9
 0125                  17,2716  02442 1           OCT  2442     -           A(B)  9
 0126                  17,2717  00000 1           OCT  0        0           C(D)  12
 0127                  17,2720  02504 1           OCT  2504     +           C(D)  12
 0128                  17,2721  02610 1           OCT  2610     -           C(D)  12

R0129   MASKS FOR PITCH AND YAW COMMANDS

 0130                  17,2722  01417 1  PJETS    OCT  1417
 0131                  17,2723  06360 1  YJETS    OCT  6360

R0132   TABLE LOOK UP FOR YAW COMMANDS WITH AND WITHOUT X-TRANSLATION AND AC QUAD FAILURES PRESENT
R0134   BITS 11, 12 CONTAIN THE NUMBER OF YAW JETS USED TO PERFORM THE YAW ROTATION

 0136   REF   5  LAST 1039   17,2724  51'514 0  TABYCOM  INDEX  XNDX2
 0137   REF   2  LAST 1040   17,2725  3 2647 0            CA     XLNNDX
 0138  *REF   3  LAST 1040   17,2726  6 1521 0  +2        AD     YINDEX
 0139   REF 227  LAST 1040   17,2727  50 000 1            INDEX  A
 0140   REF   2  LAST 1040   17,2730  3 2703 1            CA     PYTABLE
 0141   REF   1              17,2731  7 2723 1            MASK   YJETS      = 6360 OCT
 0142   REF   2  LAST  107   17,2732  55'454 1            TS     YWORDI
 0143                        17,2733  0 0006 1            EXTEND
 0144   REF  29  LAST 1038   17,2734  7 4764 1            MP     BIT5
 0145   REF   1              17,2735  55'524 1            TS     NYJETS     NO. OF YAW JETS USED TO PERFORM ROTATION
```

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P0146 ROLL COMMANDS TIMING(NO Y,Z TRANS, NO QUAD FAILS) 45MCT

```
0147   REF   4  LAST 1034   17,2736  11'561 0  RWORD    CCS    TAU       CHECK FOR ROLL COMMANDS
0148   REF 102  LAST 1040   17,2737  3 4770 0           CAF    ONE
0149                       17,2740  1 2742 0           TCF    +2
0150   REF  43  LAST 1040   17,2741  3 4767 0           CAF    TWO
0151   REF   2  LAST  112   17,2742  55'517 1           TS     RINDEX

0152   REF   3  LAST  721   17,2743  11'630 1           CCS    ACORBD    FLAG FOR AC OR BD QUAD SELECTION FOR
0153   REF   1               17,2744  1 3035 0           TCF    BDROLL    ROLL COMMANDS
0154   REF   2  LAST 1042   17,2745  1 3035 0           TCF    BDROLL    +, +0 = BD ROLL
0155                       17,2746  1 2747 0           TCF    +1        -, -0 = AC ROLL

0156   REF   6  LAST 1039   17,2747  11'626 0  ACROLL   CCS    RACFAIL   CHECK FOR REAL FAILURES
0157   REF   1               17,2750  1 2754 1           TCF    RAFAIL    ON AC QUADS
0158   REF   1               17,2751  1 2764 1           TCF    RXLNS
0159   REF   1               17,2752  1 2756 0           TCF    RCFAIL
0160   REF   2  LAST 1042   17,2753  1 2764 1           TCF    RXLNS

0161   REF   7  LAST 1040   17,2754  3 4322 0  RAFAIL   CAF    NINE      QUAD FAILURE  WILL GET
0162   REF   1               17,2755  1 2766 0           TCF    TABRCOM   1-JET OPERATION
0163   REF   5  LAST 1040   17,2756  3 5775 1  RCFAIL   CAF    TWELVE
0164   REF   2  LAST 1042   17,2757  1 2766 0           TCF    TABRCOM

0165                       17,2760  00000 1   XLNINDX  DEC    0
0166                       17,2761  00001 0            DEC    1         INDECES FOR TRANSLATION
0167                       17,2762  00002 0            DEC    2
0168                       17,2763  00000 1            DEC    0
```

R0169 TABLE LOOK UP FOR AC-ROLL COMMANDS WITH AND WITHOUT Y-TRANSLATION AND ACQUAD FAILURES PRESENT
R0171 BITS 9,10,11 CONTAIN THE MAGNITUDE AND DIRECTION OF THE ROLL

```
0172   REF   5  LAST 1039   17,2764  51'515 1  RXLNS    INDEX  YNDX      NO AC QUAD FAILURES
0173   REF   3  LAST 1041   17,2765  3 2647 0           CA     XLNNDX    INCLUDE +,-,0, Y-TRANSLATION
0174   REF   3  LAST 1042   17,2766  6 1517 0  TABRCOM  AD     RINDEX
0175   REF 228  LAST 1041   17,2767  50 000 1           INDEX  A
0176   REF   1               17,2770  3 3117 0           CA     RTABLE
0177   REF   1               17,2771  7 3136 1           MASK   ACRJETS   = 3760 OCT
0178   REF   3  LAST 1014   17,2772  55'450 0           TS     RWORD1
```

R0179 CHECK FOR Z-TRANSLATIONS ON BD

```
0180   REF   4  LAST 1039   17,2773  3 1516 1  BDZCHECK CA     ZNDX
0181                       17,2774  0 0006 1           EXTEND
0182   REF   1               17,2775  6 3027 1           BZMF   NOBDZ     NO Z-TRANSLATION
```

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```
P0183           TABLE LOOK UP FOR BD Z-TRANSLATION WITH AND WITHOUT REAL BD QUAD FAILURES.  Z-TRANSLATION WILL BE POSS-
R0185   IBLE AS LONG AS ROLL COMMANDS CAN BE SATISFIED WITH THE AC ROLL JETS.   CRITERION.. IF THE RESULTANT NET ROLL
R0187   COMMANDS = 0 (WITH Z-TRANSLATION) AND IF TAU = 0, THEN INCLUDE THE BD Z-TRANSLATION COMMANDS. IF THE RESULTANT
R0189   ROLL COMMAND = 0, AND IF TAU NZ, THEN IGNORE THE BD Z-TRANSLATION

 0190   REF   6  LAST 1040   17,2776  11'627 1          CCS     RBDFAIL
 0191   REF  37  LAST 1039   17,2777  3 6214 0          CAF     THREE
 0192                        17,3000  1 3002 1          TCF     +2
 0193   REF  25  LAST 1009   17,3001  3 6211 0          CAF     SIX
 0194   REF   5  LAST 1042   17,3002  51'516 1          INDEX   ZNDX
 0195   REF   1              17,3003  6 2760 1          AD      XLN1NDX
 0196   REF 229  LAST 1042   17,3004  50 000 1          INDEX   A
 0197   REF   1              17,3005  3 3140 1          CA      YZTABLE
 0198   REF   1              17,3006  7 3151 0          MASK    BDZJETS     = 3417 OCT
 0199   REF   4  LAST 1042   17,3007  6 1450 1          AD      RWORD1      ADD TO ROLL COMMANDS
 0200   REF  33  LAST 1038   17,3010  55'502 0          TS      T5TEMP      IF POSSIBLE.  MUST CHECK TAU FIRST

 0201                        17,3011  0 0006 1          EXTEND
 0202   REF  30  LAST 1040   17,3012  7 4762 1          MP      BIT7        DETERMINE THE NET ROLL COMMAND WITH
 0203   REF   1              17,3013  6 6061 0          AD      =-4         Z-TRANSLATION ADDED ON
 0204   REF   2  LAST  112   17,3014  55'522 1          TS      NRJETS      NET NO. OF +,- ROLL JETS ON
 0205                        17,3015  0 0006 1          EXTEND
 0206   REF   1              17,3016  1 3022 0          BZF     TAUCHECK

 0207   REF  34  LAST 1043   17,3017  3 1502 1  ACRBDZ  CA      T5TEMP      Z-TRANSLATION ACCEPTED EVEN THO WE MAY
 0208   REF   5  LAST 1043   17,3020  55'450 0          TS      RWORD1      HAVE INTRODUCED AN UNDESIREABLE ROLL
 0209   REF   1              17,3021  1 3263 1          TCF     ROLLTIME    BRANCH TO JET ON-TIME CALCULATIONS

 0210   REF   5  LAST 1042   17,3022  11'561 0  TAUCHECK CCS     TAU
 0211   REF   2  LAST 1042   17,3023  1 3027 0          TCF     NOBDZ
 0212   REF   1              17,3024  1 3017 0          TCF     ACRBDZ
 0213   REF   3  LAST 1043   17,3025  1 3027 0          TCF     NOBDZ
 0214   REF   2  LAST 1043   17,3026  1 3017 0          TCF     ACRBDZ

 0215   REF   6  LAST 1043   17,3027  3 1450 1  NOBDZ   CA      RWORD1      Z-TRANSLATION NOT ACCEPTED
 0216                        17,3030  0 0006 1          EXTEND
 0217   REF  31  LAST 1043   17,3031  7 4762 1          MP      BIT7
 0218   REF   1              17,3032  6 7701 0          AD      =-2
 0219   REF   3  LAST 1043   17,3033  55'522 1          TS      NRJETS
 0220   REF   2  LAST 1043   17,3034  1 3263 1          TCF     ROLLTIME    BRANCH TO JET ON-TIME CALCULATION
```

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P0221 BD QUAD SELECTION FOR ROLL COMMANDS

```
0222  REF   7  LAST 1043   17,3035  11'627 1  BDROLL   CCS     RBDFAIL
0223  REF   1              17,3036  1 3042 0           TCF     RBFAIL
0224  REF   1              17,3037  1 3046 1           TCF     RZXLNS
0225  REF   1              17,3040  1 3044 0           TCF     RDFAIL
0226  REF   2  LAST 1044   17,3041  1 3046 1           TCF     RZXLNS
0227  REF   8  LAST 1042   17,3042  3 4322 0  RBFAIL   CAF     NINE
0228  REF   1              17,3043  1 3050 0           TCF     TABRZCMD
0229  REF   6  LAST 1042   17,3044  3 5775 1  RDFAIL   CAF     TWELVE
0230  REF   2  LAST 1044   17,3045  1 3050 0           TCF     TABRZCMD

0231  REF   6  LAST 1043   17,3046  51'516 1  RZXLNS   INDEX   ZNDX      NO BD FAILURES
0232  REF   4  LAST 1042   17,3047  3 2647 0           CA      XLNNDX    +,-,0 Z-TRANSLATION PRESENT
0233  REF   4  LAST 1042   17,3050  6 1517 0  TABRZCMD AD      RINDEX
0234  REF 230  LAST 1043   17,3051  50 000 1           INDEX   A
0235  REF   2  LAST 1042   17,3052  3 3117 0           CA      RTABLE
0236  REF   1              17,3053  7 3137 0           MASK    BDRJETS   = 34017 OCT
0237  REF   7  LAST 1043   17,3054  55'450 0           TS      RWORD1

0238  REF   6  LAST 1042   17,3055  3 1515 1  ACYCHECK CA      YNDX      ANY Y-TRANSLATION
0239                       17,3056  0 0006 1           EXTEND
0240  REF   1              17,3057  1 3111 1           BZF     NOACY     NO Y-TRANSLATION
0241  REF   7  LAST 1042   17,3060  11'626 0           CCS     RACFAIL
0242  REF  38  LAST 1043   17,3061  3 6214 0           CAF     THREE
0243                       17,3062  1 3064 1           TCF     +2
0244  REF  26  LAST 1043   17,3063  3 6211 0           CAF     SIX
0245  REF   7  LAST 1044   17,3064  51'515 1           INDEX   YNDX
0246  REF   2  LAST 1043   17,3065  6 2760 1           AD      XLN1NDX
0247  REF 231  LAST 1044   17,3066  50 000 1           INDEX   A
0248  REF   2  LAST 1043   17,3067  3 3140 1           CA      YZTABLE
0249  REF   1              17,3070  7 3152 0           MASK    ACYJETS   = 34360 OCT
0250  REF   8  LAST 1044   17,3071  6 1450 1           AD      RWORD1
0251  REF  35  LAST 1043   17,3072  55'502 0           TS      TSTEMP
0252                       17,3073  0 0006 1           EXTEND    FOR EXPLANATION SEE CODING ON RTABLE
0253  REF  32  LAST 1021   17,3074  7 4765 0           MP      BIT4
0254  REF   2  LAST 1043   17,3075  6 6061 0           AD      =-4
0255  REF   4  LAST 1043   17,3076  55'522 1           TS      NRJETS    NO. OF NET ROLL JETS
0256                       17,3077  0 0006 1           EXTEND
0257  REF   1              17,3100  1 3104 0           BZF     TAUCHCK   IF NRJETS = 0

0258  REF  36  LAST 1044   17,3101  3 1502 1  BDRACZ   CA      TSTEMP    Y-TRANSLATION ACCEPTED
0259  REF   9  LAST 1044   17,3102  55'450 0           TS      RWORD1
0260  REF   3  LAST 1043   17,3103  1 3263 1           TCF     ROLLTIME  BRANCH TO JET ON-TIME CALCULATIONS

0261  REF   6  LAST 1043   17,3104  11'561 0  TAUCHCK  CCS     TAU
0262  REF   2  LAST 1044   17,3105  1 3111 1           TCF     NOACY
0263  REF   1              17,3106  1 3101 0           TCF     BDRACZ
0264  REF   3  LAST 1044   17,3107  1 3111 1           TCF     NOACY
0265  REF   2  LAST 1044   17,3110  1 3101 0           TCF     BDRACZ
```

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```
0266   REF  10  LAST 1044   17,3111  3 1450 1  NOACY   CA      RWORD1        Y-TRANSLATION NOT ACCEPTED
0267                        17,3112  0 0006 1          EXTEND
0268   REF  33  LAST 1044   17,3113  7 4765 0          MP      BIT4
0269   REF   2  LAST 1043   17,3114  6 7701 0          AD      =-2
0270   REF   5  LAST 1044   17,3115  55'522 1          TS      NRJETS
0271   REF   4  LAST 1044   17,3116  1 3263 1          TCF     ROLLTIME
```

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R0272 TABLE FOR ROLL, Y AND Z-TRANSLATION COMMANDS

R0273 EITHER AC OR BD ROLL MAY BE SELECTED. IF AC ROLL IS SELECTED, Y-TRANSLATIONS MAY BE SATISFIED SIMULTANEOUSLY
R0275 PROVIDED THAT THERE ARE NO AC QUAD FAILURES. IF THERE ARE AC FAILURES, Y-TRANSLATION COMMANDS WILL BE IGNORED,
R0277 IN WHICH CASE THE ASTRONAUT SHOULD SWITCH TO BD ROLL.
R0278 IF BDROLL IS SELECTED, Z-TRANSLATIONS MAY BE SATISFIED SIMULTANEOUSLY PROVIDED THAT THERE ARE NO BD QUAD
R0280 FAILURES. IF THERE ARE BD FAILURES, Z-TRANSLATION COMMANDS WILL BE IGNORED, IN WHICH CASE THE ASTRONAUT SHOULD
R0282 SWITCH TO AC ROLL.
R0283 NOTE THAT IF ONE QUAD FAILS (E.G. B FAILED), Z-TRANSLATION IS STILL POSSIBLE AND THAT THE UNDESIREABLE ROLL
R0285 INTRODUCED BY THIS TRANSLATION WILL BE COMPENSATED BY THE TWO AC ROLL JETS ACTUATED BY THE AUTOPILOT LOGIC.

R0287 WORD MAKE UP....RTABLE

R0288 TWO WORDS, CORRESPONDING TO AC OR BD ROLL SELECTION, HAVE BEEN COMBINED INTO ONE TABLE. THE WORD CORRESPOND-
R0290 ING TO AC ROLL HAS THE FOLLOWING INTERPRETATION..
R0291 BITS 9,10,11 ARE CODED TO GIVE THE NET ROLL TORQUE FOR THE WORD SELECTED. THE CODING IS..
R0293 BIT NO. 11 10 9 NO. OF ROLL JETS

R0294 0 0 0 -2
R0295 0 0 1 -1
R0296 0 1 0 0
R0297 0 1 1 +1
R0298 1 0 0 +2

R0299 THIS WORD MAY THEN BE ADDED TO THE WORD SELECTED FROM THE YZ-TRANSLATION TABLE, WHICH HAS THE SAME TYPE OF
R0301 CODING AS ABOVE, AND THE NET ROLL DETERMINED BY SHIFTING THE RESULTANT WORD RIGHT 8 PLACES AND SUBTRACTING FOUR.

R0303 THE WORD CORRESPONDING TO BD ROLL HAS A SIMILIAR INTERPRETATION, EXCEPT THAT BITS 12, 13, 14 ARE CODED
R0305 (AS ABOVE) TO GIVE THE NET ROLL TORQUE.

A0306						ROLL	TRANS	QUADFAIL	BIAS
0307	17,3117	11000 1	RTABLE	OCT	11000	0			0
0308	17,3120	22125 1		OCT	22125	+			0
0309	17,3121	00252 1		OCT	00252	-			0
0310	17,3122	11231 1		OCT	11231	0	+Y(+Z)		3
0311	17,3123	15421 1		OCT	15421	+	+Y(+Z)		3
0312	17,3124	04610 1		OCT	04610	-	+Y(+Z)		3
0313	17,3125	11146 1		OCT	11146	0	-Y(-Z)		6
0314	17,3126	15504 1		OCT	15504	+	-Y(-Z)		6
0315	17,3127	04442 1		OCT	04442	-	-Y(-Z)		6
0316	17,3130	11000 1		OCT	11000	0		A(B)	9
0317	17,3131	15504 1		OCT	15504	+		A(B)	9
0318	17,3132	04610 1		OCT	04610	-		A(B)	9
0319	17,3133	11000 1		OCT	11000	0		C(D)	12
0320	17,3134	15421 1		OCT	15421	+		C(D)	12
0321	17,3135	04442 1		OCT	04442	-		C(D)	12

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```
R0322           RTABLE MASKS -

0323                        17,3136   03760 0   ACRJETS   OCT    03760
0324                        17,3137   34017 0   EDRJETS   OCT    34017
```

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R0325 Y, Z TRANSLATION TABLE

R0326 ONCE AC OR BD ROLL IS SELECTED THE QUAD PAIR WHICH IS NOT BEING USED TO SATISFY THE ROLL COMMANDS MAY BE
R0328 USED TO SATISFY THE REMAINING TRANSLATION COMMANDS. HOWEVER, WE MUST MAKE SURE THAT ROLL COMMANDS ARE SATISFIED
R0330 WHEN THEY OCCUR. THEREFORE, THE Y-Z TRANSLATIONS FROM THIS TABLE WILL BE IGNORED IF THE NET ROLL TORQUE OF THE
R0332 COMBINED WORD IS ZERO AND THE ROLL COMMANDS ARE NON-ZERO. THIS SITUATION WOULD OCCUR, FOR EXAMPLE, IF WE EN-
R0334 COUNTER SIMULTANEOUS +R +Y -Z COMMANDS AND A QUAD D FAILURE WHILE USING AC FOR ROLL.
R0336 TO FACILITATE THE LOGIC, THE Y-Z TRANSLATION TABLE HAS BEEN CODED IN A MANNER SIMILIAR TO THE ROLL TABLE
R0338 ABOVE.
R0339 BITS 9,10,11 ARE CODED TO GIVE THE NET ROLL TORQUE INCURRED BY Z-TRANSLATIONS. THE WORD SELECTED CAN THEN BE
R0341 ADDED TO THE AC-ROLL WORD AND THE RESULTANT ROLL TORQUE DETERMINED FROM THE COMBINED WORD. SIMILIARLY BITS
R0343 12,13,14 ARE CODED TO GIVE THE NET ROLL TORQUE INCURRED BY Y-TRANSLATIONS WHEN BD-ROLL IS SELECTED.

							TRANSLATION	QUADFAIL	BIAS
A0345									
0346		17,3140	11000 1	YZTABLE	OCT	11000	0		0
0347		17,3141	11231 1		OCT	11231	+Z(+Y)		
0348		17,3142	11146 1		OCT	11146	-Z(-Y)		0
0349		17,3143	11000 1		OCT	11000	0	B(A)	3
0350		17,3144	04610 1		OCT	04610	+Z(+Y)	B(A)	3
0351		17,3145	15504 1		OCT	15504	-Z(-Y)	B(A)	3
0352		17,3146	11000 1		OCT	11000	0	D(C)	6
0353		17,3147	15421 1		OCT	15421	+Z(+Y)	D(C)	6
0354		17,3150	04442 1		OCT	04442	-Z(-Y)	D(C)	6

R0355 YZ-TABLE MASKS-

0356	17,3151	03417 0	BDZJETS	OCT	03417	
0357	17,3152	34360 0	ACYJETS	OCT	34360	

R0358 ADDITIONAL CONSTANTS

0359	REF	8	LAST	957	7701	=-2	=	NEG2	
0360	REF	1			6061	=-4	=	NEG4	

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PC361 CALCULATION OF JET ON-TIMES

RC362 THE ROTATION COMMANDS (TAU:S), WHICH WERE DETERMINED FROM THE JET SWITCHING LOGIC ON THE BASIS OF SINGLE JET
RC364 OPERATION, MUST NOW BE UPDATED BY THE ACTUAL NUMBER OF JETS TO BE USED IN SATISFYING THESE COMMANDS TAU MUST
RC366 ALSO BE DECREMENTED ACCORDING TO THE EXPECTED TORQUE GENERATED BY THE NEW COMMANDS ACTING OVER THE NEXT T5 INT-
RC368 ERVAL.
RC369 IN ORDER TO MAINTAIN ACCURATE KNOWLEDGE OF VEHICLE ANGULAR RATES, WE MUST ALSO PROVIDE EXPECTED FIRING TIMES
RC371 (DFT:S, ALSO IN TERMS OF 1-JET OPERATION) FOR THE RATE FILTER.
RC372 NOTE THAT TRANSLATIONS CAN PRODUCE ROTATIONS EVEN THOUGH NO ROTATIONS WERE CALLED FOR. NEVERTHELESS, WE MUST
RC374 UPDATE DFT.
RC375 WHEN THE ROTATIONS HAVE FINISHED, WE MUST PROVIDE CHANNEL INFORMATION TO THE T6 PROGRAM TO CONTINUE ON WITH
RC377 THE TRANSLATIONS. THIS WILL BE DONE IN THE NEXT SECTION. HOWEVER, TO INSURE THAT JETS ARE NOT FIRED FOR LESS
RC379 THAN A MINIMUM IMPULSE (14MS), ALL JET CHANNEL COMMANDS WILL BE HELD FIXED FROM THE START OF THE T5 PROGRAM FOR
RC381 ATLEAST 14MS UNTIL THE INITIALIZATION OF NEW COMMANDS. MOREOVER, A 14MS ON-TIME WILL BE ADDED TO ANY ROTATIONAL
RC383 COMMANDS GENERATED BY THE MANUAL CONTROLS OR THE JET SWITCHING LOGIC, AND ALL TRANSLATION COMMANDS WILL BE
RC385 ACTIVE FOR ATLEAST ONE CYCLE OF THE T5 PROGRAM (.1SEC)

RC386 PITCH JET ON-TIME CALCULATION

```
 0387  REF  4  LAST 1039   17,3153  11'562 0  PITCHTIM CCS   TAU1
 0388  REF  1              17,3154  1 3163 1            TCF   PTAUPOS
 0389                      17,3155  1 3157 0            TCF   +2
 0390  REF  1              17,3156  1 3161 0            TCF   PTAUNEG
 0391  REF  2  LAST  112   17,3157  55'550 1            TS    DFT1          NO PITCH ROTATION
 0392  REF  1              17,3160  1 3361 1            TCF   PBYPASS       COMMANDS

 0393  REF  3  LAST 1040   17,3161  4 1523 0  PTAUNEG   CS    NPJETS
 0394  REF  4  LAST 1049   17,3162  55'523 0            TS    NPJETS
 0395  REF  5  LAST 1049   17,3163  3 1562 1  PTAUPOS   CA    TAU1
 0396                      17,3164  0 0006 1            EXTEND
 0397  REF  5  LAST 1049   17,3165  5 1523 1            INDEX NPJETS
 0398  REF  1              17,3166  7 3342 0            MP    NJET
 0399  REF  3  LAST 1014   17,3167  55'460 0            TS    BLAST1
 0400  REF  1              17,3170  6 3275 1            AD    =-.1SEC
 0401                      17,3171  0 0006 1            EXTEND
 0402  REF  1              17,3172  6 3203 0            BZMF  AD14MSP
 0403  REF  6  LAST 1049   17,3173  51'523 1            INDEX NPJETS
 0404  REF  1              17,3174  3 3276 1            CA    DFTMAX        THE PITCH ON-TIME IS GREATER THAN .1 SEC
 0405  REF  3  LAST 1049   17,3175  55'550 1            TS    DFT1
 0406                      17,3176  4 0000 0            COM
 0407  REF  6  LAST 1049   17,3177  27'562 0            ADS   TAU1          UPDATE TAU1
 0408  REF  1              17,3200  3 3277 0            CAF   =+.1SEC       LIMIT THE LENGTH OF PITCH ROTATION
 0409  REF  4  LAST 1049   17,3201  55'460 0            TS    BLAST1        COMMANDS TO .1 SEC SO THAT ONLY
 0410  REF  1              17,3202  1 3346 1            TCF   ASMBLWP       X-TRANSLATIONS WILL CONTINUE ON SWITCH
A0411                                                                       OVER TO TVC
 0412  REF  5  LAST 1049   17,3203  4 1460 0  AD14MSP   CS    BLAST1        SEE IF JET ON TIME LESS THAN
 0413  REF  2  LAST 1038   17,3204  6 3302 0            AD    =14MS         MINIMUM IMPULSE TIME
 0414                      17,3205  0 0006 1            EXTEND
 0415  REF  1              17,3206  6 3211 0            BZMF  PBLASTOK      IF SO LIMIT MINIMUM ON TIME TO 14 MS
 0416  REF  3  LAST 1049   17,3207  3 3302 0            CAF   =14MS
```

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```
0417   REF   6  LAST 1049   17,3210  55'460 0            TS      BLAST1
0418   REF   7  LAST 1050   17,3211  3 1460 1  PBLASTOK  CA      BLAST1
0419                        17,3212  0 0006 1            EXTEND                 THE PITCH COMMANDS WILL BE COMPLETED
0420   REF   7  LAST 1049   17,3213  7 1523 0            MP      NPJETS         WITHIN THE TS-CYCLE TIME
0421   REF   4  LAST 1049   17,3214  23'550 0            LXCH    DFT1           FOR USE IN UPDATING RATE FILTER
0422   REF   7  LAST 1049   17,3215  55'562 0            TS      TAU1           ZERO TAU1 (ACC CONTAINS ZERO)
0423   REF   2  LAST 1049   17,3216  1 3346 1            TCF     ASMBLWP
```

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P0424 YAW JET ON-TIME CALCULATION

```
0425  REF  4  LAST 1040   17,3217  11'563 1  YAWTIME  CCS    TAU2
0426  REF  1              17,3220  1 3227 1           TCF    YTAUPOS
0427                      17,3221  1 3223 0           TCF    +2
0428  REF  1              17,3222  1 3225 0           TCF    YTAUNEG
0429  REF  2  LAST  112   17,3223  55'551 0           TS     DFT2        NO YAW ROTATION COMMANDS
0430  REF  1              17,3224  1 3525 1           TCF    YBYPASS

0431  REF  2  LAST 1041   17,3225  4 1524 1  YTAUNEG  CS     NYJETS
0432  REF  3  LAST 1051   17,3226  55'524 1           TS     NYJETS
0433  REF  5  LAST 1051   17,3227  3 1563 0  YTAUPOS  CA     TAU2
0434                      17,3230  0 0006 1           EXTEND
0435  REF  4  LAST 1051   17,3231  5 1524 0           INDEX  NYJETS
0436  REF  2  LAST 1049   17,3232  7 3342 0           MP     NJET
0437  REF  3  LAST 1014   17,3233  55'462 1           TS     BLAST2
0438  REF  2  LAST 1049   17,3234  6 3275 1           AD     =-.1SEC
0439                      17,3235  0 0006 1           EXTEND
0440  REF  1              17,3236  6 3247 0           BZMF   AD14MSY
0441  REF  5  LAST 1051   17,3237  51'524 0           INDEX  NYJETS
0442  REF  2  LAST 1049   17,3240  3 3276 1           CA     DFTMAX      YAW COMMANDS WILL LAST LONGER THAN .1SEC
0443  REF  3  LAST 1051   17,3241  55'551 0           TS     DFT2
0444                      17,3242  4 0000 0           COM
0445  REF  6  LAST 1051   17,3243  27'563 1           ADS    TAU2        DECREMENT TAU2
0446  REF  2  LAST 1049   17,3244  3 3277 0           CAF    =+.1SEC     LIMIT THE LENGTH OF YAW ROTATION COMMAND
0447  REF  4  LAST 1051   17,3245  55'462 1           TS     BLAST2      TO 0.1 SEC SO THAT ONLY X-TRANSLATION
0448  REF  1              17,3246  1 3512 0           TCF    ASMBLWY     WILL CONTINUE ON SWITCH OVER TO TVC

0449  REF  5  LAST 1051   17,3247  4 1462 1  AD14MSY  CS     BLAST2      SEE IF JET ON-TIME LESS THAN
0450  REF  4  LAST 1049   17,3250  6 3302 0           AD     =14MS       MINIMUM IMPULSE TIME
0451                      17,3251  0 0006 1           EXTEND
0452  REF  1              17,3252  6 3255 0           BZMF   YBLASTOK    IF SO, LIMIT MINIMUM ON-TIME TO 14 MS
0453  REF  5  LAST 1051   17,3253  3 3302 0           CAF    =14MS
0454  REF  6  LAST 1051   17,3254  55'462 1           TS     BLAST2
0455  REF  7  LAST 1051   17,3255  3 1462 0  YBLASTOK  CA     BLAST2      YAW COMMANDS WILL BE COMPLETED WITHIN
0456                      17,3256  0 0006 1           EXTEND              THE T5CYCLE TIME
0457  REF  6  LAST 1051   17,3257  7 1524 1           MP     NYJETS
0458  REF  4  LAST 1051   17,3260  23'551 1           LXCH   DFT2
0459  REF  7  LAST 1051   17,3261  55'563 1           TS     TAU2        ZERO TAU2
0460  REF  2  LAST 1051   17,3262  1 3512 0           TCF    ASMBLWY
```

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```
P0461                ROLL ON-TIME CALCULATION-

 0462   REF   7  LAST 1044   17,3263  11'561 0  ROLLTIME CCS     TAU
 0463   REF   1              17,3264  1 3303 0           TCF     RBLAST
 0464                        17,3265  1 3267 0           TCF     +2
 0465   REF   2  LAST 1052   17,3266  1 3303 0           TCF     RBLAST
 0466   REF   6  LAST 1045   17,3267  51'522 0           INDEX   NRJETS
 0467   REF   3  LAST 1051   17,3270  3 3276 1           CA      DFTMAX     UPDATE DFT EVEN THO NO ROLL COMMANDS ARE
 0468   REF   3  LAST 1004   17,3271  55'547 1           TS      DFT        PRESENT
 0469   REF   1              17,3272  1 3505 0           TCF     RBYPASS

 0470                        17,3273   77037 0           DEC     -480       = -.3SEC
 0471                        17,3274   77277 0           DEC     -320       = -.2SEC
 0472                        17,3275   77537 0  =-.1SEC  DEC     -160       = -.1SEC
 0473                        17,3276   00000 1  DFTMAX   DEC     0             0
 0474                        17,3277   00240 1  =+.1SEC  DEC     160        = +.1SEC
 0475                        17,3300   00500 1           DEC     320        = +.2SEC
 0476                        17,3301   00740 1           DEC     480        = +.3SEC
 0477                        17,3302   00027 1  =14MS    DEC     23         =14MS

 0478   REF   8  LAST 1052   17,3303  3 1561 1  RBLAST   CA      TAU
 0479                        17,3304  0 0006 1           EXTEND
 0480   REF   7  LAST 1052   17,3305  5 1522 0           INDEX   NRJETS
 0481   REF   3  LAST 1051   17,3306  7 3342 0           MP      NJET
 0482   REF   2  LAST  107   17,3307  55'456 0           TS      BLAST      BLAST IS AN INTERMEDIATE VARIABLE
AC483                                                                      USED IN DETERMINING THE JET ON-TIMES
 0484   REF   3  LAST 1051   17,3310  6 3275 1           AD      =-.1SEC
 0485                        17,3311  0 0006 1           EXTEND
 0486   REF   1              17,3312  6 3323 0           BZMF    AD14MSR
 0487   REF   8  LAST 1052   17,3313  51'522 0           INDEX   NRJETS     THE ROLL ROTATION WILL LAST LONGER
 0488   REF   4  LAST 1052   17,3314  3 3276 1           CA      DFTMAX     THAN THE T5 CYCLE TIME
 0489   REF   4  LAST 1052   17,3315  55'547 1           TS      DFT
 0490                        17,3316  4 0000 0           COM
 0491   REF   9  LAST 1052   17,3317  27'561 0           ADS     TAU
 0492   REF   3  LAST 1051   17,3320  3 3277 0           CAF     =+.1SEC    LIMIT THE LENGTH OF ROLL ROTATION
 0493   REF   3  LAST 1052   17,3321  55'456 0           TS      BLAST      COMMANDS TO 0.1 SEC SO THAT ONLY Y-Z
 0494   REF   1              17,3322  1 3366 0           TCF     ASMBLWR    TRANSLATION COMMANDS CONTINUE

 0495   REF   4  LAST 1052   17,3323  4 1456 0  AD14MSR  CS      BLAST      SEE IF THE JET ON-TIME LESS THAN
 0496   REF   6  LAST 1051   17,3324  6 3302 0           AD      =14MS      MINIMUM IMPULSE TIME
 0497                        17,3325  0 0006 1           EXTEND
 0498   REF   1              17,3326  6 3331 0           BZMF    RBLASTOK
 0499   REF   7  LAST 1052   17,3327  3 3302 0           CAF     =14MS      IF SO, LIMIT MINIMUM ON-TIME TO 14 MS
 0500   REF   5  LAST 1052   17,3330  55'456 0           TS      BLAST
 0501   REF   6  LAST 1052   17,3331  3 1456 1  RBLASTOK CA      BLAST
 0502                        17,3332  0 0006 1           EXTEND
 0503   REF   9  LAST 1052   17,3333  7 1522 1           MP      NRJETS
 0504   REF   5  LAST 1052   17,3334  23'547 0           LXCH    DFT
 0505   REF  10  LAST 1052   17,3335  55'561 0           TS      TAU        ZERO TAU
 0506   REF   2  LAST 1052   17,3336  1 3366 0           TCF     ASMBLWR
```

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```
0507                17,3337   65252 1          DEC    -.333333        = -1/3
0508                17,3340   57777 1          DEC    -.500000        = -1/2
0509                17,3341   40000 0          DEC    -.999999        = -1 (NEGMAX)
0510                17,3342   00000 1  NJET    DEC    0
0511                17,3343   37777 1          DEC     .999999        = +1 (POSMAX)
0512                17,3344   20000 0          DEC     .500000        = +1/2
0513                17,3345   12525 0          DEC     .333333        = +1/3
```

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```
R0514      WHEN THE ROTATION COMMANDS ARE COMPLETED, IT IS NECESSARY TO REPLACE THESE COMMANDS BY NEW COMMANDS WHICH
R0516   CONTINUE ON WITH THE TRANSLATIONS IF ANY ARE PRESENT.
R0517      IN THIS SECTION THESE NEW COMMANDS ARE GENERATED AND STORED FOR REPLACEMENT OF THE CHANNEL COMMANDS WHEN THE
R0519   CORRESPONDING ROTATIONS ARE COMPLETED.

R0520   GENERATION OF THE SECOND PITCH(X-TRANS) WORD...PWORD2

 0521   REF   8  LAST 1044   17,3346  11'626 0  ASMBLWP  CCS     RACFAIL
 0522   REF   1              17,3347  1 3355 0           TCF     FPX2        IF FAILURE ON AC IGNORE X-TRANSLATION
 0523                        17,3350  1 3352 1           TCF     +2
 0524   REF   2  LAST 1054   17,3351  1 3355 0           TCF     FPX2
 0525   REF   7  LAST 1039   17,3352  51'513 1           INDEX   XNDX1
 0526   REF   5  LAST 1044   17,3353  3 2647 0           CA      XLNNDX
 0527   REF 232  LAST 1044   17,3354  50 000 1           INDEX   A
 0528   REF   3  LAST 1041   17,3355  3 2703 1  FPX2     CA      PYTABLE
 0529   REF   2  LAST 1040   17,3356  7 2722 0           MASK    PJETS
 0530   REF   2  LAST  107   17,3357  55'453 0           TS      PWORD2
 0531   REF   1              17,3360  1 3217 1           TCF     YAWTIME

 0532   REF   3  LAST 1040   17,3361  3 1452 0  PBYPASS  CA      PWORD1      THE T6 PROGRAM WILL LOAD PWORD2
 0533   REF   3  LAST 1054   17,3362  55'453 0           TS      PWORD2      UPON ENTRY
 0534   REF 182  LAST 1027   17,3363  3 4772 1           CAF     ZERO
 0535   REF   8  LAST 1050   17,3364  55'460 0           TS      BLAST1      THERE IS NO PWORD2
 0536   REF   2  LAST 1054   17,3365  1 3217 1           TCF     YAWTIME
```

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PC537 GENERATION OF THE SECOND ROLL (Y,Z) WORD (RWORD2)

```
0538   REF    8  LAST 1044   17,3366  11'515 0  ASMBLWR  CCS    YNDX      CHECK FOR Y-TRANS
0539   REF    1               17,3367  1 3377 0           TCF    ACBD2Y
0540   REF  183  LAST 1054   17,3370  3 4772 1  NO2Y     CAF    ZERO
0541  *REF    2  LAST  107   17,3371  55'451 1    +1     TS     RWORD2
0542   REF    7  LAST 1044   17,3372  11'516 0           CCS    ZNDX      CHECK FOR Z-TRANS
0543   REF    1               17,3373  1 3442 1           TCF    ACBD2Z
0544   REF  184  LAST 1055   17,3374  3 4772 1  NO2Z     CAF    ZERO
0545  *REF    3  LAST 1055   17,3375  27'451 1    +1     ADS    RWORD2
0546   REF    1               17,3376  1 3153 1           TCF    PITCHTIM  RWORD2 ASSEMBLED

0547   REF    4  LAST 1042   17,3377  11'630 1  ACBD2Y   CCS    ACORBD
0548   REF    1               17,3400  1 3415 0           TCF    AC2Y      CAN DO Y-TRANS
0549   REF    2  LAST 1055   17,3401  1 3415 0           TCF    AC2Y
0550                          17,3402  1 3403 1           TCF    +1        USING AC FOR ROLL
0551   REF    9  LAST 1054   17,3403  11'626 0           CCS    RACFAIL
0552   REF    1               17,3404  1 3370 1           TCF    NO2Y      USING AC AND AC HAS FAILED
0553                          17,3405  1 3407 0           TCF    +2
0554   REF    2  LAST 1055   17,3406  1 3370 1           TCF    NO2Y      DITTO

0555   REF    9  LAST 1055   17,3407  51'515 1           INDEX  YNDX      NO FAILURES, CAN DO Y
0556   REF    6  LAST 1054   17,3410  3 2647 0           CA     XLNNDX
0557   REF  233  LAST 1054   17,3411  50 000 1           INDEX  A
0558   REF    3  LAST 1044   17,3412  3 3117 0           CA     RTABLE
0559   REF    2  LAST 1042   17,3413  7 3136 1           MASK   ACRJETS
0560   REF    3  LAST 1055   17,3414  1 3371 0           TCF    NO2Y +1

0561   REF   10  LAST 1055   17,3415  11'626 0  AC2Y     CCS    RACFAIL
0562   REF   39  LAST 1044   17,3416  3 6214 0           CAF    THREE
0563                          17,3417  1 3421 1           TCF    +2
0564   REF   27  LAST 1044   17,3420  3 6211 0           CAF    SIX
0565   REF   10  LAST 1055   17,3421  51'515 1           INDEX  YNDX
0566   REF    3  LAST 1044   17,3422  6 2760 1           AD     XLNINDX
0567   REF  234  LAST 1055   17,3423  50 000 1           INDEX  A
0568   REF    3  LAST 1044   17,3424  3 3140 1           CA     YZTABLE
0569   REF    2  LAST 1044   17,3425  7 3152 0           MASK   ACYJETS
0570   REF    4  LAST 1055   17,3426  55'451 1           TS     RWORD2
0571                          17,3427  0 0006 1           EXTEND
0572   REF   34  LAST 1045   17,3430  7 4765 0           MP     BIT4
0573   REF    3  LAST 1045   17,3431  6 7701 0           AD     =-2
0574   REF   10  LAST 1052   17,3432  55'522 1           TS     NRJETS
0575   REF    7  LAST 1052   17,3433  4 1456 0           CS     BLAST
0576   REF    4  LAST 1052   17,3434  6 3277 0           AD     =+.1SEC
0577                          17,3435  0 0006 1           EXTEND
0578   REF   11  LAST 1055   17,3436  7 1522 1           MP     NRJETS
0579   REF   99  LAST 1024   17,3437  3 0001 0           CA     L
0580   REF    6  LAST 1052   17,3440  27'547 1           ADS    DFT
0581   REF    4  LAST 1055   17,3441  1 3372 0           TCF    NO2Y +2
```

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```
0582   REF   5  LAST 1055   17,3442  11'630 1  ACBD2Z   CCS    ACORBD
0583   REF   1               17,3443  1 3473 0          TCF    BDF2Z        USING BD-ROLL
0584   REF   2  LAST 1056    17,3444  1 3473 0          TCF    BDF2Z        MUST CHECK FOR BD FAILURES
0585                         17,3445  1 3446 0          TCF    +1
0586   REF   8  LAST 1044    17,3446  11'627 1          CCS    RBDFAIL      USING AC FOR ROLL, CAN DO Z-TRANS
0587   REF  40  LAST 1055    17,3447  3 6214 0          CAF    THREE
0588                         17,3450  1 3452 0          TCF    +2
0589   REF  28  LAST 1055    17,3451  3 6211 0          CAF    SIX
0590   REF   8  LAST 1055    17,3452  51'516 1          INDEX  ZNDX
0591   REF   4  LAST 1055    17,3453  6 2760 1          AD     XLNINDX
0592   REF 235  LAST 1055    17,3454  50 000 1          INDEX  A
0593   REF   4  LAST 1055    17,3455  3 3140 1          CA     YZTABLE
0594   REF   2  LAST 1043    17,3456  7 3151 0          MASK   BDZJETS
0595   REF   5  LAST 1055    17,3457  27'451 1          ADS    RWORD2
0596                         17,3460  0 0006 1          EXTEND
0597   REF  32  LAST 1043    17,3461  7 4762 1          MP     BIT7
0598   REF   4  LAST 1055    17,3462  6 7701 0          AD     =-2
0599   REF  12  LAST 1055    17,3463  55'522 1          TS     NRJETS
0600   REF   8  LAST 1055    17,3464  4 1456 0          CS     BLAST
0601   REF   5  LAST 1055    17,3465  6 3277 0          AD     =+.1SEC
0602                         17,3466  0 0006 1          EXTEND
0603   REF  13  LAST 1056    17,3467  7 1522 1          MP     NRJETS
0604   REF 100  LAST 1055    17,3470  3 0001 0          CA     L
0605   REF   7  LAST 1055    17,3471  27'547 1          ADS    DFT
0606   REF   2  LAST 1055    17,3472  1 3153 1          TCF    PITCHTIM

0607   REF   9  LAST 1056    17,3473  11'627 1  BDF2Z    CCS    RBDFAIL
0608   REF   1               17,3474  1 3374 0          TCF    NO2Z         USING BD-ROLL AND BD HAS FAILED
0609                         17,3475  1 3477 1          TCF    +2
0610   REF   2  LAST 1056    17,3476  1 3374 0          TCF    NO2Z         DITTO
0611   REF   9  LAST 1056    17,3477  51'516 1          INDEX  ZNDX
0612   REF   7  LAST 1055    17,3500  3 2647 0          CA     XLNNDX
0613   REF 236  LAST 1056    17,3501  50 000 1          INDEX  A
0614   REF   4  LAST 1055    17,3502  3 3117 0          CA     RTABLE
0615   REF   2  LAST 1044    17,3503  7 3137 0          MASK   BDRJETS
0616   REF   3  LAST 1056    17,3504  1 3375 1          TCF    NO2Z +1

0617   REF  11  LAST 1045    17,3505  3 1450 1  RBYPASS  CA     RWORD1
0618   REF   6  LAST 1056    17,3506  55'451 1          TS     RWORD2
0619   REF 185  LAST 1055    17,3507  3 4772 1          CAF    ZERO
0620   REF   9  LAST 1056    17,3510  55'456 0          TS     BLAST
0621   REF   3  LAST 1056    17,3511  1 3153 1          TCF    PITCHTIM
```

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P0622 GENERATION OF THE SECOND YAW (X-TRANS) WORD...YWORD2

```
0623   REF  10  LAST 1056   17,3512  11'627 1  ASMBLWY  CCS     RBDFAIL
0624   REF   1              17,3513  1 3521 0           TCF     FYX2        IF FAILURE ON BD IGNORE X-TRANSLATION
0625                        17,3514  1 3516 1           TCF     +2
0626   REF   2  LAST 1057   17,3515  1 3521 0           TCF     FYX2
0627   REF   6  LAST 1041   17,3516  51'514 0           INDEX   XNDX2
0628   REF   8  LAST 1056   17,3517  3 2647 0           CA      XLNNDX
0629   REF 237  LAST 1056   17,3520  50 000 1           INDEX   A
0630   REF   4  LAST 1054   17,3521  3 2703 1  FYX2     CA      PYTABLE
0631   REF   2  LAST 1041   17,3522  7 2723 1           MASK    YJETS
0632   REF   2  LAST  107   17,3523  55'455 0           TS      YWORD2
0633   REF   1              17,3524  1 3531 1           TCF     T6SETUP

0634   REF   3  LAST 1041   17,3525  3 1454 0  YBYPASS  CA      YWORD1
0635   REF   3  LAST 1057   17,3526  55'455 0           TS      YWORD2
0636   REF 186  LAST 1056   17,3527  3 4772 1           CAF     ZERO
0637   REF   8  LAST 1051   17,3530  55'462 1           TS      BLAST2
```

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P0638 SORT THE JET ON-TIMES

R0639 AT THIS POINT ALL THE CHANNEL COMMANDS AND JET ON-TIMES HAVE BEEN DETERMINED. IN SUMMARY THESE ARE-

R0641 RWORD1
R0642 RWORD2 BLAST

R0643 PWORD1
R0644 PWORD2 BLAST1

R0645 YWORD1
R0646 YWORD2 BLAST2

R0647 IN THIS SECTION THE JET ON-TIMES ARE SORTED AND THE SEQUENCE OF T6 INTERRUPTS IS DETERMINED. TO FACILITATE
R0649 THE SORTING PROCESS AND THE T6 PROGRAM, THE VARIABLES BLAST, BLAST1, BLAST2, ARE RESERVED AS DOUBLE PRECISION
R0651 WORDS. THE LOWER PART OF THESE WORDS CONTAIN A BRANCH INDEX ASSOCIATED WITH THE ROTATION AXIS OF THE HIGHER
R0653 ORDER WORD.

```
0654   REF 187  LAST 1057   17,3531  3 4772 1  T6SETUP  CAF     ZERO        BRANCH INDEX FOR ROLL
0655   REF  10  LAST 1056   17,3532  55'457 1           TS      BLAST +1
0656   REF  15  LAST 1029   17,3533  3 4766 1           CAF     FOUR        BRANCH INDEX FOR PITCH
0657   REF   9  LAST 1054   17,3534  55'461 1           TS      BLAST1 +1
0658   REF   9  LAST 1014   17,3535  3 4775 0           CAF     ELEVEN      BRANCH INDEX FOR YAW
0659   REF   9  LAST 1057   17,3536  55'463 0           TS      BLAST2 +1

0660   REF  11  LAST 1058   17,3537  4 1456 0           CS      BLAST
0661   REF  10  LAST 1058   17,3540  6 1460 1           AD      BLAST1
0662                        17,3541  0 0006 1           EXTEND
0663   REF   1              17,3542  6 3566 1           BZMF    DXCHT12     T1 GR T2
0664   REF  11  LAST 1058   17,3543  4 1460 0  CHECKT23 CS      BLAST1
0665   REF  10  LAST 1058   17,3544  6 1462 0           AD      BLAST2
0666                        17,3545  0 0006 1           EXTEND
0667   REF   1              17,3546  6 3572 1           BZMF    DXCHT23

0668   REF  12  LAST 1058   17,3547  4 1460 0  CALCDT6  CS      BLAST1
0669   REF  11  LAST 1058   17,3550  27'462 1           ADS     BLAST2
0670   REF  12  LAST 1058   17,3551  4 1456 0           CS      BLAST
0671   REF  13  LAST 1058   17,3552  27'460 0           ADS     BLAST1      END OF SORTING PROCEDURE
0672                        17,3553  0 0006 1           EXTEND              RESET T5LOC TO BEGIN PHASE1
0673   REF   1              17,3554  3 3565 1           DCA     RCS2CADR
0674   REF  20  LAST 1035   17,3555  52 113 0           DXCH    T5LOC

0675   REF  57  LAST 1014   17,3556  4 4770 1  ENDJETS  CS      BIT1        RESET BIT1 FOR INITIALIZATION OF
0676   REF  51  LAST 1032   17,3557  7 1501 0           MASK    RCSFLAGS    T6 PROGRAM
0677   REF  52  LAST 1058   17,3560  55'501 0           TS      RCSFLAGS
0678   REF 188  LAST 1058   17,3561  4 4772 0           CS      ZERO        RESET T5PHASE FOR PHASE1
0679   REF  10  LAST 1021   17,3562  55'464 1           TS      T5PHASE

0680   REF  38  LAST 1035   17,3563  1 5323 1           TCF     RESUME      RESUME INTERRUPTED PROGRAM


0681   REF  37  LAST 1038   E6,1510                    EBANK=  KMPAC
0682   REF   4  LAST 1000   17,3564    02140 0  RCS2CADR 2CADR  RCSATT
0682                        17,3565    42066 1
```

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```
0683  REF  13  LAST 1058   17,3566  53'457 1  DXCHT12  DXCH   BLAST
0684  REF  14  LAST 1058   17,3567  53'461 1           DXCH   BLAST1
0685  REF  14  LAST 1059   17,3570  53'457 1           DXCH   BLAST
0686  REF   1              17,3571  1 3543 1           TCF    CHECKT23

0687  REF  15  LAST 1059   17,3572  53'461 1  DXCHT23  DXCH   BLAST1
0688  REF  12  LAST 1058   17,3573  53'463 0           DXCH   BLAST2
0689  REF  16  LAST 1059   17,3574  53'461 1           DXCH   BLAST1
0690  REF  15  LAST 1059   17,3575  4 1456 0           CS     BLAST
0691  REF  17  LAST 1059   17,3576  6 1460 1           AD     BLAST1
0692                       17,3577  0 0006 1           EXTEND
0693                       17,3600  6 3602 0           BZMF   +2
0694  REF   1              17,3601  1 3547 0           TCF    CALCDT6
0695  REF  16  LAST 1059   17,3602  53'457 1           DXCH   BLAST
0696  REF  18  LAST 1059   17,3603  53'461 1           DXCH   BLAST1
0697  REF  17  LAST 1059   17,3604  53'457 1           DXCH   BLAST
0698  REF   2  LAST 1059   17,3605  1 3547 0           TCF    CALCDT6
```

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P0699 T6 PROGRAM AND CHANNEL SETUP

```
0701   REF    1                17,2000                        SETLOC  DAPS5
0702                            17,3606                        BANK

07025 *REF    1                                               COUNT*  $$/T6RPT
0703   REF   19  LAST 1038     17,3606   22 016 0  T6START    LXCH    BANKRUPT
0704                            17,3607   0 0006 1             EXTEND
0705   REF   15  LAST 1038     17,3610   22 012 1             QXCH    QRUPT
0706   REF    5  LAST 1038     17,3611   10 031 1             CCS     TIME6          CHECK TO SEE IF TIME6 WAS RESET
0707   REF   39  LAST 1058     17,3612   1 5323 1             TCF     RESUME         AFTER T6RUPT OCCURED(IN T5RUPT)
0708                            17,3613   1 3615 1             TCF     +2             IF SO WAIT FOR NEXT T6RUPT BEFORE
0709   REF   40  LAST 1060     17,3614   1 5323 1             TCF     RESUME         TAKING ACTION

0710   REF   53  LAST 1058     17,3615   4 1501 0             CS      RCSFLAGS
0711   REF   58  LAST 1058     17,3616   7 4770 1             MASK    BIT1           IF BIT1 IS 0 RESET TO 1
0712                            17,3617   0 0006 1             EXTEND                 AND INITIALIZE CHANNEL
0713   REF    1                17,3620   1 3631 1             BZF     T6RUPTOR
0714   REF   54  LAST 1060     17,3621   27'501 0             ADS     RCSFLAGS
0715   REF   12  LAST 1056     17,3622   3 1450 1             CA      RWORD1
0716                            17,3623   0 0006 1             EXTEND                 INITIALIZE CHANNELS 5,6 WITH WORD1
0717   REF    7  LAST  995     17,3624   01 006 0             WRITE   CHAN6
0718   REF    4  LAST 1054     17,3625   3 1452 0             CA      PWORD1
0719   REF    4  LAST 1057     17,3626   6 1454 0             AD      YWORD1
0720                            17,3627   0 0006 1             EXTEND
0721   REF    3  LAST  703     17,3630   01 005 0             WRITE   CHAN5

0722   REF   18  LAST 1059     17,3631   11'456 0  T6RUPTOR   CCS     BLAST
0723   REF    1                17,3632   1 3711 1             TCF     ZBLAST         ZERO BLAST1
0724   REF    1                17,3633   1 3650 0             TCF     REPLACE        REPLACE WORD1
0725                            17,3634   1 3636 0             TCF     +2
0726   REF    2  LAST 1060     17,3635   1 3650 0             TCF     REPLACE
0727   REF   19  LAST 1059     17,3636   11'460 0  T6L1       CCS     BLAST1
0728   REF    1                17,3637   1 3714 1             TCF     ZBLAST1
0729   REF    1                17,3640   1 3655 0             TCF     REPLACE1
0730                            17,3641   1 3643 1             TCF     +2
0731   REF    2  LAST 1060     17,3642   1 3655 0             TCF     REPLACE1
0732   REF   13  LAST 1059     17,3643   11'462 1  T6L2       CCS     BLAST2
0733   REF    1                17,3644   1 3717 1             TCF     ZBLAST2
0734   REF    1                17,3645   1 3662 1             TCF     REPLACE2
0735   REF   41  LAST 1060     17,3646   1 5323 1             TCF     RESUME
0736   REF    2  LAST 1060     17,3647   1 3662 1             TCF     REPLACE2

0737   REF   19  LAST 1060     17,3650   51'457 0  REPLACE    INDEX   BLAST +1
0738   REF    1                17,3651   0 3667 0             TC      REPLACER
0739   REF  103  LAST 1042     17,3652   4 4770 1             CS      ONE
0740   REF   20  LAST 1060     17,3653   55'456 0             TS      BLAST
0741   REF    1                17,3654   1 3636 0             TCF     T6L1

0742   REF   20  LAST 1060     17,3655   51'461 0  REPLACE1   INDEX   BLAST1 +1
```

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```
0743   REF   2  LAST 1060   17,3656  0 3667 0            TC      REPLACER
0744   REF 104  LAST 1060   17,3657  4 4770 1            CS      ONE
0745   REF  21  LAST 1060   17,3660  55'460 0            TS      BLAST1
0746   REF   1              17,3661  1 3643 1            TCF     T6L2

0747   REF  14  LAST 1060   17,3662  51'463 1  REPLACE2  INDEX   BLAST2 +1
0748   REF   3  LAST 1061   17,3663  0 3667 0            TC      REPLACER
0749   REF 105  LAST 1061   17,3664  4 4770 1            CS      ONE
0750   REF  15  LAST 1061   17,3665  55'462 1            TS      BLAST2
0751   REF  42  LAST 1060   17,3666  1 5323 1            TCF     RESUME

0752   REF   7  LAST 1056   17,3667  3 1451 0  REPLACER  CA      RWORD2
0753                        17,3670  0 0006 1            EXTEND
0754   REF   8  LAST 1060   17,3671  01 006 0            WRITE   CHAN6
0755   REF 176  LAST 1020   17,3672  0 0002 0            TC      Q

0756   REF   3  LAST 1057   17,3673  3 2723 0  REPLACEP  CA      YJETS
0757                        17,3674  0 0006 1            EXTEND
0758   REF   4  LAST 1060   17,3675  02 005 0            RAND    CHAN5
0759   REF   4  LAST 1054   17,3676  6 1453 1            AD      PWORD2
0760                        17,3677  0 0006 1            EXTEND
0761   REF   5  LAST 1061   17,3700  01 005 0            WRITE   CHAN5
0762   REF 177  LAST 1061   17,3701  0 0002 0            TC      Q

0763   REF   3  LAST 1054   17,3702  3 2722 1  REPLACEY  CA      PJETS
0764                        17,3703  0 0006 1            EXTEND
0765   REF   6  LAST 1061   17,3704  02 005 0            RAND    CHAN5
0766   REF   4  LAST 1057   17,3705  6 1455 1            AD      YWORD2
0767                        17,3706  0 0006 1            EXTEND
0768   REF   7  LAST 1061   17,3707  01 005 0            WRITE   CHAN5
0769   REF 178  LAST 1061   17,3710  0 0002 0            TC      Q

0770   REF 189  LAST 1058   17,3711  3 4772 1  ZBLAST    CAF     ZERO
0771   REF  21  LAST 1060   17,3712  57'456 1            XCH     BLAST
0772   REF   1              17,3713  1 3721 1            TCF     ENABT6
0773   REF 190  LAST 1061   17,3714  3 4772 1  ZBLAST1   CAF     ZERO
0774   REF  22  LAST 1061   17,3715  57'460 1            XCH     BLAST1
0775   REF   2  LAST 1061   17,3716  1 3721 1            TCF     ENABT6
0776   REF 191  LAST 1061   17,3717  3 4772 1  ZBLAST2   CAF     ZERO
0777   REF  16  LAST 1061   17,3720  57'462 0            XCH     BLAST2
0778   REF   6  LAST 1060   17,3721  54 031 1  ENABT6    TS      TIME6
07785  REF   4  LAST 1038   17,3722  0 4542 0            TC      C13STALL
0779   REF  10  LAST 1038   17,3723  3 4752 0            CAF     NEGMAX
0780                        17,3724  0 0006 1            EXTEND
0781   REF  12  LAST 1038   17,3725  05 013 0            WOR     CHAN13          ENABLE T6RUPT
0782   REF  43  LAST 1061   17,3726  1 5323 1            TCF     RESUME

RC783                  END OF T6 INTERRUPT

0784                        17,3727           ENDSLECT EQUALS
```

L JET SELECTION LOGIC USER'S PAGE NO. 25 E6 S3

L CM ENTRY DIGITAL AUTOPILOT USER'S PAGE NO. 1 E0 S3

```
R0001   SUBROUTINE TO READ GYMBAL ANGLES AND FORM DIFFERENCES.  GIMBAL ANGLES ARE SAVED IN 2S COMPLEMENT, BUT THE
R0003   DIFFERENCES ARE IN 1S COMP.     ENTER AND READ ANGLES EACH .1 SEC.

R0004           CM/DSTBY = 1  FOR DAP OPERATION
R0005           CM/DSTBY = 0 TO TERMINATE DAP OPERATION.

 0007   REF   1                15,2000                          SETLOC  ETRYDAP
 0008                          15,2063                          BANK

 0009  *REF   1                                                 COUNT*  $$/DAPEN
 0010   REF  26  LAST  896     E6,1661                          EBANK=  AOG

 0011   REF   6  LAST  996     15,2063  3 4355 0  READGYMB  CA      TEN             KEEP RESTART DT GOING RELATIVE TO
 0012   REF   5  LAST  829     15,2064  27'725 1             ADS     CM/GYMDT        PIPTIME. (GROUP 6)

A0013                                                                IF A RESTART OCCURS, SKIP PRESENT CYCLE. THE
A0014                                                                PHASCHNG PROTECTION IS IN CM/DAPIC.

 0015   REF   7  LAST 1013     15,2065  3 4763 1             CA      NOIMUDAP        CHECK FOR FINE ALIGN MODE OF CDU.
 0016   REF  32  LAST 1013     15,2066  7 1334 0             MASK    IMODES33        ( PROTECT AOG/PIP ETC AS WELL AS
 0017                          15,2067  0 0006 1             EXTEND                   GIMBAL DIFFERENCES)
 0018   REF   1                15,2070  1 2076 0             BZF     READGYM1        OK

 0019   REF   2  LAST  804     15,2071  4 4770 1             CS      GYMDIBIT        NOT IN FINE ALIGN, SO IDLE
 0020   REF  10  LAST  894     15,2072  7 0102 0             MASK    CM/FLAGS        SET GYMDIFSW =0
 0021   REF  11  LAST 1063     15,2073  54 102 0             TS      CM/FLAGS
 0022   REF   1                15,2074  0 6000 1             TC      FLUSHJET        QUENCH JETS, SINCE MAY BE A WHILE.
 0023   REF   1                15,2075  0 2143 0             TC      CM/GYMIC +2

 0024   REF  27  LAST 1036     15,2076  3 0032 0  READGYM1   CA      CDUX
 0025   REF  27  LAST 1063     15,2077  57'661 1             XCH     AOG
 0026                          15,2100  0 0006 1             EXTEND
 0027   REF  28  LAST 1063     15,2101  21'661 0             MSU     AOG             -DELAOG=AOG(N-1) - AOG(N)
 0028   REF   2  LAST  115     15,2102  55'675 0             TS      -DELAOG

 0029   REF  16  LAST 1026     15,2103  3 0033 1             CA      CDUY
 0030   REF   2  LAST  115     15,2104  57'662 1             XCH     AIG
 0031                          15,2105  0 0006 1             EXTEND
 0032   REF   3  LAST 1063     15,2106  21'662 0             MSU     AIG
 0033   REF   2  LAST  115     15,2107  55'676 0             TS      -DELAIG

 0034   REF  24  LAST 1036     15,2110  3 0034 0             CA      CDUZ
 0035   REF   3  LAST  828     15,2111  57'663 0             XCH     AMG
 0036                          15,2112  0 0006 1             EXTEND
 0037   REF   4  LAST 1063     15,2113  21'663 1             MSU     AMG
 0038   REF   2  LAST  115     15,2114  55'677 1             TS      -DELAMG

 0039   REF  12  LAST 1063     15,2115  3 0102 1  DOBRATE?   CA      CM/FLAGS
 0040   REF   3  LAST  828     15,2116  7 4767 1             MASK    CM/DSBIT
 0041   REF 238  LAST 1057     15,2117  10 000 0             CCS     A
```

L CM ENTRY DIGITAL AUTOPILOT USER'S PAGE NO. 2 E6 S3

```
0042   REF   1                15,2120  1 2135 0            TCF     CKGYMSW

0046   REF   2  LAST 1063     15,2121  0 6000 1            TC      FLUSHJET        TURN OFF ALL JETS

0047   REF  92  LAST  898     15,2122  0 5402 1            TC      PHASCHNG
0048                          15,2123    00006 1            OCT     00006           DEACTIVATE DAP GROUP 6.

0049   REF  48  LAST  994     15,2124  0 5314 1            TC      TASKOVER

0050   REF 106  LAST 1061     15,2125  3 4770 0  DOBRATE   CA      ONE             DO BODYRATE
0051   REF   2  LAST  116     15,2126  55'720 1  DOBRATE1  TS      JETEM           SKIP BODYRATE.

0052   REF   7  LAST 1063     15,2127  3 4355 0            CA      TEN             KEEP CDU READ GOING.
0053   REF  21  LAST  961     15,2130  0 5223 1            TC      TWIDDLE
0054   REF   2  LAST  236     15,2131    02063 0           ADRES   READGYMB
A0056                                                          DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

0057   REF   3  LAST 1064     15,2132  11'720 1            CCS     JETEM
0058   REF   1                15,2133  0 2165 1            TC      BODYRATE
0059   REF  49  LAST 1064     15,2134  0 5314 1            TC      TASKOVER        SKIP CALC ON INITIAL PASS. (PASSES)

00592  REF  13  LAST 1063     15,2135  4 0102 0  CKGYMSW   CS      CM/FLAGS
00594  REF   3  LAST 1063     15,2136  7 4770 1            MASK    GYMDIBIT
00596                          15,2137  0 0006 1            EXTEND
00598  REF   1                15,2140  1 2125 1            BZF     DOBRATE
0060   REF  14  LAST 1064     15,2141  26 102 0  CM/GYMIC  ADS     CM/FLAGS        GYMDIFSW: C(A)=1, KNOW BIT IS 0
0061   REF 192  LAST 1061     15,2142  3 4772 1            CAF     ZERO
0062  *REF   2  LAST  115     15,2143  55'711 0    +2      TS      JETAG
0063   REF   2  LAST  115     15,2144  55'706 0            TS      OLDELP
0064   REF   2  LAST  115     15,2145  55'707 1            TS      OLDELQ
0065   REF   2  LAST  115     15,2146  55'710 1            TS      OLDELR
0066   REF   4  LAST  894     15,2147  55'723 1            TS      GAMDOT          NO GYM DIF, PROB NO GAM DIF.
0067   REF   1                15,2150  0 2126 0            TC      DOBRATE1
```

L CM ENTRY DIGITAL AUTOPILOT USER'S PAGE NO. 3 E6 S3

```
PC068   COME HERE TO CORRECT FOR OVERFLOW IN ANGULAR CALCULATIONS

 0069   REF 101  LAST 1056   15,2151  54 001 1  ANGOVCOR TS      L          THIS COSTS 2 MCT TO USE.
 0070   REF 179  LAST 1061   15,2152  0 0002 0            TC      Q          NO OVFL
 0071   REF 239  LAST 1063   15,2153  50 000 1            INDEX   A
 0072   REF   4  LAST  991   15,2154  3 4751 0            CAF     LIMITS
 0073   REF 102  LAST 1065   15,2155  26 001 1            ADS     L
 0074   REF 180  LAST 1065   15,2156  0 0002 0            TC      Q

 0075  *REF   1               6000                        SETLOC  FFTAG6
 00755 *                      6000                        BANK

 0076  *REF   1                                          COUNT*  $$/DAPEN
 0077                         6000  3 0007 0  FLUSHJET   CA      7          COME HERE TO TURN OFF ALL JETS.
 0078                         6001  0 0006 1            EXTEND
 0079   REF   2  LAST   42    6002  01 006 0            WRITE   ROLLJETS   ZERO CHANNEL 6
 0080                         6003  0 0006 1            EXTEND
 0081   REF   2  LAST   42    6004  01 005 0            WRITE   PYJETS     ZERO CHANNEL 5
 0082   REF 181  LAST 1065    6005  0 0002 0            TC      Q

 0085   REF   2  LAST 1063   15,2000                     SETLOC  ETRYDAP
 0086                        15,2157                     BANK

 00865 *REF   2 LAST 1063 TO 1065:    60     60*        COUNT*  $$/DAPEN
 0087                        15,2157  4 0000 0  RATEAVG  COM                SUBROUTINE TO ESTIMATE RATES IN PRESENCE
 0088   REF   4  LAST 1064   15,2160  6 1720 0            AD      JETEM      OF CONSTANT ACCELERATION.
 0096                        15,2161  0 0006 1            EXTEND
 0097   REF   5  LAST  592   15,2162  7 4753 0            MP      HALF       DELV (EST) = DELV +(DELV-OLDELV)/2
 0098   REF   5  LAST 1065   15,2163  6 1720 0            AD      JETEM
 0099   REF 182  LAST 1065   15,2164  0 0002 0            TC      Q
```

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P0101 THESE ARE CALLED FOR THE VARIOUS INITIALIZATIONS NEEDED.

```
0103   REF   1                20,2000                    SETLOC  DAPS1
0104                          20,3624                    BANK

0105  *REF   1                                           COUNT*  $$/DAPEN
0106   REF  29  LAST 1063     E6,1661                    EBANK=  AOG

0107   REF  14  LAST  895     20,3624   0 4611 0  CM/DAPON TC     E6SETTER

0109   REF  61  LAST  834     20,3625   0 5561 0         TC     DOWNFLAG      RESET DAPBIT1.  T5 RESTART IDENTIFIER.
0109.5 REF   1                20,3626    00132 1         ADRES  DAPBIT1       BIT 15  FLAG 6          CM FLAGS.
0110   REF  62  LAST 1066     20,3627   0 5561 0         TC     DOWNFLAG      RESET DAPBIT2
0110.5 REF   1                20,3630    00133 0         ADRES  DAPBIT2       BIT 14  FLAG 6
0111                          20,3631   0 0006 1         EXTEND
0112   REF   1                20,3632   3 3747 0         DCA    T5IDLER1      DISABLE RCS CALCULATION
0113   REF  21  LAST 1058     20,3633   52 113 0         DXCH   T5LOC
0114                          20,3634   0 0006 1         EXTEND
0115   REF   2  LAST 1066     20,3635   3 3747 0         DCA    T5IDLER1      DISABLE RCS JET CALLS
0116   REF   4  LAST 1014     20,3636   52 111 1         DXCH   T6LOC

0117   REF   3  LAST 1064     20,3637   0 6000 1         TC     FLUSHJET      JETS DEPARTED  ON SM. ZERO JET BITS.

0118   REF   5  LAST 1010     20,3640   4 7673 0         CS     13,14,15
0119   REF  65  LAST 1038     20,3641   7 1465 0         MASK   DAPDATR1      SET  CONFIG  BITS =0 FOR ENTRY
0120   REF  66  LAST 1066     20,3642   55'465 0         TS     DAPDATR1
0121                          20,3643   0 3647 1         TC     +4

0122   REF   9  LAST  951     20,3644   3 5011 1  NOTYET CA     .5SEC
0123   REF 213  LAST  941     20,3645   0 4636 0         TC     BANKCALL
0124   REF  17  LAST  941     20,3646    01731 0         CADR   DELAYJOB      (DELAYJOB DOES INHINT)
0125   REF   2  LAST  894     20,3647   3 4756 1  +4     CA     GMDIFBIT      GAMDIFSW = 94D BIT11   INITLY=0
0126   REF  15  LAST 1064     20,3650   7 0102 0         MASK   CM/FLAGS      IF ZERO, WAIT UNTIL CM/POSE UPDATE.
0127                          20,3651   0 0006 1         EXTEND
0128   REF   1                20,3652   1 3644 0         BZF    NOTYET

0129   REF 107  LAST 1064     20,3653   4 4770 1         CS     ONE           ACTIVATE CM/DAP
0130   REF  55  LAST 1060     20,3654   55'501 0         TS     RCSFLAGS      USE BIT3 TO INITIALIZE NEEDLER ON
A0131                                                                        NEXT PASS.
0132   REF   3  LAST  798     20,3655   55'727 0         TS     P63FLAG       SO WAKEP62 WILL NOT BE INITIATED UNTIL
A0133                                                                        HEADSUP IS SET IN P62.
A0134                                                          FLAG TO PREVENT MULTIPLE CALLS TO WAKEP62.

0135                          20,3656   3 0007 0         CA     7
0136   REF   3  LAST 1064     20,3657   55'711 0         TS     JETAG
0136.1 REF   4  LAST  187     20,3660   55'713 1         TS     PAXERR1       KEEP NEEDLES ZERO UNTIL DAP UPDATE
A0136.2                                                                     IN CASE CMDAPMOD IS NOT +1.
0137                          20,3661   0 0004 0         INHINT
0138                          20,3662   0 0006 1         EXTEND
0139   REF   5  LAST  895     20,3663   3 1666 0         DCA    ALFA/180      DO ATTITUDE HOLD UNTIL KEYBOARD
```

```
0140   REF   3  LAST  796   20,3664  53'604 0      DXCH   ALFACOM       ESTABLISHES HEADSUP.
0141   REF   5  LAST  895   20,3665  3 1664 1      CA     ROLL/180
0142   REF   2  LAST  116   20,3666  55'717 0      TS     ROLLHOLD      FOR ATTITUDE HOLD IN MODE +1.
0143                        20,3667  0 0006 1      EXTEND
0144   REF   6  LAST 1065   20,3670  7 4753 0      MP     HALF
0145   REF  14  LAST  881   20,3671  55'715 1      TS     ROLLC         NOT INTERESTED IN LO WORD.

0146   REF  16  LAST 1066   20,3672  4 0102 0      CS     CM/FLAGS
0147   REF   2  LAST  828   20,3673  7 4755 0      MASK   CMARMBIT        CMDAPARM = 93D BIT12 INITLY=0
0148   REF  17  LAST 1067   20,3674  26 102 0      ADS    CM/FLAGS      SET BIT TO 1.

0149   REF  23  LAST  827   20,3675  4 0076 1      CS     FLAGWRD2      SET  NODOFLAG  TO PREVENT FURTHER
0150   REF   3  LAST  212   20,3676  7 4770 1      MASK   NODOBIT       V 37 ENTRIES
0151   REF  24  LAST 1067   20,3677  26 076 1      ADS    FLAGWRD2

0152                        20,3700  0 0003 1      RELINT

0153   REF  53  LAST  962   20,3701  0 4655 0      TC     POSTJUMP
0154   REF   1              20,3702   54343 1      CADR   P62.1
```

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```
P0155   INITIALIZE CM/DAP.   WAITLIST CALL FOR READGYMB.  SET SWITCH CM/DSTBY =1
R0156   SO READACCS WILL ENTER A WTLST CALL FOR  SETJTAG  .
R0157    CMDAPARM  = 0    , SO ONLY BODY RATE AND ATTITUDE CALCULATIONS ARE DONE.
R0158   SET AVEGEXIT TO CONTINUE AT CM/POSE
R0159

 C0160  REF  15  LAST 1066   20,3703  0 4611 0  CM/DAPIC TC      E6SETTER

 C0162                       20,3704  0 0004 0           INHINT
 C0163  REF  17  LAST  857   20,3705  4 1044 1  CM/DAP2C CS      PIPTIME +1
A0164                                                           PRIO OF P62 L PRIO AVG,:PIPTM=PIPTM1
 C0165  REF   6  LAST 1065   20,3706  55'720 1           TS      JETEM

 C0166  REF   1              20,3707  3 4753 1           CA      POS1/2
 C0167  REF   2  LAST 1068   20,3710  6 4753 1           AD      POS1/2
 C0168  REF  18  LAST  776   20,3711  6 0025 0           AD      TIME1       OVFL GUARANTEED
 C0169  REF   7  LAST 1068   20,3712  27'720 1           ADS     JETEM       C(A) = DELTA TIME SINCE PIPUP

 C0170  REF  24  LAST 1017   20,3713  4 4773 1           CS      FIVE
 C0171  REF   8  LAST 1068   20,3714  6 1720 0           AD      JETEM
 C0172  REF 240  LAST 1065   20,3715  10 000 0           CCS     A
 C0173  REF   1              20,3716  6 3745 1           AD      -CDUT+1
 C0174                       20,3717  1 3715 0           TCF     -2
 C0175                       20,3720  13 721 1           NOOP
 C0176  REF 108  LAST 1066   20,3721  6 4770 0           AD      ONE         SEND NO ZERO TO WTLST
 C0177  REF   6  LAST 1063   20,3722  55'725 1           TS      CM/GYMDT    FOR RESTART
 C0178  REF  25  LAST  946   20,3723  0 5233 0           TC      WAITLIST
 C0179  REF  30  LAST 1066   E6,1661                     EBANK=  AOG
 C0180  REF   3  LAST 1064   20,3724   02063 0           2CADR   READGYMB
 C0180                       20,3725   32066 0

 C0181  REF   1              20,3726  4 3744 1           CS      CM/SWIC1    GAMDIFSW, GYMDIFSW, CM/DSTBY
 C0182  REF  18  LAST 1067   20,3727  7 0102 0           MASK    CM/FLAGS    DAPARM, .05GSW, LATSW, ENTRYDSP
 C0183  REF   1              20,3730  6 4355 0           AD      CM/SWIC2    SET CM/DSTBY, LATSW
A01831                                                                      DISABLE ENTRY DISPLAY, SINCE DES. GIMB.
A01832                                                                      CALC. (P62.3) GOES TO ENDEXIT.
 C0184  REF  19  LAST 1068   20,3731  54 102 0           TS      CM/FLAGS

 C0185                       20,3732  3 0007 0           CA      7
 C0186  REF   6  LAST  895   20,3733  55'666 1           TS      BETA/180    NECESSARY: NO OVFL CORRECTION
 C0188  REF 109  LAST 1068   20,3734  3 4770 0           CA      ONE         INITIALIZE THE TM OF BODY RATES VIA
 C0189  REF   1              20,3735  54 305 0           TS      SW/NDX        UPBUFF.

 C0190  REF  35  LAST  883   20,3736  0 5362 0           TC      2PHSCHNG    DOES INHINT/RELINT
 C0191                       20,3737   40116 0           OCT     40116       SAVE TBASE6
 C0192                       20,3740   05024 1           OCT     05024
 C0193                       20,3741   13000 0           OCT     13000

 C1935 *REF   1              01,2336             6P11SPT1 =      6.11SPOT
 C0194  REF  54  LAST 1067   20,3742  0 4655 0           TC      POSTJUMP
```

```
0195   REF   1              20,3743   54327 0          CADR    P62.2

0196                        20,3744   16017 0  CM/SWIC1 OCT     16017
01961  REF   8  LAST 1064     4355            CM/SWIC2 =       TEN          00012 : CM/DSTBY, LATSW
0197                        20,3745   77766 0  -CDUT+1  OCT     77766
0198   REF  22  LAST 1066     0112                      EBANK=  T5LOC
0199   REF   4  LAST  714   20,3746   03226 1  T5IDLER1 2CADR   T5IDLOC
0199                        20,3747   12060 1
```

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PC200 THIS SECTION CALCULATES THE ANGULAR BODY RATES EACH .1 SEC. THE ANGULAR RATES ARE THOSE ALONG THE BODY AXES
RC202 XB, YB, ZB, AND ARE NORMALLY DESIGNATED P, Q, R. REQUIREMENT: TEMPORARY ERASE. JETEM, JETEM +1

RC204 SINCE RESTARTS ZERO THE JET OUTPUT CHANNELS, NO ATTEMPT IS MADE TO RESTART THE ENTRY DAPS. THAT IS,
RC206 THE 0.1 SEC DAPS WILL MISS A CYCLE, AND WILL PICK UP AT THE NEXT 0.1 SEC UPDATE. MOST OF THE TIME THE 2 SEC
RC208 ROLL SYSTEM WILL MISS ONLY 0.1 SEC OF CONTROL. HOWEVER IF THE RESTART OCCURS AFTER THE SECTION TIMETST HAS
RC210 STARTED, THEN THE ROLL SYSTEM WILL MISS ONE CYCLE.
RC211 THIS IS NECESSARY UNDER THE GROUNDRULE THAT NO JET COMMANDS SHALL BE LESS THAN 14 MS.

```
 0213   REF  31  LAST 1068   E6,1661                          EBANK= AOG
 0215   REF   3  LAST 1065   15,2000                          SETLOC ETRYDAP
 02151                       15,2165                          BANK

 0216  *REF   3 LAST 1065 TO 1066:     6    66*              COUNT* $$/DAPEN
 0218   REF   5  LAST 1063   15,2165  3 1663 0  BODYRATE     CA     AMG          THESE ARE 2S COMPL NOS, BUT USE ANYWAY.
 0219   REF   3  LAST  997   15,2166  0 5060 1                TC     SPCOS
 0220   REF   2  LAST  116   15,2167  55'511 1                TS     COSM

 0221   REF  32  LAST 1070   15,2170  3 1661 1                CA     AOG          C(AOG) = AOG/180
 0222   REF   3  LAST  997   15,2171  0 5061 0                TC     SPSIN        SINO
 0223   REF   2  LAST  116   15,2172  55'512 1                TS     SINO         SINO = SIN(AOG)

 0224                       15,2173  0 0006 1                EXTEND
 0225   REF   3  LAST 1070   15,2174  7 1511 1                MP     COSM
 0226   REF   2  LAST  116   15,2175  55'514 1                TS     SINOCOSM     SO CM

 0227   REF  33  LAST 1070   15,2176  3 1661 1                CA     AOG
 0228   REF   4  LAST 1070   15,2177  0 5060 1                TC     SPCOS        COSO
 0229   REF   2  LAST  116   15,2200  55'513 0                TS     COSO

 0230                       15,2201  0 0006 1                EXTEND
 0231   REF   4  LAST 1070   15,2202  7 1511 1                MP     COSM
 0232   REF   1              15,2203  55'515 0                TS     COSOCOSM     CO CM
```

R0233 PITCHDOT: Q TCDU/180 = IDOT TCDU/180 COSO COSM + MDOT TCDU/180 SINO

```
 0234   REF   3  LAST 1063   15,2204  4 1677 1                CS     -DELAMG
 0235                       15,2205  0 0006 1                EXTEND
 0236   REF   3  LAST 1070   15,2206  7 1512 1                MP     SINO
 0237   REF   9  LAST 1068   15,2207  53'721 0                DXCH   JETEM        2 LOCS _
 0238   REF   3  LAST 1063   15,2210  4 1676 0                CS     -DELAIG
 0239                       15,2211  0 0006 1                EXTEND
 0240   REF   2  LAST 1070   15,2212  7 1515 0                MP     COSOCOSM
 0241   REF  10  LAST 1070   15,2213  21'721 0                DAS    JETEM
 0242   REF  11  LAST 1070   15,2214  3 1720 0                CA     JETEM
 0243   REF   3  LAST 1064   15,2215  57'707 0                XCH    OLDELQ
 0244   REF   1              15,2216  0 2157 0                TC     RATEAVG
 0245   REF   5  LAST  188   15,2217  55'702 1                TS     QREL         PITCHDOT = Q TCDU/180
```

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```
P0246   YAWDOT:   R TCDU/180 = -IDOT TCDU/180 COSM SINO + MDOT TCDU/180 COSO

 0247   REF   4  LAST 1070   15,2220  4 1677 1        CS      -DELAMG
 0248                        15,2221  0 0006 1        EXTEND
 0249   REF   3  LAST 1070   15,2222  7 1513 0        MP      COSO
 0250   REF  12  LAST 1070   15,2223  53'721 0        DXCH    JETEM
 0251   REF   4  LAST 1070   15,2224  3 1676 1        CA      -DELAIG
 0252                        15,2225  0 0006 1        EXTEND
 0253   REF   3  LAST 1070   15,2226  7 1514 1        MP      SINOCOSM
 0254   REF  13  LAST 1071   15,2227  21'721 0        DAS     JETEM
 0255   REF  14  LAST 1071   15,2230  3 1720 0        CA      JETEM
 0256   REF   3  LAST 1064   15,2231  57'710 0        XCH     OLDELR
 0257   REF   2  LAST 1070   15,2232  0 2157 0        TC      RATEAVG
 0258   REF   4  LAST  188   15,2233  55'703 0        TS      RREL            YAWDOT = R TCDU/180

R0259    ROLLDOT:   P TCDU/180 = ODOT TCDU/180 + IDOT TCDU/180 SINM

 0260   REF   6  LAST 1070   15,2234  3 1663 0        CA      AMG
 0261   REF   4  LAST 1070   15,2235  0 5061 0        TC      SPSIN
 0262   REF   2  LAST  116   15,2236  55'510 0        TS      SINM

 0263                        15,2237  0 0006 1        EXTEND
 0264   REF   5  LAST 1071   15,2240  7 1676 0        MP      -DELAIG
 0265   REF  15  LAST 1071   15,2241  55'720 1        TS      JETEM
 0266   REF 193  LAST 1064   15,2242  3 4772 1        CA      ZERO
 0267                        15,2243  20 001 1        DDOUBL                  ROUND L INTO A
 0268   REF   3  LAST 1063   15,2244  6 1675 1        AD      -DELAOG
 0269   REF  16  LAST 1071   15,2245  6 1720 0        AD      JETEM
 0270   REF 241  LAST 1068   15,2246  4 0000 0        CS      A
 0271   REF  17  LAST 1071   15,2247  55'720 1        TS      JETEM
 0272   REF   3  LAST 1064   15,2250  57'706 1        XCH     OLDELP
 0273   REF   3  LAST 1071   15,2251  0 2157 0        TC      RATEAVG
 0274   REF   5  LAST  188   15,2252  55'701 1        TS      PREL            RCLLDOT = P TCDU/180

A0275                                                IF GAMDOT  < 0.5 DEG/SEC, THEN GAMDOT =0

 0276   REF   5  LAST 1064   15,2253  11'723 1        CCS     GAMDOT
 0277                        15,2254  0 2256 1        TC      +2
 0278   REF   1              15,2255  0 2300 0        TC      NOGAMDUT
 0279   REF   6  LAST 1067   15,2256  4 1664 0        CS      ROLL/180
 0280   REF   5  LAST 1071   15,2257  0 5061 0        TC      SPSIN
 0281                        15,2260  0 0006 1        EXTEND
 0282   REF   6  LAST 1071   15,2261  7 1723 1        MP      GAMDOT
 0283   REF  18  LAST 1071   15,2262  55'721 0        TS      JETEM  +1        -SR GAMDOT
 0284                        15,2263  0 0006 1        EXTEND
 0285   REF   1              15,2264  7 2626 0        MP      SINTRIM          SIN(-2D)   (FOR NOMINAL L/D = .3)
 0287   REF   6  LAST 1071   15,2265  27'701 1        ADS     PREL             PREL TCDU/180=(P-SALF SR GAMDOT)TCDU/180

 0288   REF   7  LAST 1071   15,2266  3 1664 1        CA      ROLL/180
 0289   REF   5  LAST 1070   15,2267  0 5060 1        TC      SPCOS
```

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```
0290                          15,2270  4 0000 0          COM
0291                          15,2271  0 0006 1          EXTEND
0292  REF   7  LAST 1071     15,2272  7 1723 1          MP      GAMDOT
0293  REF   6  LAST 1070     15,2273  27'702 1          ADS     QREL        QREL TCDU/180=(Q-CR GAMDOT) TCDU/180

0294  REF  19  LAST 1071     15,2274  4 1721 0          CS      JETEM +1    B( ) = -SR GAMDOT
0295                          15,2275  0 0006 1          EXTEND
0296  REF   1                15,2276  7 2627 1          MP      COSTRIM     COS(-20)   (FOR NOMINAL L/D = .3)
0297  REF   5  LAST 1071     15,2277  27'703 0          ADS     RREL        RREL TCDU/180=(R+CALF SR GAMDOT)TCDU/180

0298  REF   3  LAST 1067     15,2300  3 4755 1 NOGAMDUT CA      CMARMBIT    CMDAPARM = 93D BIT12
0299  REF  20  LAST 1068     15,2301  7 0102 0          MASK    CM/FLAGS
0300                          15,2302  0 0006 1          EXTEND
0301  REF  50  LAST 1064     15,2303  1 5314 0 STBYDUMP BZF     TASKOVER    DAP NOT ARMED.

0302  REF  26  LAST 1034     15,2304  3 4750 1          CA      POSMAX      PICK UP AT ATTRATES IN 10 MS OR SO.
0303  REF  25  LAST 1038     15,2305  54 030 0          TS      TIME5

0304                          15,2306  0 0006 1          EXTEND
0305  REF   1                15,2307  3 2313 1          DCA     ATDOTCAD
0306  REF  23  LAST 1069     15,2310  52 113 0          DXCH    T5LOC
A0307                                                   DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

0308  REF  51  LAST 1072     15,2311  0 5314 1          TC      TASKOVER

0309  REF  34  LAST 1070     E6,1661                            EBANK= AOG
0310  REF   1                15,2312  02314 0 ATDOTCAD 2CADR  ATTRATES
0310  REF   1                15,2313  32066 0
```

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P0311 CALCULATE BODY ATTITUDE RATES AND INTEGRATE TO OBTAIN ATTITUDE ANGLES.

R0312 CB PHIDOT TCDU/180 = (CA PREL + SA RREL) TCDU/180
R0313 BETADOT TCDU/180 = (-SA PREL + CA RREL) TCDU/180
R0314 ALFADOT TCDU = (QREL + SB PHIDOT) TCDU/180

0315	REF	20	LAST 1060	15,2314	22 016 0	ATTRATES	LXCH	BANKRUPT	CONTINUE HERE VIA T5
0316				15,2315	0 0006 1		EXTEND		TASK MAY BE SKIPPED AT RESTART.
0317	REF	16	LAST 1060	15,2316	22 012 1		QXCH	QRUPT	
0318	REF	8	LAST 370	15,2317	3 0021 1		CA	SR	
0319				15,2320	6 0000 1		DOUBLE		
0320	REF	2	LAST 117	15,2321	55'623 0		TS	CM/SAVE	
A0321								DOES NOT PROTECT TEMK, SQ IN SPSIN/COS	
0322	REF	7	LAST 1072	15,2322	3 1702 0		CA	QREL	
0323	REF	6	LAST 1066	15,2323	6 1665 0		AD	ALFA/180	
0324	REF	1		15,2324	0 2151 0		TC	ANGOVCOR	
0325	REF	7	LAST 1073	15,2325	55'665 1		TS	ALFA/180	
0326	REF	6	LAST 1071	15,2326	0 5060 1		TC	SPCOS	
0327	REF	2	LAST 116	15,2327	55'506 1		TS	CALFA	CALFA
0328	REF	2	LAST 115	15,2330	55'705 0		TS	PHIDOT	
0329				15,2331	0 0006 1		EXTEND		
0330	REF	7	LAST 1071	15,2332	7 1701 1		MP	PREL	
0331	REF	3	LAST 1073	15,2333	57'705 1		XCH	PHIDOT	CA PREL
0332				15,2334	0 0006 1		EXTEND		
0333	REF	6	LAST 1072	15,2335	7 1703 0		MP	RREL	CA RREL
0334	REF	2	LAST 115	15,2336	55'704 1		TS	BETADOT	
0335	REF	8	LAST 1073	15,2337	3 1665 0		CA	ALFA/180	
0336	REF	6	LAST 1071	15,2340	0 5061 0		TC	SPSIN	
0337	REF	2	LAST 116	15,2341	55'507 0		TS	SALFA	SIN(ALFA)
0338				15,2342	0 0006 1		EXTEND		
0339	REF	7	LAST 1073	15,2343	7 1703 0		MP	RREL	SA RREL
0340	REF	4	LAST 1073	15,2344	27'705 0		ADS	PHIDOT	CB PHIDOT, SAVED.
0341	REF	3	LAST 1073	15,2345	4 1507 0		CS	SALFA	
0342				15,2346	0 0006 1		EXTEND		
0343	REF	8	LAST 1073	15,2347	7 1701 1		MP	PREL	
0344	REF	3	LAST 1073	15,2350	27'704 1		ADS	BETADOT	SAVE BETADOT TCDU/180
0345	REF	7	LAST 1068	15,2351	27'666 1		ADS	BETA/180	BETA DONE.
0346	REF	7	LAST 1073	15,2352	0 5061 0		TC	SPSIN	
0347				15,2353	0 0006 1		EXTEND		
0348	REF	5	LAST 1073	15,2354	7 1703 0		MP	PHIDOT	NEGLECT CB IN CB PHIDOT
0349	REF	9	LAST 1073	15,2355	6 1665 0		AD	ALFA/180	
0350	REF	2	LAST 1073	15,2356	0 2151 0		TC	ANGOVCOR	
0351	REF	10	LAST 1073	15,2357	55'665 1		TS	ALFA/180	ALFA DONE.

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```
 0352                                15,2360  4 0000 0          COM
 0353  REF   4  LAST 1067            15,2361  6 1603 0          AD      ALFACOM
 0354  REF   3  LAST 1073            15,2362  0 2151 0          TC      ANGOVCOR        JUST IN CASE ...
 0355  REF  11  LAST 1022            15,2363  55'477 0          TS      AK1
 0356  REF   2  LAST  117            15,2364  55'572 1          TS      QAXERR          FOR PITCH FDAI   AND EDIT.

 0357  REF   6  LAST 1073            15,2365  3 1705 1          CA      PHIDOT          PHIDOT TCDU/180, NEGLECTING CB
 0358  REF   8  LAST 1071            15,2366  6 1664 1          AD      ROLL/180
 0359  REF   4  LAST 1074            15,2367  0 2151 0          TC      ANGOVCOR
 0360  REF   5  LAST  188            15,2370  55'714 0          TS      ROLLTM          ROLL/180 FOR TM.
 0361  REF   9  LAST 1074            15,2371  55'664 0          TS      ROLL/180        ROLL DONE.

R0362       START YAW AUTOPILOT HERE .  RATE DAMPING WITH ENFORCED COORDINATED ROLL MANEUVER.

 03631 REF   8  LAST 1073            15,2372  4 1666 1          CS      BETA/180        IF IN ATM, SAVE 'RAXERR' FOR TM DNLST.
 03632 REF   2  LAST  116            15,2373  6 1604 1          AD      BETACOM
 03633 REF   1                       15,2374  55'573 0          TS      RAXERR          IF OUTSIDE ATM, USE TM REGISTER 'RAXERR'
A03634                                                                                  AS A TEMPORARY. (DAP OPERATION IS IN INTERRUPT, SO
A03635                                                                                  IS OK.)  FINAL C(RAXERR) AT END OF DAP CYCLE WILL
A03636                                                                                  BE R-AXIS ERROR.

 0364  REF   1                       15,2375  3 4766 1          CA      .05GBIT         .05GSW = 102D BIT3  SW=0, LESS .05G
 0365  REF  21  LAST 1072            15,2376  7 0102 0          MASK    CM/FLAGS        SWITCH =1, GREATER THAN .05 G
 0366                                15,2377  0 0006 1          EXTEND
 0367  REF   1                       15,2400  1 2466 0          BZF     EXDAP           IF G LESS THAN .05
 0368  REF 110  LAST 1068            15,2401  4 4770 1          CS      CNE             IF G GEQ  THAN .05
 0369  REF   6  LAST  797            15,2402  55'700 0          TS      CMDAPMOD        SAVE -1 FOR USE IN CM/RCS

 0370  REF  12  LAST 1074            15,2403  55'477 0          TS      AK1             TO ZERO PITCH AND YAW FDAI NEEDLES
 0371  REF  12  LAST 1022            15,2404  55'500 1          TS      AK2             IN ATM.  (MODE =-1)

 03713 REF   9  LAST 1073            15,2405  4 1701 1          CS      PREL            YAW ERROR = RREL - PREL TAN(ALFA)
 0372                                15,2406  0 0006 1          EXTEND
 0373  REF   2  LAST 1071            15,2407  7 2626 0          MP      SINTRIM         LET SIN(-20) BE APPROX FOR TAN(-20)
 0374  REF   8  LAST 1073            15,2410  6 1703 1          AD      RREL
 0375  REF   1                       15,2411  0 2456 1          TC      2D/SDZ          GO TEST DZ. GET TAG: +0 IF IN DZ
 0376  REF 242  LAST 1071            15,2412  50 000 1          INDEX   A               +/- 1 IF NOT
 0377  REF   1                       15,2413  3 2631 1          CAF     YJETCODE

 0378  REF  20  LAST 1072            15,2414  55'720 1          TS      JETEM

R0379       START PITCH AUTOPILOT HERE.  RATE DAMPING ONLY.

 0380  REF   8  LAST 1073            15,2415  3 1702 0          CA      QREL
 0381  REF   2  LAST 1074            15,2416  0 2456 1          TC      2D/SDZ
 0382  REF 243  LAST 1074            15,2417  50 000 1  EXDAPIN  INDEX   A               COME HERE FROM EX ATM DAP
 0383  REF   1                       15,2420  3 2634 1          CAF     P/RJCODE
 0384  REF  21  LAST 1074            15,2421  27'720 1          ADS     JETEM           COMBINE ALL NEW BITS.

 0385                                15,2422  0 0006 1          EXTEND                  DOES NOT REQUIRE SAVING OLD CODES.
```

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```
0386  REF  3  LAST 1065   15,2423  01 005 0        WRITE  PYJETS      SET PYCHAN TO DESIRED BIT CONFIG.

0387  REF  4  LAST 1066   15,2424  11'711 0        CCS    JETAG
0388  REF  1              15,2425  0 2645 1        TC     CM/RCS
0389  REF  1              15,2426  0 3325 0        TC     CM/FDAI
0390  REF  1              15,2427  0 3332 0        TC     CM/FDAIR -1     (JETAG=-1 EQUIVALENT TO CMDAPMOD=+1)
```

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P0391 DEAD ZONE LOGIC USED BY ENTRY DIGITAL AUTOPILOTS.

```
 0392   REF 244  LAST 1074   15,2430  10 000 0  3DDZ     CCS   A          YAWLIM=1.0-3/180=16384-273=16111
 0393   REF   1              15,2431  6 2624 0           AD    YAWLIM
 0394   REF   1              15,2432  1 2462 1           TCF   DZCOM
 0395   REF   2  LAST 1076   15,2433  6 2624 0           AD    YAWLIM
 0396   REF   1              15,2434  1 2463 0           TCF   DZNOCOM

A0397                                                    BIASED DZ FOR EXT ATM DAP.
 0398   REF   1              15,2435  55'624 1  EIASEDZ  TS    JETEM2     SAVE RATE/180. ERROR/180 IS IN L.
 0399   REF 245  LAST 1076   15,2436  10 000 0           CCS   A          START ERROR DZ.
 0400   REF   1              15,2437  4 2623 0           CS    CM/BIAS    = .6/180
 0401                        15,2440  1 2442 0           TCF   +2
 0402   REF   2  LAST 1076   15,2441  3 2623 1           CA    CM/BIAS
 0403   REF 103  LAST 1065   15,2442  6 0001 0           AD    L          BIAS THE ERROR.
 0404   REF 183  LAST 1065   15,2443  22 002 0           LXCH  Q          SAVE CALLERS RETURN ADDRESS.
 0405   REF   1              15,2444  0 2430 1           TC    3DDZ       GO GENERATE THE ERROR BIT.
 0406   REF 104  LAST 1076   15,2445  52 002 1           DXCH  L          BIT TO L, RESTORE CALLERS Q.
 0407   REF   2  LAST 1076   15,2446  11'624 1  4D/SDZ   CCS   JETEM2     CAME HERE IN EXT ATM. C(L) = ERROR BIT
 0408   REF   1              15,2447  6 2621 0           AD    4D/SLIM    IF RATE GEQ 4D/S, SET L=0 AND TAKE
 0409                        15,2450  1 2452 1           TCF   +2         JET BITS ACCORDING TO SGN OF RATE.
 0410   REF   2  LAST 1076   15,2451  6 2621 0           AD    4D/SLIM
 0411   REF 246  LAST 1076   15,2452  54 000 0           TS    A
 0412                        15,2453  1 2455 0           TCF   +2         RATE OK. CONTINUE
 0413                        15,2454  22 007 0           ZL               RATE GEQ 4 D/S. OVER RIDE ERROR BIT
 0414   REF   3  LAST 1076   15,2455  57'624 0           XCH   JETEM2     AND CONTINUE TO GET SIGN.

 0415   REF 247  LAST 1076   15,2456  10 000 0  2D/SDZ   CCS   A          COME HERE TO TEST IF A WITHIN 2DEG/S DZ
 0416   REF   1              15,2457  6 2622 0           AD    YDOTLIM    1.0 - YDOT DZ          ( OR PDOT)
 0417                        15,2460  1 2463 0           TCF   +3
 0418   REF   2  LAST 1076   15,2461  6 2622 0           AD    YDOTLIM    YDOT DZ = 2 DEG/SEC
 0419                        15,2462  4 0000 0  DZCOM    COM
 0420   REF  22  LAST 1074   15,2463  55'721 0  DZNOCOM  TS    JETEM  +1   GENERATE TAG, SET C(A)= -+1 OUTSIDE DZ
 0421   REF 194  LAST 1071   15,2464  3 4772 1           CA    ZERO       SET C(A) = +0 INSIDE
 0422   REF 184  LAST 1076   15,2465  0 0002 0           TC    Q
```

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```
P0423           EXTRA ATMOSPHERIC DIGITAL AUTOPILOT

R0424           1.    IF ABS(CALF) -C(45) POS, USE                  IF CALFA POS, CMDAPMOD= +0
R0426             BETA:   YAW ERROR = SGN(CALF) (BETACOM -BETA)     IF CALFA NEG, CMDAPMOD =-0
R0428                       RATE = BETADOT                          IF CMDAPMOD =-0, RATE =  RREL
R0430                    R-AXIS = CONTROL

R0431             ROLL:   ROLL ERROR = SGN(CALF) (ROLLC - ROLL)     IF CMDAPMOD = -0, RATE DAMP ONLY.
R0433                       RATE = PREL
R0434                    P-AXIS = CONTROL

R0435           2.    IF C(45) GEQ CALFA GEQ -C(45), USE            CMDAPMOD = +1
R0437             BETA:   ROLL ERROR = SGN(-SALF) (BETACOM -BETA)
R0438                       RATE = BETADOT
R0439                    P-AXIS = CONTROL

R0440             ROLL:   YAW ERROR = SGN(SALF) (ROLLC -ROLL)       RATE DAMP ONLY.
R0442                       RATE = RREL
R0443                    R-AXIS = CONTROL

R0444           3.    FOR ALL CASES , USE
R0445             ALFA:   PITCH ERROR = (ALFACOM - ALFA)
R0446                       RATE = QREL
R0447                    Q-AXIS = CONTROL
R0448
```

```
0449   REF   7  LAST 1074   15,2466  55'700 0  EXDAP    TS      CMDAPMOD      +0 FOR NOW
0453   REF   3  LAST 1073   15,2467  11'506 1            CCS     CALFA
0454   REF   1              15,2470  6 2625 1            AD      C45LIM        =1.0-COS(45)
0455                        15,2471  1 2473 1            TCF     +2
0456   REF   2  LAST 1077   15,2472  6 2625 1            AD      C45LIM
0457   REF 248  LAST 1076   15,2473  54 000 0            TS      A
0458   REF   1              15,2474  1 2555 1            TCF     EXDAP2        HERE IF ABS(CALFA)  L  COS(45)

04582  REF   4  LAST 1077   15,2475  11'506 1            CCS     CALFA         |CALFA| > 0.707
04583                       15,2476  1 2477 0            TCF     +1            CONTINUE IF POS; GO TO EXDAP4 IF NEG.

0459   REF   4  LAST 1066   15,2477  11'727 0            CCS     P63FLAG       VALID VALUES ARE:  -1, +1, +0.
0460   REF   1              15,2500  0 2513 1            TC      EXDAP4
0461                        15,2501  0 2503 0            TC      +2
0462   REF   2  LAST 1077   15,2502  0 2513 1            TC      EXDAP4
0463   REF  93  LAST 1064   15,2503  0 5402 1            TC      PHASCHNG      SINGLE PASS THROUGH HERE.
0464                        15,2504    40334 1          OCT     40334
04645 *REF   1              01,2170                4P33SPT1 =      4.33SPOT
0465   REF 111  LAST 1074   15,2505  4 4770 1            CS      ONE
0466   REF   5  LAST 1077   15,2506  55'727 0            TS      P63FLAG       SET FLAG TO ASSURE SINGLE PASS.
0467   REF   1              15,2507  3 2620 1            CA      NSEC
0468   REF  26  LAST 1068   15,2510  0 5233 0            TC      WAITLIST
0469   REF  35  LAST 1072   E6,1661                      EBANK=  A0G
```

```
 0470   REF   2  LAST  233   15,2511   02375 1          2CADR  WAKEP62     CALL TO TERMINATE P62 IN N SEC.
 0470                       15,2512   54066 0
AC471                                                                     65 DEG/ 3DEG/SEC = 21 SEC NOMINAL
AC472                                                                     TRANSIT TIME FROM ALFA=45 TO ALFA TRIM.

 0473   REF   5  LAST 1075   15,2513   11'711 0  EXDAP4   CCS    JETAG      ROLLJET INTERFACE TEST BETWEEN .1 SEC
 0474   REF   1              15,2514   1 2522 1          TCF    EXDAP3     DAP AND THE 2 SEC CM/RCS DAP
 0475   REF   2  LAST 1078   15,2515   1 2522 1          TCF    EXDAP3
 0476   REF 195  LAST 1076   15,2516   3 4772 1          CA     ZERO
 0477                       15,2517   0 0006 1          EXTEND                 TURN OFF ROLL JETS IF ON AND WAIT
 0478   REF   3  LAST 1065   15,2520   01 006 0          WRITE  ROLLJETS       UNTIL START  OF 2 SEC CM/RCS CYCLE
 0479   REF   6  LAST 1078   15,2521   55'711 0          TS     JETAG          RESTORE PROPER VALUE +0

AC480                                                                     ROLL FDAI WILL BE IN ERROR UNTIL NEXT CM/RCS CALL.
 0481   REF   5  LAST 1077   15,2522   11'506 1  EXDAP3   CCS    CALFA      HERE IF ABS(CALFA) GEQ COS(45)
 0482   REF   2  LAST 1074   15,2523   3 1573 1          CA     RAXERR     C()= BETACOM - BETA/180
 0483   REF   1              15,2524   1 2530 1          TCF    EXDAP1
 0484   REF 196  LAST 1078   15,2525   4 4772 0          CS     ZERO
 0485   REF   8  LAST 1077   15,2526   55'700 0          TS     CMDAPMOD       FOR CM/RCS
 0486   REF   3  LAST 1078   15,2527   4 1573 0          CS     RAXERR         COMPLEMENT OF YAW ERROR.
 0487   REF   4  LAST 1078   15,2530   55'573 0  EXDAP1   TS     RAXERR         FOR YAW FDAI
 0488   REF  13  LAST 1074   15,2531   55'500 1          TS     AK2            WANT RAXERR FOR TM.
 0489   REF 105  LAST 1076   15,2532   54 001 1          TS     L
 0490   REF   9  LAST 1078   15,2533   11'700 0          CCS    CMDAPMOD       COORDINATE BETA CONTROL.
 0491                       15,2534   0 2537 1          TC     +3             C(CMDAPMOD) CAN BE +1, +0, OR -0.
 0492   REF 112  LAST 1077   15,2535   3 4770 0          CA     CNE            USE BETADOT TO COORD IN MODE +0
 0493   REF 249  LAST 1077   15,2536   50 000 1          INDEX  A              OTHERWISE USE RREL.
 0494   REF   9  LAST 1074   15,2537   3 1703 1          CA     RREL
 0495   REF   1              15,2540   0 2435 1          TC     BIASEDZ        GO TEST DZ. +0 IF IN DZ, +-1 OTHERWISE
A0496                                                                     IF GEQ 4D/S, SET ERROR BIT IN L =0)
 0497                       15,2541   0 0006 1          EXTEND
 0498   REF  12  LAST 1016   15,2542   04 001 1          ROR    LCHAN          L HAS BETA BIT
 0499   REF 250  LAST 1078   15,2543   50 000 1          INDEX  A
 0500   REF   2  LAST 1074   15,2544   3 2631 1          CAF    YJETCODE
 0501   REF  23  LAST 1076   15,2545   55'720 1          TS     JETEM

 0502   REF   3  LAST 1074   15,2546   3 1572 0          CA     QAXERR         ALFA ERROR.
 0503   REF 106  LAST 1078   15,2547   54 001 1          TS     L
 0504   REF   9  LAST 1074   15,2550   3 1702 0          CA     QREL           FOR ALFADOT USE QREL
 0505   REF   2  LAST 1078   15,2551   0 2435 1          TC     BIASEDZ
 0506                       15,2552   0 0006 1          EXTEND
 0507   REF  13  LAST 1078   15,2553   04 001 1          ROR    LCHAN
 0508   REF   1              15,2554   1 2417 0          TCF    EXDAPIN        CONTINUE ON IN DAP

 0509   REF  10  LAST 1078   15,2555   25'700 1  EXDAP2   INCR   CMDAPMOD      SET CMDAPMOD TO +1

 0510   REF 113  LAST 1078   15,2556   4 4770 1          CS     CNE            INDICATE CHANGE FROM .1 SEC UPDATE TO
 0511   REF   7  LAST 1078   15,2557   55'711 0          TS     JETAG          TO 2 SEC FOR ROLL JETS.( IF CMDAPMOD
AC512                                                                     =0 AND JETAG =-1, QUENCHES JETS IF ON)
```

```
0513   REF   6  LAST 1077   15,2560  11'727 0        CCS     P63FLAG         IF FLAG WAS +1, SET =0.
0514   REF   7  LAST 1079   15,2561  55'727 0        TS      P63FLAG
0515                        15,2562  12 563 1        NOOP

0516   REF   4  LAST 1073   15,2563  11'507 0        CCS     SALFA           BETA CONTROL WITH P JETS
0517   REF   5  LAST 1078   15,2564  4 1573 0        CS      RAXERR          B()= BETACOM - BETA/180
0518                        15,2565  1 2567 0        TCF     +2
0519   REF   6  LAST 1079   15,2566  3 1573 1        CA      RAXERR
0520   REF   5  LAST 1066   15,2567  55'713 1        TS      PAXERR1         TEMP SAVE.  ERROR/180
0521                        15,2570  0 0006 1        EXTEND
0522   REF   7  LAST 1067   15,2571  7 4753 0        MP      HALF            CM/FDAI EXPECTS ERROR/360.
0523   REF   6  LAST 1079   15,2572  57'713 0        XCH     PAXERR1         ERROR/360 FOR FDAI, GET ERROR/180.
0524   REF 107  LAST 1078   15,2573  54 001 1        TS      L
0525   REF   5  LAST 1079   15,2574  11'507 0        CCS     SALFA
0526   REF   4  LAST 1073   15,2575  4 1704 1        CS      BETADOT         USE BETADOT TO COORD IN MODE +1
0527                        15,2576  0 2600 0        TC      +2
0528   REF   5  LAST 1079   15,2577  3 1704 0        CA      BETADOT
0529   REF   3  LAST 1078   15,2600  0 2435 1        TC      BIASEDZ
0530                        15,2601  0 0006 1        EXTEND
0531   REF  14  LAST 1078   15,2602  04 001 1        ROR     LCHAN
0532   REF 251  LAST 1078   15,2603  50 000 1        INDEX   A
0533   REF   2  LAST 1074   15,2604  3 2634 1        CAF     P/RJCODE        GET ROLL CODE
0534                        15,2605  0 0006 1        EXTEND                  ROLL CONTROL WITH YAW JETS.
0535   REF   4  LAST 1078   15,2606  01 006 0        WRITE   ROLLJETS        WE,LL SKIP REGULAR ROLL SYST
0536   REF   3  LAST 1067   15,2607  3 1717 1        CA      ROLLHOLD        ROLL/180 AT CM/DAPON TIME.
0537                        15,2610  0 0006 1        EXTEND
0538   REF  10  LAST 1074   15,2611  21'664 0        MSU     ROLL/180        1,S COMPL, BUT SO WHATS A BIT.?
0539   REF 108  LAST 1079   15,2612  54 001 1        TS      L               FORCE A LIMIT CYCLE IN YAW RATE.
0540   REF   6  LAST 1079   15,2613  11'507 0        CCS     SALFA
0541   REF 109  LAST 1079   15,2614  3 0001 0        CA      L               TO REMOVE ITS BIASING EFFECT ON M DOT.
0542   REF   2  LAST 1078   15,2615  0 2530 0        TC      EXDAP1
0543   REF 110  LAST 1079   15,2616  4 0001 1        CS      L
0544   REF   3  LAST 1079   15,2617  0 2530 0        TC      EXDAP1

0545                        15,2620   04064 1  NSEC     DEC     2100            65 DEG/ 3 DEG/SEC
A0546                                                        IF NSEC IS CHANGED, REMEMBER TO CHANGE 4.33SPOT.
0547                        15,2621   37734 0  4D/SLIM  DEC     16348           1.0 -4/180 D/S = 4/1800 EXP 14
0548                        15,2622   37756 1  YDOTLIM  DEC     16366           =1.0 - YDOT DZ= 16384 -18
A0549                                                                        YDOT DZ = YDOT TCDU/180 = 2/1800 EXP 14

0550                        15,2623   00067 0  CM/BIAS  DEC     55              =.6/180 B14  = 55
0551                        15,2624   37267 0  YAWLIM   DEC     16055           YAWLIM=1.0-3.6/180=16384-329=16055
0552                        15,2625   11277 0  C45LIM   DEC     .29289          =1.0-COS(45)
R0553

05531                       15,2626   65033 1  SINTRIM  DEC     -.34202         SIN(-20)     (FOR NOMINAL L/D = .3)
05532                       15,2627   36044 1  COSTRIM  DEC      .93969         COS(-20)     (FOR NOMINAL L/D = .3)

R05534  TO MAKE CAP INSENSITIVE TO PITCH ERRORS DUE TO ACCUMULATED NAV ERRORS,USE NOMINAL VALUE (-20 DEG) FOR TRIM ALFA
R05536  USED DURING ATMOSPHERIC COORDINATION. OUTSIDE ATMOSPHERE, NAV ERRORS WILL BE SLIGHT, BUT ALFA CAN DIFFER GREATLY
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R05538 FROM TRIM, SO USE ON-BOARD ESTIMATES.

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AC554                                   JET CODE TABLES FOLLOW _

 C555                15,2630   00120 1          OCTAL  00120      POS Y
 C556                15,2631   00000 1  YJETCODE OCTAL  00000      RCS JET BITS
 C557                15,2632   00240 1          OCTAL  00240      NEG Y
 C558                15,2633   00005 1          OCTAL  00005      POS R JET BITS    ALSO POS P JET BITS
 C559                15,2634   00000 1  P/RJCODE OCTAL  00000
 C560                15,2635   00012 1          OCTAL  00012      NEG R             ALSO NEG P
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R0561   RCS       THIS SECTION IS ENTERED EACH 2 SEC BY WAITLIST CALL FOLLOWING A DELAY OF 1.2 SEC AFTER PIPUP.
R0563   THE TASK SETJTAG  SETS A FLAG IN  JETAG  TO SIGNIFY THAT ROLL UPDATE IS DUE.  IN ROUGHLY 5 CS  BPDYRATE WILL BE
R0565   EXECUTED AND JETAG WILL CAUSE  CM/RCS  TO ACT ON ROLLC IMMEDIATELY THEREAFTER.   THE
R0567   TASK SAVES THE CALL TIME SO THAT CM/RCS CAN DETERMINE HOW MUCH OF THE 2 SEC INTERVAL REMAINS BEFORE THE
R0569   NEXT UPDATE.

 0570   REF  19  LAST 1068   15,2636  4 0025 1  SETJTAG  CS      TIME1          SAVE NOMINAL UPDATE TIME FOR SYNCH
 0571   REF   2  LAST  115   15,2637  55'712 0            TS      TUSED
A0572                                                                THE 5 CS APPEARS IN TIMETST.
 0573   REF 114  LAST 1078   15,2640  3 4770 0            CA      ONE            RATHER THAN INCR, FOR SAFETY
 0574   REF   8  LAST 1078   15,2641  55'711 0            TS      JETAG          SET JETAG=1 TO CAUSE CM/RCS TO BE
 0575   REF  94  LAST 1077   15,2642  0 5402 1            TC      PHASCHNG
 0576                        15,2643   00001 0            OCT     00001

 0577   REF  52  LAST 1072   15,2644  0 5314 1            TC      TASKOVER       EXECUTED AFTER NEXT BODYRATE UPDATE

R0578   PREDICTIVE ROLL SYSTEM    ENTRY STEERING PROVIDES ROLL COMMAND IN LOC ROLLC. THE FOLLOWING CALCULATES THE
R0580   TRAJECTORY TO THE ORIGIN IN PHASE PLANE (X,V). PROGRAM ENTERS JET ON AND OFF CALLS INTO WTLST TO PRODUCE
R0582   THE DESIRED TRAJECTORY. ONLY THOSE CALLS WHICH CAN BE EXECUTED WITHIN THE INTERVAL T  (2 SEC) ARE ENTERED IN
R0584   WTLST, THE REMAINDER ARE RECONSIDERED AT NEXT UPDATE.

 0585   REF   4  LAST  203        4752             HALFPR  EQUALS NEG1/2 +1

A0586                                                        CLEAR JETAG BEFORE TIMETST.  SET TO +0 TO SHOW
A0587                                                        ROLL DAP CALLED. IN EVENT OF RESTART, BODYRATE
A0588                                                        MAY MISS A CYCLE. CM/RCS WILL MISS A CYCLE ONLY
A0589                                                        IF A RESTART OCCURS AFTER TIMETST COMMENCES.

 0590   REF 115  LAST 1081   15,2645  4 4770 1  CM/RCS   CS      ONE
 0591   REF   2  LAST  116   15,2646  55'617 1            TS      JNDX           SET NDX FOR POS ROLL, AND CHANGE LATER

 0592   REF   1              15,2647  4 5004 1            CS      2T/TCDU        ROLLDOT = DELAOG + DELAIG SINM =DELR
 0593                        15,2650  0 0006 1            EXTEND
 0594   REF  10  LAST 1074   15,2651  7 1701 1            MP      PREL           DELR/180 = RDOT TCDU/180 = RDOT/1800
 0595   REF 111  LAST 1079   15,2652  6 0001 0            AD      L              -2 RDOT T/180 IN L
 0596   REF   2  LAST  116   15,2653  55'613 0            TS      -VT/180        SAVE -2VT/180 HERE

 0597   REF  11  LAST 1079   15,2654  4 1664 0            CS      ROLL/180
 0598   REF   9  LAST 1073   15,2655  54 021 0            TS      SR             SAVE (-R/180) /2

 0599   REF  22  LAST 1074   15,2656  4 0102 0            CS      CM/FLAGS
 0600   REF   1              15,2657  7 4765 0            MASK    LATSWBIT       LATSW = 101D BIT4
 0601                        15,2660  0 0006 1            EXTEND                 ROLL OVER TOP $
 0602   REF   1              15,2661  1 2667 0            BZF     GETLCX         NO, TAKE SHORTEST PATH
 0603   REF  23  LAST 1081   15,2662  26 102 0            ADS     CM/FLAGS       YES, ENFORCE ROLL OVER TOP.. (BIT =0)
 0604   REF  15  LAST 1067   15,2663  3 1715 0            CA      ROLLC          (ROLLC/180) /2
 0605   REF  10  LAST 1081   15,2664  6 0021 1            AD      SR             -(R/180) /2
 0606   REF   2  LAST  116   15,2665  57'614 0            XCH     LCX/360        DIFFERENT X REQD HERE. DISCONT AT 180.
 0607   REF   1              15,2666  1 2727 0            TCF     COMPAT         POSSIBLE OVFL ABOVE.
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0608   REF   3  LAST 1068   15,2667  3 4753 1  GETLCX   CA      POS1/2          FORM RCOM/360
0609                        15,2670  6 0000 1           DOUBLE
0610   REF  16  LAST 1081   15,2671  6 1715 0           AD      ROLLC
0611   REF   3  LAST 1081   15,2672  57'614 0           XCH     LCX/360         IGNORE POSSIBLE OVFL.

0612   REF  11  LAST 1081   15,2673  3 0021 1           CA      SR              FORM -R/360
0613   REF   5  LAST 1081   15,2674  6 4751 0           AD      NEG1/2
0614   REF   6  LAST 1082   15,2675  6 4751 0           AD      NEG1/2          IGNORE OVFL
0615   REF   4  LAST 1082   15,2676  57'614 0           XCH     LCX/360         -R/360
0616   REF   5  LAST 1082   15,2677  27'614 1           ADS     LCX/360         LCX/360 = RCOM/360 -R/360  RANGE (-1,1)

R0617  DOES SGN(-VT) (VT/180) (VT/180) (180/(4 A1 TT COSALFA)) + X/360 + SGN(X) / 2          OVFL   ?

0619   REF   3  LAST 1081   15,2700  11'613 0           CCS     -VT/180         TAKE SHORTEST ANGULAR PATH
0620   REF 116  LAST 1081   15,2701  6 4770 0           AD      ONE             (BASED ON SINGLE JET ACCELERATION)
0621                        15,2702  1 2704 1           TCF     +2
0622   REF 117  LAST 1082   15,2703  6 4770 0           AD      ONE
0623                        15,2704  0 0006 1           EXTEND
0624   REF   4  LAST 1082   15,2705  7 1613 0           MP      -VT/180         C(-VT/180) = -2 VT/180
0625                        15,2706  0 0006 1           EXTEND
0626   REF   1              15,2707  7 3375 1           MP      1/16A1          = 180/(16 A1 TT )
0627                        15,2710  0 0006 1           EXTEND
0628   REF   6  LAST 1078   15,2711  11'506 1           DV      CALFA
0629   REF 112  LAST 1081   15,2712  54 001 1           TS      L
0630   REF   6  LAST 1082   15,2713  11'614 1           CCS     LCX/360
0631   REF   4  LAST 1082   15,2714  3 4753 1           CAF     POS1/2
0632                        15,2715  1 2717 0           TCF     +2
0633   REF   5  LAST 1082   15,2716  4 4753 0           CS      POS1/2
0634   REF   7  LAST 1082   15,2717  6 1614 0           AD      LCX/360         IS LCX/360 LESS THAN 180 DEG  $
0635   REF 113  LAST 1082   15,2720  6 0001 0           AD      L
0636   REF 114  LAST 1082   15,2721  54 001 1           TS      L
0637   REF   2  LAST 1081   15,2722  1 2727 0           TCF     COMPAT          YES, GO ON.
0638   REF 252  LAST 1079   15,2723  50 000 1  TRTAGXPI INDEX   A               NO, SHIFT X BY - SGN(X) 2 PI
0639   REF   1              15,2724  4 4752 1           CS      HALFPR          +A YIELDS -1/2
0640                        15,2725  6 0000 1           DOUBLE
0641   REF   8  LAST 1082   15,2726  27'614 1           ADS     LCX/360

0642   REF   9  LAST 1082   15,2727  3 1614 0  COMPAT   CA      LCX/360         CORRECT FOR ASSUMED COORD TURN.
0643                        15,2730  0 0006 1           EXTEND
0644   REF   7  LAST 1082   15,2731  7 1506 1           MP      CALFA           COS ALFA
0645   REF  10  LAST 1082   15,2732  55'614 1           TS      LCX/360         SCALED LCX OK HERE.

0646   REF  11  LAST 1078   15,2733  11'700 0           CCS     CMDAPMOD        FOUR POSSIBILITIES HERE
0647   REF   1              15,2734  0 3323 0           TC      DZCALL1         EXIT, SETTING JETAG=0.(C(A)=0)
A0648                                                                           ALL 3 AXES ALREADY DONE.
0649                        15,2735  0 2736 1           TC      +1              G LESS THAN .05. CA POS. CONTINUE
0650   REF  11  LAST 1082   15,2736  3 1614 0           CA      LCX/360         G GEQ .05. CONTINUE IN CM/RCS
0651   REF  12  LAST 1082   15,2737  55'614 1           TS      LCX/360         CMDAPMOD=-0. DAMPING ONLY. SET LCX=0
06511  REF  12  LAST 1027   15,2740  55'571 1           TS      ERRORZ          INITIAL ROLL ERROR (UNREFLECTED) FOR TM.
0652   REF   7  LAST 1079   15,2741  55'713 1           TS      PAXERR1         SAVE LCX FOR FDAI AND EDIT.( /360)
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0653  REF   5  LAST 1082   15,2742  3 1613 1          CA      -VT/180          GET - 2 VT/180
0654  REF  12  LAST 1082   15,2743  54 021 0          TS      SR
0655  REF  13  LAST 1083   15,2744  3 0021 1          CA      SR               GET -VT/180, LEAVE -VT/360 IN SR FOR DZ
0656  REF   1               15,2745  55'570 0          TS      -VT/180E                          DIAGNOSTIC ****
0657  REF   6  LAST 1083   15,2746  57'613 1          XCH     -VT/180          NOW CONTENTS OF -VT/180 AS LABELED
0658                        15,2747  0 0006 1          EXTEND
0659  REF   7  LAST 1083   15,2750  7 1613 0          MP      -VT/180          B(A) = -2VT/180
0660                        15,2751  0 0006 1          EXTEND
0661  REF   1               15,2752  7 3375 1          MP      180/8ATT
0662  REF   2  LAST  116   15,2753  55'616 0          TS      VSQ/4API

R0663    IS SGN(VT) ( (180/4A1 TT) VT/180 VT/180 - .5 BUFLIM/360 )  -X/360      - .5 BUFLIM/360   POS  ?

0665                        15,2754  6 0000 1  WHICHALF DOUBLE                   FOR SECOND BURN,  A1
0666                        15,2755  4 0000 0          COM
0667  REF   1               15,2756  6 3401 1          AD      BUFLIM           =BUFLIM/(2 360)
0668  REF 115  LAST 1082    15,2757  54 001 1          TS      L
0669  REF   8  LAST 1083   15,2760  11'613 0          CCS     -VT/180
0670  REF 116  LAST 1083   15,2761  4 0001 1          CS      L
0671                        15,2762  1 2764 1          TCF     +2
0672  REF 117  LAST 1083   15,2763  3 0001 0          CA      L
0673  REF  13  LAST 1082   15,2764  6 1614 0          AD      LCX/360
0674  REF   2  LAST 1083   15,2765  6 3401 1          AD      BUFLIM
0675                        15,2766  0 0006 1          EXTEND
0676  REF   1               15,2767  6 3004 0          BZMF    REFLECT          POINT (X,V) IN LHP.

R0677    IS SGN(VT) ( (180/4A1 TT) VT/180 VT/180 - .5 BUFLIM/360 )  -X/360      + .5 BUFLIM/360   NEG  ?

0679                        15,2770  4 0000 0          COM
0680  REF   3  LAST 1083   15,2771  6 3401 1          AD      BUFLIM
0681  REF   4  LAST 1083   15,2772  6 3401 1          AD      BUFLIM
0682                        15,2773  0 0006 1          EXTEND
0683  REF   1               15,2774  6 3013 0          BZMF    DZ1              POINT (X,V) IN RHP.

R0684    IS POINT WITHIN VELOCITY DZ ?

0685  REF   1               15,2775  4 4355 1          CS      VSQMIN           IS VSQ/4API - (VSQ/4API) MIN  NEG  ?
0686  REF   3  LAST 1083   15,2776  6 1616 1          AD      VSQ/4API
0687                        15,2777  0 0006 1          EXTEND
0688  REF   1               15,3000  6 3305 1          BZMF    DZCALL           YES.

R0689          POINT IS IN BUFFER ZONE. THRUST TO X AXIS.

0690  REF   3  LAST 1081   15,3001  4 1617 1          CS      JNDX
0691  REF   2  LAST  117   15,3002  55'620 0          TS      JNDX1
0692  REF   1               15,3003  0 3066 1          TC      OVRLINE1

0699  REF   9  LAST 1083   15,3004  4 1613 0  REFLECT CS      -VT/180          REFLECT LHP INTO RHP REL TO TERM CONTR
0700  REF  10  LAST 1083   15,3005  55'613 0          TS      -VT/180
0701  REF  14  LAST 1083   15,3006  54 021 0          TS      SR               -VT/360  SAVED FOR DZ.
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 0702   REF  14  LAST 1083   15,3007  4 1614 1            CS      LCX/360
 0703   REF  15  LAST 1084   15,3010  55'614 1            TS      LCX/360
 0704   REF   4  LAST 1083   15,3011  4 1617 1            CS      JNDX
 0705   REF   5  LAST 1084   15,3012  55'617 1            TS      JNDX

R0706    IS VSQ/4API - (VSQ/4API) MIN  NEG   $

 0707   REF   2  LAST 1083   15,3013  4 4355 1  DZ1       CS      VSQMIN      IS VSQ/4API - (VSQ/4API) MIN  NEG  $
 0708   REF   4  LAST 1083   15,3014  6 1616 1            AD      VSQ/4API
 0709                        15,3015  0 0006 1            EXTEND
 0710   REF   1              15,3016  6 3020 0            BZMF    DZ2         YES, GO TEST FURTHER.
 0711   REF   1              15,3017  1 3025 1            TCF     MAXVTEST    NO

R0712    IS X/360 - XMIN/360 -VT/360  NEG  $

 0713   REF   1              15,3020  4 3377 0  DZ2       CS      XMIN/360    XMIN/360 = 4/360
 0714   REF  16  LAST 1084   15,3021  6 1614 0            AD      LCX/360
 0715   REF  15  LAST 1083   15,3022  6 0021 1            AD      SR          C(SR) = -VT/360
 0716                        15,3023  0 0006 1            EXTEND              IS X/360 - XMIN/360 -VT/360  NEG  $
 0717   REF   2  LAST 1083   15,3024  6 3305 1            BZMF    DZCALL      YES,IN DZ. EXIT SETTING JETAG=0.

R0718    IS  XD/360 - VM/360K - XS/360   POS   ?

 0719   REF   6  LAST 1084   15,3025  4 1617 1  MAXVTEST  CS      JNDX
 0720   REF   3  LAST 1083   15,3026  55'620 0            TS      JNDX1       NOW CAN SET JNDX1 FOR TON2 JETS.
 0721   REF   1              15,3027  4 3401 0            CS      XS/360      XS/360 = (XMIN -YMIN/K) /360
 0722   REF   5  LAST 1084   15,3030  6 1616 1            AD      VSQ/4API
 0723   REF  17  LAST 1084   15,3031  6 1614 0            AD      LCX/360
 0724   REF   2  LAST  116   15,3032  55'615 0            TS      XD/360      XD/360= X/360 +VSQ/4API    X INTERCEPT
AC725                                                                         BUT C(XD/360) = (XD - XS) /360
 0726   REF   1              15,3033  6 3400 0            AD      -VM/360K    X INTERCEPT FOR MAX V (VM)
 0727                        15,3034  4 0000 0            COM
 0728                        15,3035  0 0006 1            EXTEND
 0729   REF   1              15,3036  6 3044 1            BZMF    MAXVTIM1    YES, THRUST TO VM
 0730   REF   3  LAST 1084   15,3037  3 1615 1            CA      XD/360
 0731                        15,3040  0 0006 1            EXTEND
 0732   REF   1              15,3041  7 4753 0            MP      KTRCS
 0733                        15,3042  20 001 1            DDOUBL              GO SAVE PREDICTED DRIFTING VELOCITY.

 0734   REF   1              15,3043  0 3047 1            TC      GETON1      INSURE THAT Q IS POS AS TAG.
 0735                        15,3044  0 0006 1  MAXVTIM1  EXTEND
 0736                        15,3045  22 007 0            ZQ                  SET +0 AS TAG
 0737   REF   1              15,3046  4 3400 1            CS      -VMT/180
 0738   REF   1              15,3047  55'567 0  GETON1    TS      VDT/180     VDT/180 OR VMT/180.
 0739   REF  11  LAST 1083   15,3050  6 1613 1            AD      -VT/180
 0740                        15,3051  6 0000 1            DOUBLE
 0741                        15,3052  0 0006 1            EXTEND
 0742   REF   2  LAST 1083   15,3053  7 3375 1            MP      180/8ATT
 0743   REF   2  LAST  117   15,3054  55'621 1            TS      TON1        TON1 / 4T
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0744                          15,3055  0 0006 1           EXTEND
0745   REF   1                15,3056  6 3060 1           BZMF    CVRLINE
0746   REF   1                15,3057  0 3072 1           TC      GETON2          RESET Q POS IF CAME FROM MAXVTIM1

0747   REF 185  LAST 1076     15,3060 10 002 1  CVRLINE  CCS     Q
0748   REF   2  LAST 1083     15,3061  1 3066 0           TCF     CVRLINE1
0749   REF   4  LAST 1084     15,3062  3 1620 1  MAXVTIM2 CA      JNDX1           ABOVE VM, SO THRUST DOWN
0750   REF   7  LAST 1084     15,3063 55'617 1           TS      JNDX
0751   REF   3  LAST 1084     15,3064  4 1621 1           CS      TON1
0752   REF   1                15,3065  1 3071 0           TCF     CVRLINE2 +1

0753   REF  12  LAST 1084     15,3066  4 1613 0  CVRLINE1 CS      -VT/180         DRIFT AT V
0754   REF   2  LAST 1084     15,3067 55'567 0           TS      VDT/180
0755   REF 197  LAST 1078     15,3070  3 4772 1  CVRLINE2 CA      ZERO
0756  *REF   4  LAST 1085     15,3071 55'621 1    +1     TS      TON1
0757   REF   3  LAST 1085     15,3072  3 1567 1  GETON2   CA      VDT/180         VDT/180, OR VMT/180 OR VT/180
0758                          15,3073  6 0000 1           DOUBLE
0759                          15,3074  0 0006 1           EXTEND
0760   REF   3  LAST 1084     15,3075  7 3375 1           MP      180/8ATT
0761                          15,3076  6 0000 1           DOUBLE                  FOR SECOND BURN, A1
0762   REF   2  LAST  116     15,3077 55'607 0           TS      TON2            = TON2 / 4T

0763                          15,3100  4 0000 0           COM
0764                          15,3101  0 0006 1           EXTEND
0765   REF   1                15,3102  6 3106 0           BZMF    GETOFF
0766   REF   3  LAST 1085     15,3103 55'607 0           TS      TON2
07661  REF   8  LAST 1085     15,3104  3 1617 0           CA      JNDX
07662  REF   5  LAST 1085     15,3105 55'620 0           TS      JNDX1

0767   REF   4  LAST 1085     15,3106  4 1607 0  GETOFF   CS      TON2            TON2 / 4T
0768                          15,3107  0 0006 1           EXTEND
0769   REF   4  LAST 1085     15,3110  7 1567 0           MP      VDT/180         VDT/180, OR VT/180, OR VMT/180.
0770   REF   4  LAST 1084     15,3111 55'615 0           TS      XD/360          USE AS TEMP
0771   REF   5  LAST 1085     15,3112  4 1567 0           CS      VDT/180
07711                         15,3113  0 0006 1           EXTEND
07712  REF   1                15,3114  1 3130 1           BZF     TOFFOVFL        OMIT THE DIVIDE IF DEN = 0.
0772   REF  13  LAST 1085     15,3115  6 1613 1           AD      -VT/180
0773                          15,3116  0 0006 1           EXTEND
0774   REF   5  LAST 1085     15,3117  7 1621 1           MP      TON1            TON1 /4T
0775   REF   5  LAST 1085     15,3120  6 1615 1           AD      XD/360          TEMP = -VDT/180 / 2 TON2
0776   REF  18  LAST 1084     15,3121  6 1614 0           AD      LCX/360
0777                          15,3122 22 007 0           ZL
0778   REF 118  LAST 1083     15,3123 56 001 0           XCH     L               TEST THE DIVIDE
0779                          15,3124  0 0006 1           EXTEND
0780   REF   6  LAST 1085     15,3125 11'567 0           DV      VDT/180
0781                          15,3126  0 0006 1           EXTEND
0782   REF   1                15,3127  1 3132 0           BZF     GETOFF2         DIVIDE OK

0787   REF   1                15,3130  3 5020 0  TOFFOVFL CA      2JETT           OVFL, USE  2T  FOR CONVENIENCE.
0788   REF   1                15,3131  1 3137 0           TCF     TIMSCAL
```

```
0796   REF 119  LAST 1085   15,3132  56 001 0  GETOFF2  XCH     L          GET NUMERATOR.
0797                        15,3133  0 0006 1           EXTEND
0798   REF   7  LAST 1085   15,3134  11'567 0           DV      VDT/180    C(A) = TOFF / 2T
0799                        15,3135  0 0006 1           EXTEND
0800   REF   2  LAST 1085   15,3136  7 5020 1           MP      2JETT
0801   REF   2  LAST  116   15,3137  55'605 1  TIMSCAL  TS      TOFF       IN CS

0802   REF   1               15,3140  3 3376 0           CAF     4JETT
0803                        15,3141  0 0006 1           EXTEND
0804   REF   6  LAST 1085   15,3142  7 1621 1           MP      TON1       C(TON1) = TON1 / 4T
0805   REF   7  LAST 1086   15,3143  55'621 1           TS      TON1        IN CS

0806   REF   2  LAST 1086   15,3144  3 3376 0           CAF     4JETT
0807                        15,3145  0 0006 1           EXTEND
0808   REF   5  LAST 1085   15,3146  7 1607 0           MP      TON2       C(TON2) = TON2 / 4T
0809   REF   6  LAST 1086   15,3147  55'607 0           TS      TON2       IN CS

0810   REF 198  LAST 1085   15,3150  3 4772 1           CA      ZERO       CANNOT REDO AFTER TIMETST. TUSED GONE
0811   REF   9  LAST 1081   15,3151  55'711 0           TS      JETAG      SET +0 TO SHOW ROLL DAP CALLED.

AC812                                                                     CAUSE THE TM OF BODY RATES VIA UPBUFF TO BE
AC813                                                                     INITIALIZED. ALSO CAUSE NEEDLES TO BE DONE ON NEXT
AC814                                                                     AND ON ALTERNATE PASSES THROUGH CM/DUMPR.

0815   REF 118  LAST 1082   15,3152  3 4770 0           CA      ONE
0816   REF   2  LAST 1068   15,3153  54 305 0           TS      SW/NDX
```

```
P0817   TIMETEST SECTION FOR RCS
RC818   ENTER WITH THREE TIME INTERVALS AND THE CORRESPONDING JET CODE INDEXES IN ERASEABLE LOCS TON1, TOFF, TON2, JNDX
RC820   JNDX1.  SECTION PROCESSES TIME INTERVALS FOR WTLST CALLS AND ASSURES THAT WTLST CALLS ARE MADE ONLY
RC822   (1) FOR POS INTERVALS GREATER THAN A SPECIFIED MINIMUM ( HERE CHOSEN AS  2 CS) AND
RC824   (2) FOR THE INTERVALS THAT WILL BE EXECUTED WITHIN THE TIME REMAINING IN THE SAMPLE INTERVAL T  (2 SEC).
RC826   TIMETST  ESTABLISHES 6 LOCS CONTAINING JET CODES AND CORRESPONDING TIME  INTERVALS. THUS: TON1, T1BITS,
RC828   TOFF, T2BITS,  TON2, T2BITS.   OF THESE THE FIRST 2 LOCS ARE TEMPORARY, FOR IMMEDIATE ACTION, IN GENERAL.
RC830   SECTION JETCALL  BELOW PROCESSES THIS LIST.

 C831   REF  20  LAST 1081   15,3154  3 0025 0  TIMETST  CA     TIME1     CORRECT FOR POSSIBLE TIME1 OVFL.
 C832   REF   6  LAST 1082   15,3155  6 4753 1            AD     POS1/2
 C833   REF   7  LAST 1087   15,3156  6 4753 1            AD     POS1/2    OVFL GUARANTEED.
 C834   REF   3  LAST 1081   15,3157  27'712 0           ADS    TUSED     B(TUSED) =-TUSED =-OLTIME1

 C835   REF   1              15,3160  3 3374 1            CA     -T-3      =-T +2 -5  (SEE SETJTAG)
AC836                                                                     THE +2 REQUIRED FOR PROPER BRANCH.
 C837   REF   4  LAST 1087   15,3161  27'712 0           ADS    TUSED     TUSED = TIME(K)-TIME(K-1)-T+2

 C838   REF  44  LAST 1042   15,3162  4 4767 1            CS     TWO       USE 2 SINCE TIME3 UNCERTAIN TO 1
 C839   REF   8  LAST 1086   15,3163  6 1621 0            AD     TON1
 C840                        15,3164  0 0006 1            EXTEND
 C841   REF   1              15,3165  6 3177 0            BZMF   TIMETST1
 C842   REF   9  LAST 1085   15,3166  51'617 0           INDEX  JNDX
 C843   REF   3  LAST 1079   15,3167  3 2634 1            CAF    P/RJCODE
 C844   REF   2  LAST  117   15,3170  55'622 1            TS     T1BITS

 C845   REF   9  LAST 1087   15,3171  3 1621 0            CA     TON1
 C846   REF   5  LAST 1087   15,3172  27'712 0           ADS    TUSED
 C847                        15,3173  0 0006 1            EXTEND
 C848   REF   1              15,3174  6 3201 1            BZMF   TOFFTEST
 C849   REF 199  LAST 1086   15,3175  3 4772 1            CA     ZERO
 C850   REF   1              15,3176  1 3232 0            TCF    TIMETST3
 C851   REF 119  LAST 1086   15,3177  4 4770 1  TIMETST1  CS     ONE
 C852   REF  10  LAST 1087   15,3200  55'621 1            TS     TON1
 C853   REF  45  LAST 1087   15,3201  4 4767 1  TOFFTEST  CS     TWO
 C854   REF   3  LAST 1086   15,3202  6 1605 0            AD     TOFF
 C855                        15,3203  0 0006 1            EXTEND
 C856   REF   1              15,3204  6 3213 1            BZMF   TIMETST2
 C857   REF   4  LAST 1087   15,3205  3 1605 0            CA     TOFF
 C858   REF   6  LAST 1087   15,3206  27'712 0           ADS    TUSED
 C859                        15,3207  0 0006 1            EXTEND
 C860   REF   1              15,3210  6 3215 1            BZMF   TON2TEST
 C861   REF 200  LAST 1087   15,3211  3 4772 1            CA     ZERO
 C862   REF   1              15,3212  1 3234 0            TCF    TIMETST4
 C863   REF 120  LAST 1087   15,3213  4 4770 1  TIMETST2  CS     ONE
 C864   REF   5  LAST 1087   15,3214  55'605 1            TS     TOFF
 C865   REF  46  LAST 1087   15,3215  4 4767 1  TON2TEST  CS     TWO
 C866   REF   7  LAST 1086   15,3216  6 1607 1            AD     TON2
 C867                        15,3217  0 0006 1            EXTEND
 C868   REF   1              15,3220  6 3235 0            BZMF   TIMETST5
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0869   REF   6  LAST 1085   15,3221  51'620 1            INDEX  JNDX1
0870   REF   4  LAST 1087   15,3222  3 2634 1            CAF    P/RJCODE
0871   REF   2  LAST  116   15,3223  55'610 0            TS     T2BITS
0872   REF   8  LAST 1087   15,3224  3 1607 1            CA     TON2
0873   REF   7  LAST 1087   15,3225  27'712 0            ADS    TUSED
0874                        15,3226  0 0006 1            EXTEND
0875   REF   1              15,3227  6 3237 1            BZMF   JETCALL1
0876   REF 201  LAST 1087   15,3230  3 4772 1            CA     ZERO
0877   REF   2  LAST 1087   15,3231  1 3236 1            TCF    TIMETST5 +1
0878   REF  11  LAST 1087   15,3232  55'621 1  TIMETST3  TS     TON1
0879   REF 121  LAST 1087   15,3233  4 4770 1            CS     ONE
0880   REF   6  LAST 1087   15,3234  55'605 1  TIMETST4  TS     TOFF
0881   REF 122  LAST 1088   15,3235  4 4770 1  TIMETST5  CS     ONE
0882  *REF   9  LAST 1088   15,3236  55'607 0    +1      TS     TON2
R0883  SECTION  JETCALL  EXAMINES CONTENTS OF JET TIMES IN LIST, ESTABLISHES WTLST ENTRIES, AND EXECUTES CORRESPONDING
R0885  JET CODES. A POSITIVE NZ NUMBER IN A TIME REGISTER INDICATES THAT A WTLST CALL IS TO BE MADE, AND ITS JET BITS
R0887  EXECUTED. A +0 INDICATES THAT THE TIME INTERVAL DOES NOT APPLY, BUT THE  CORRESPONDING JET BITS ARE TO BE
R0889  EXECUTED. A NEG NUMBER INDICATES THAT THE TIME INTERVAL HAS BEEN PROCESSED. IN EVENT OF +0 OR -1, THE
R0891  SUBSEQUENT TIME REGISTER IS EXAMINED FOR POSSIBLE ACTION. THUS JET BITS TO BE EXECUTED MAY COME FROM MORE
R0893  THAN ONE REGISTER.

0894   REF 202  LAST 1088   15,3237  3 4772 1  JETCALL1 CA     ZERO
0895   REF   2  LAST  116   15,3240  55'611 1            TS     OUTTAG
0896   REF   2  LAST  116   15,3241  55'612 1            TS     NUJET
0897   REF   2  LAST  116   15,3242  55'606 1            TS     TBITS
0898   REF  12  LAST 1088   15,3243  53'622 1            DXCH   TON1
0899   REF 253  LAST 1082   15,3244  10 000 0            CCS    A
0900   REF   1              15,3245  1 3262 0            TCF    JETCALL2        CALL WTLST
0901   REF   3  LAST 1088   15,3246  23'612 0  JETCALL3  LXCH   NUJET          WTLST ENTRIES COME HERE FROM JETCALL
0902   REF 123  LAST 1088   15,3247  4 4770 1            CS     ONE
0903   REF   7  LAST 1088   15,3250  53'606 1            DXCH   TOFF
0904   REF 254  LAST 1088   15,3251  10 000 0            CCS    A
0905   REF   2  LAST 1088   15,3252  1 3262 0            TCF    JETCALL2        CALL WTLST
0906   REF   4  LAST 1088   15,3253  23'612 0            LXCH   NUJET
0907   REF 124  LAST 1088   15,3254  4 4770 1            CS     ONE
0908   REF  10  LAST 1088   15,3255  53'610 0            DXCH   TON2
0909   REF 255  LAST 1088   15,3256  10 000 0            CCS    A
0910   REF   3  LAST 1088   15,3257  1 3262 0            TCF    JETCALL2        CALL WTLST
0911   REF   5  LAST 1088   15,3260  23'612 0            LXCH   NUJET
0912   REF   1              15,3261  0 3270 1            TC     JETACTN         C(A) = +0
0913   REF 120  LAST 1086   15,3262  56 001 0  JETCALL2  XCH    L               SAVE JET BITS FOR AFTER WTLST CALL
0914   REF   6  LAST 1088   15,3263  27'612 1            ADS    NUJET
0915   REF 121  LAST 1088   15,3264  56 001 0            XCH    L
0916   REF 125  LAST 1088   15,3265  6 4770 0            AD     ONE             RESTORE FOR CCS
0917   REF  22  LAST 1064   15,3266  0 5223 1            TC     TWIDDLE
0918   REF   1              15,3267   03276 1            ADRES  JETCALL
0920   REF   7  LAST 1088   15,3270  3 1612 0  JETACTN   CA     NUJET           COME HERE WHEN DESIRED JET CODE IS KNOWN
0921   *                    15,3271  0 0006 1    +1      EXTEND                 NO NEED TO SAVE OLD CODES
0922   REF   5  LAST 1079   15,3272  01 006 0            WRITE  ROLLJETS        SET RCHAN TO NEW BIT CONFIG.
```

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0923   REF   3  LAST 1088   15,3273  11'611 1          CCS    OUTTAG
0924   REF  53  LAST 1081   15,3274  0 5314 1          TC     TASKOVER
0925   REF   2  LAST 1075   15,3275  0 3333 1 ROLLDUMP TC     CM/FDAIR

A0926                                                        EDIT DUMP AT ABOVE LOCATION.

R0927    WAITLIST ENTRIES COME HERE.

0928   REF   4  LAST 1063   15,3276  3 4767 0 JETCALL  CAF    CM/DSBIT      CM/DSTBY = BIT2 103D
0929   REF   4  LAST 1089   15,3277  55'611 1          TS     OUTTAG        SIGNIFY WTLST ENTRY
0930   REF  24  LAST 1081   15,3300  7 0102 0          MASK   CM/FLAGS      IS SYSTEM DISABLED  $
0931                        15,3301  0 0006 1          EXTEND
0932   REF   2  LAST 1088   15,3302  1 3271 1          BZF    JETACTN +1    YES, QUENCH ROLL JETS,IF ON AND EXIT.
0933                        15,3303  22 007 0          ZL                   NO, CONTINUE.
0934   REF   1              15,3304  1 3246 0          TCF    JETCALL3      C(A) POS, C(L) =+0

R0935     DEAD ZONE ENTRIES COME HERE.

09351  REF  12  LAST 1082   15,3305  4 1700 0 DZCALL   CS     CMDAPMOD      POSSIBLE VALUES OF CMDAPMOD: -1, +0, -0.
09352  REF  59  LAST 1060   15,3306  7 4770 1          MASK   BIT1
09353  REF 122  LAST 1088   15,3307  54 001 1          TS     L             C(L)=0 FOR -0; C(L)=1 FOR -1 OR +0.
09354  REF 256  LAST 1088   15,3310  50 000 1          INDEX  A             ERASBLE ORDER: ROLLTM,ROLLC,ROLLC +1.
09355  REF   6  LAST 1074   15,3311  3 1714 1          CA     ROLLTM        GET ROLL/180 OR ROLLC  (/360).
09356  REF 123  LAST 1089   15,3312  50 001 0          INDEX  L
09357  REF 257  LAST 1089   15,3313  54 000 0          TS     A             IF C(L)=1, STORE 'ROLLC' IN 'L'.
09358  REF 124  LAST 1089   15,3314  6 0001 0          AD     L             (BOTH MUST BE SCALED DEG/180)
09359  REF   5  LAST 1074   15,3315  0 2151 0          TC     ANGOVCOR      C(A)=ROLL/180  OR  2 ROLLC  .
0936   REF   4  LAST 1079   15,3316  55'717 0          TS     ROLLHOLD      IF CMDAPMOD =-0, SAVE ROLL ANGLE,
A09361                                                                     OTHERWISE, SAVE ROLL COMMAND.

09362  REF 203  LAST 1088   15,3317  3 4772 1          CA     ZERO          COME HERE IF IN DZ, AND CANCEL JETS.
0937                        15,3320  0 0006 1          EXTEND               INHINT NOT NEEDED HERE.
0938   REF   6  LAST 1088   15,3321  01 006 0          WRITE  ROLLJETS      TURN OFF ALL ROLL JETS.
0939   REF   8  LAST 1086   15,3322  55'567 0          TS     VDT/180       SET =0 TO SHOW IN DEAD ZONE.
0940   REF  10  LAST 1086   15,3323  55'711 0 DZCALL1  TS     JETAG         COME HERE WITH C(A)=0.
0941   REF   1              15,3324  0 3275 1          TC     ROLLDUMP
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P0942    CM ENTRY FDAI DISPLAY

R0943    CALCULATE BY INTEGRATION THE ROLL ERROR BETWEEN THE 2 SEC CM/RCS UPDATES . DISPLAY ATTITUDE ERRORS AS FOLLOWS:
R0945              ATM DAP:    DISPLAY ONLY ROLL ATTITUDE ERROR.
R0946              EXT ATM DAP:    PRESENT 3 ATTITUDE ERRORS RELATIVE TO THE APPROPRIATE BODY AXES EACH .1 SEC.
R0948                                        ROLL    ROLLC-ROLL
R0949                                        PITCH   ALFAC-ALFA
R0950                                        YAW     BETAC-BETA

R0951    DURING ENTRY, THE FDAI NEEDLES HAVE FULL SCALE OF 67.5 DEG IN ROLL AND  16.875 DEG IN PITCH AND YAW.
R0953    THE SUBROUTINE  NEEDLER  EXPECTS (ANGLE/180) AND SCALES TO 16.875 DEG   FULL SCALE.

A0958                                                                  COME HERE EACH .1 SEC  (CMDAPMOD=+1 COMES BELOW)
 0959  REF   7  LAST 1074   15,3325  4 1705 0  CM/FDAI  CS      PHIDOT          INTEGRATE ROLL ERROR 'TWEEN 2SEC UPDATES
 0960                       15,3326  0 0006 1            EXTEND
 0961  REF   8  LAST 1082   15,3327  7 1506 1            MP      CALFA           FOR ASSUMED COORDINATION.
 0962                       15,3330  0 0006 1            EXTEND
 0963  REF   8  LAST 1079   15,3331  7 4753 0            MP      HALF
 0964 *REF   8  LAST 1082   15,3332  27'713 1    -1      ADS     PAXERR1         ROLL ERROR/360.    OVFL OK

A0965                                                                  EDIT DUMP AT ABOVE LOCATION.
 0966  REF   9  LAST 1090   15,3333  3 4753 1  CM/FDAIR CA      HALF
 0967                       15,3334  0 0006 1            EXTEND
 0968  REF   9  LAST 1090   15,3335  7 1713 1            MP      PAXERR1         FULL SCALE FOR FDAI (ROLL) IS 67.5 D
 0969  REF   1              15,3336  55'476 1            TS      PAXERR          .25 (ROLL ERROR/180) FOR FDAI NEEDLE.

A0970                                                                  PROGRAM TO FILE BODY  RATES FOR TM ON ONE PASS AND
A0971                                                                  TO UPDATE THE NEEDLE DISPLAY ON THE NEXT.
A0972                                                                  SYNCHRONIZATION WITH CM/RCS IS USED SO THAT THE TM
A0973                                                                  IS DONE WITH THE ROLL SYSTEM AND NEEDLES START ON
A0974                                                                  THE SUBSEQUENT PASS.
A0975

 0976  REF   3  LAST 1086   15,3337  4 0305 0  CM/DUMPR CS      SW/NDX          COMBINED ALTERNATION SWITCH AND FILE
 09761 REF   4  LAST 1090   15,3340  54 305 0            TS      SW/NDX
 0977                       15,3341  0 0006 1            EXTEND                  INDEX.
 0978  REF   1              15,3342  6 3346 0            BZMF    CMTMFILE        FILE STARTS WITH SW/NDX +1 AND GOES TO
A0979                                                                  ENDBUF.
A0980                                                                  INDEX IS POS FOR NEEDLES

 0981  REF  36  LAST 1012   15,3343  0 4714 1            TC      IBNKCALL
 0982  REF   9  LAST 1007   15,3344   42425 1           CADR    NEEDLER

 0983  REF   1              15,3345  0 3364 0            TC      CM/END

A0984                                                                  INDEX IS NEG FOR TM FILE

 0985  REF  41  LAST 1056   15,3346  6 6214 0  CMTMFILE AD      THREE
 0986                       15,3347  0 0006 1            EXTEND
 0987  REF   1              15,3350  6 3354 0            BZMF    SAVENDX
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 0988   REF  21  LAST 1087   15,3351  3 0025 0            CA      TIME1          INITIALIZE THE TM LIST IN UPBUFF.
 0989   REF   3  LAST   73   15,3352  54 304 1            TS      CMTMTIME
 0990   REF   3  LAST  879   15,3353  4 4776 1            CS      THIRTEEN        INITIALIZE COUNTER
 0991   REF   5  LAST 1090   15,3354  54 305 0  SAVENDX    TS      SW/NDX         A NEGATIVE NUMBER.
 0992                        15,3355  0 0006 1            EXTEND
 0993   REF  11  LAST 1081   15,3356  3 1702 0            DCA     PREL
 0994   REF   6  LAST 1091   15,3357  50 305 1            INDEX   SW/NDX
 0995   REF   2  LAST   73   15,3360  52 324 0            DXCH    ENDBUF -1
 0996   REF  10  LAST 1078   15,3361  3 1703 1            CA      RREL
 0997   REF   7  LAST 1091   15,3362  50 305 1            INDEX   SW/NDX
 0998   REF   3  LAST 1091   15,3363  54 325 1            TS      ENDBUF +1

 0999   REF   3  LAST 1073   15,3364  3 1623 1  CM/END    CA      CM/SAVE
 1000   REF  16  LAST 1084   15,3365  54 021 0            TS      SR
A1001                                                            DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

 1002                        15,3366  0 0006 1            EXTEND
 1003   REF   1              15,3367  3 3373 0            DCA     T5IDLER2
 1004   REF  24  LAST 1072   15,3370  52 113 0            DXCH    T5LOC
 1005   REF  44  LAST 1061   15,3371  0 5323 0            TC      RESUME

 1006   REF  25  LAST 1091      0112                      EBANK=  T5LOC
 1007   REF   5  LAST 1069   15,3372    03226 1  T5IDLER2 2CADR   T5IDLOC
 1007                        15,3373    12060 1
A1008                                                    DEFINE THE FOLLOWING 17D REGISTERS IN UPBUFF TO BE
A1009                                                    USED TO TELEMETER CM VEHICLE BODY RATE INFORMATION.
A1010                                                    THE INFORMATION IS FILED EACH 0.2 SEC, GIVING 15D
A1011                                                    DATA POINTS EACH 1 SEC.  TM LIST IS READ TWICE
A1012                                                    EACH 2 SECONDS.

A1013                                                    THE SEQUENCE IS:    SP TIME        INITIAL TIME
A1014                                                                        SWITCH          ALSO INDEX.
A1015                                                                        P               ROLL RATE
A1016                                                                        Q               PITCH RATE
A1017                                                                        R               YAW RATE
A1018                                                                        ETC.

A1019                    CMTMTIME =      UPBUFF
A1020                    SW/NDX   =      UPBUFF  +1
A1021                    ENDBUF   =      UPBUFF  +16D
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P10211  SPACER

R1022   CONSTANTS USED IN THE ROLL CONTROL SYSTEM:
R1023   CONSTANTS ARE THE FOLLOWING: A = 9.1 DEG/SECSQ, VM = 20 DEG/SEC,        T = 2 SEC,  TCDU = .1 SEC,
R1025   XMIN = 4 DEG, VMIN = 2 DEG/SEC, K = .25, A1 = 4.55 DEG/SECSQ,          VI = 1 DEG/SEC, INTERCEPT WITH DZ SIDE
R1027   XBUF = 4 DEG

 1028                          15,3374   77464 1  -T-3      DEC   -203            CS
A1029                                             VSQMIN    DEC   .61050061 E-3   VSQ MIN/4 A PI = 4/(4  (9.1)  180)
 10295  REF   1                 4355              VSQMIN    =     OCT12
 1030   REF   8  LAST  564      5004              2T/TCDU   =     OCT50           T/TCDU  EXP-14   TCDU =.1SEC
 1031                          15,3375   23617 0  180/8ATT  DEC   .61813187      180/(8  (9.1) 4)=(180/ATT)  EXP -3
 1032   REF   2  LAST 1084     15,3400            -VMT/180  =     -VM/360K       = 20  (2) / 180
 1033   REF   3  LAST  589      5020              2JETT     =     4SECS          CS          2 (2) 100   INTEGER
 1034                          15,3376   01440 0  4JETT     DEC   800            CS          4 (2) 100   INTEGER
 1035                          15,3377   00266 0  XMIN/360  DEC   182            XMIN/360 = 4/ 360  EXP 14  = 182 INTEGER
 1036                          15,3400   70706 1  -VM/360K  DEC   -.22222222     =-20/( 360  (.25))
 1037   REF   4  LAST 1085     15,3375            1/16A1    =     180/8ATT
A10371                                                              1/16A1       = 180/(16 A1 TT)
A1038                                                               =180/(16  4.55  4)
 1039                          15,3401   00133 0  XS/360    DEC   91             =(XMIN +VI (T-1/K))/360 = 2/360 EXP 14
 1040   REF   2  LAST 1084     15,3401            BUFLIM    =     XS/360         4/(2  360)

 1041   REF  10  LAST 1090      4753              KTRCS     =     HALF           KT = (.25) 2 = .5
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*** END OF ULYSSES .029 ***

L DOWN-TELEMETRY PROGRAM USER'S PAGE NO. 1 EQ S3

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R0001   PROGRAM NAME- DOWN TELEMETRY PROGRAM
R0002   MOD NO.- 0      TO COMPLETELY REWRITE THE DOWN TELEMETRY PROGRAM AND DOWNLINK ERASABLE DUMP PROGRAM FOR THE
R0004                   PURPOSE OF SAVING APPROXIMATELY 150 WORDS OF CORE STORAGE.
R0006                   THIS CHANGE REQUIRES AN ENTIRELY NEW METHOD OF SPECIFYING DOWNLINK LISTS.REFER TO DOWNLINK
R0008                   LISTS LOG SECTION FOR MORE DETAILS. HOWEVER THIS CHANGE WILL NOT AFFECT THE GROUND PROCESSING
R0010                   OF DOWN TELEMETRY DATA.
R0011   MOD BY- KILROY, SMITH, DEWITT
R0115   MOD BY - DENSMORE - JUNE 1969 - ELIMINATE ERASABLE DUMP COUNT
R0012   DATE-   020CT67
R0013   AUTHORS- KILROY, SMITH, DEWITT, DEWOLF, FAGIN
R0014   LOG SECTION- DOWN-TELEMETRY PROGRAM
R0015   FUNCTIONAL DESCRIPTION- THIS ROUTINE IS INITIATED BY TELEMETRY END
R0016           PULSE FROM THE DOWNLINK TELEMETRY CONVERTER. THIS PULSE OCCURS
R0017           AT 50 TIMES PER SECIEVERY 20 MS) THEREFORE DODOWNTM IS
R0018           EXECUTED AT THESE RATES. THIS ROUTINE SELECTS THE APPROPRIATE
R0019           AGC DATA TO BE TRANSMITTED DOWNLINK AND LOADS IT INTO OUTPUT
R0020           CHANNELS 34 AND 35. THE INFORMATION IS THEN GATED OUT FROM THE
R0021           LGC IN SERIAL FASHION.
R0022           THIS PROGRAM IS CODED FOR A 2 SECOND DOWNLIST. SINCE DOWNRUPTS
R0023           OCCUR EVERY 20MS AND 2 AGC COMPUTER WORDS CAN BE PLACED IN
R0024           CHANNELS 34 AND 35 DURING EACH DOWNRUPT THE PROGRAM IS CAPABLE
R0025           OF SENDING 200 AGC WORDS EVERY 2 SECONDS.
R0026   CALLING SEQUENCE- NONE
R0027           PROGRAM IS ENTERED VIA TCF DODOWNTM WHICH IS EXECUTED AS A
R0028           RESULT OF A DOWNRUPT. CONTROL IS RETURNED VIA TCF RESUME WHICH
R0029           IN EFFECT IS A RESUME.
R0030   SUBROUTINES CALLED- NONE
R0031   NORMAL EXIT MODE- TCF RESUME
R0032   ALARM OR ABORT EXIT MODE- NONE
R0033   RESTART PROTECTION:
R0034           ON A FRESH START AND RESTART THE 'STARTSUB' SUBROUTINE WILL INITIALIZE THE DOWNLIST POINTER(ACTUALLY
R0036           DNTMGOTO) TO THE BEGINNING OF THE CURRENT DOWNLIST(I.E. CURRENT CONTENTS OF DNLSTADR). THIS HAS THE
R0038           EFFECT OF IGNORING THE REMAINDER OF THE DOWNLIST WHICH THE DOWN-TELEMETRY PROGRAM WAS WORKING ON WHEN
R0040           THE RESTART(OR FRESH START) OCCURRED AND RESUME DOWN TELEMETRY FROM THE BEGINNING OF THE CURRENT
R0042           DOWNLIST.
R0043           ALSO OF INTEREST IS THE FACT THAT ON A RESTART THE AGC WILL ZERO DOWNLINK CHANNELS 13, 34 AND 35.
R0047   DOWNLINK LIST SELECTION:
R0048           THE APPROPRIATE DOWNLINK LISTS ARE SELECTED BY THE FOLLOWING:
R0049           1. FRESH START
R0050           2. V37EXXE  WHERE XX = THE MAJOR MODE BEING SELECTED.
R0051           3. UPDATE PROGRAM(P27)
R0052           4.      NON-V37 SELECTABLE TYPE PROGRAMS(E.G. AGS INITIALIZATION(SUNDANCE,LUMINARY) AND P61-P62
R00522                  TRANSITION(COLOSSUS) ETC.).
R0525   DOWNLINK LIST RULES AND LIMITATIONS:
R0526           READ SECTION(S) WHICH FOLLOW 'DEBRIS' WRITEUP.
R0053   OUTPUT-  EVERY 2 SECONDS 100 DOUBLE PRECISION WORDS(I.E. 200 LGC
R0054           COMPUTER WORDS) ARE TRANSMITTED VIA DOWNLINK.
R0055   ERASABLE INITIALIZATION REQUIRED- NONE
R0056           'DNTMGOTO' AND 'DNLSTADR' ARE INITIALIZED BY THE FRESH START PROGRAM.
R0058   DEBRIS(ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)-
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R0059           LDATALST,DNTMBUFF TO DNTMBUFF +21D,TMINDEX,DNQ.
R0060
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R0065   DODOWNTM IS ENTERED EVERY 20 MS BY AN INTERRUPT TRIGGERED BY THE
R0066   RECEIPT OF AN ENDPULSE FROM THE SPACECRAFT TELEMETRY PROGRAMMER.

R0067   NOTES REGARDING DOWNLINK LISTS ASSOCIATED WITH THIS PROGRAM:
R0068   1. DOWNLISTS. - DOWNLISTS MUST BE COMPILED IN THE SAME BANK AS THE
R0069      DOWN-TELEMETRY PROGRAM. THIS IS DONE FOR EASE OF CODING, FASTER
R0070      EXECUTION.
R0075   2. EACH DOWNLINK LIST CONSISTS OF A CONTROL LIST AND A NUMBER OF
R0076      SUBLISTS.
R0077   3. A SUBLIST REFERS TO A SNAPSHOT OR DATA COMMON TO THE SAME OR OTHER
R0078      DOWNLINK LISTS.  ANY SUBLIST CONTAINING COMMON DATA NEEDS TO BE
R0079      CODED ONLY ONCE FOR THE APPLICABLE DOWNLINK LISTS.
R0080   4. SNAPSHOT SUBLISTS REFER SPECIFICALLY TO HOMOGENOUS DATA WHICH MUST BE
R0081      SAVED IN A BUFFER DURING ONE DOWNRUPT.
R0082   5. THE 1DNADR FOR THE 1ST WORD OF SNAPSHOT DATA IS FOUND AT THE END
R0083      OF EACH SNAPSHOT SUBLIST, SINCE THE PROGRAM CODING SENDS THIS DP WORD
R0084      IMMEDIATELY AFTER STORING THE OTHERS IN THE SNAPSHOT BUFFER.
R0085   6. ALL LISTS ARE COMBINATIONS OF CODED ERASABLE ADDRESS CONSTANTS
R0086      CREATED FOR THE DOWNLIST PROGRAM.
R0087         A. 1DNADR                1-WORD DOWNLIST ADDRESS.
R0088            SAME AS ECADR, BUT USED WHEN THE WORD ADDRESSED IS THE LEFT
R0089            HALF OF A DOUBLE-PRECISION WORD FOR DOWN TELEMETRY.
R0090         B. 2DNADR - 6DNADR     N-WORD DOWNLIST ADDRESS, N = 2 - 6.
R0091            SAME AS 1DNADR, BUT WITH THE 4 UNUSED BITS OF THE ECADR FORMAT
R0092            FILLED IN WITH 0001-0101.  USED TO POINT TO A LIST OF N DOUBLE-
R0093            PRECISION WORDS, STORED CONSECUTIVELY, FOR DOWN TELEMETRY.
R0094         C. DNCHAN                DOWNLIST CHANNEL ADDRESS.
R0095            SAME AS 1DNADR, BUT WITH PREFIX BITS 0111.  USED TO POINT TO
R0096            A PAIR OF CHANNELS FOR DOWN TELEMETRY.
R0097         D. DNPTR                 DOWN TELEMETRY SUBLIST POINTER.
R0098          SAME AS CAF BUT TAGGED AS A CONSTANT. USED IN CONTROL LIST TO POINT TO A SUBLIST.
R0100          CAUTION--- A DNPTR CANNOT BE USED IN A SUBLIST.
R0101   7. THE WORD ORDER CODE IS SET TO ZERO AT THE BEGINNING OF EACH DOWNLIST (I.E. CONTROL LIST) AND WHEN
R0103      A 'TDNADR TIME2' IS DETECTED IN THE CONTROL LIST(ONLY).
R0104   8. IN THE SNAPSHOT SUBLIST ONLY, THE DNADR'S CANNOT POINT TO THE FIRST WORD OF ANY EBANK.

R0106   DOWNLINK LIST RESTRICTIONS:
R0107     (THE FOLLOWING POINTS MAY BE LISTED ELSEWHERE BUT ARE LISTED HERE SO  IT IS CLEAR THAT THESE THINGS CANNOT BE
R0109     DONE)

R0110   1. SNAPSHOT DOWNLIST:
R0111     (A) CANNOT CONTAIN THE FOLLOWING ECADRS(I.E. 1DNADR'S): 0, 400, 1000, 1400, 2000, 2400, 3000, 3400.
R0113     (B) CAN CONTAIN ONLY 1DNADR'S

R0114   2. ALL DOWNLINKED DATA(EXCEPT CHANNELS) IS PICKED UP BY A <DCA<SO DOWNLINK LISTS CANNOT CONTAIN THE
R0116      EQUIVALENT OF THE FOLLOWING ECADRS(I.E. 1DNADRS): 377, 777, 1377, 1777, 2377, 27777, 3377, 3777.

R0118      (NOTE: THE TERM EQUIVALENT ' MEANT THAT THE 1DNADR  TO 6DNADR  WILL BE PROCESSED LIKE 1 TO 6 ECADRS)

R0120   3. CONTROL LISTS AND SUBLISTS CANNOT HAVE ENTRIES = OCTAL 00000 OR OCTAL 77777
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R0122   4. THE '1DNADR TIME2' WHICH WILL CAUSE THE DOWNLINK PROGRAM TO SET THE WORDER CODE TO 3 MUST APPEAR IN THE
R0124      CONTROL SECTION OF THE DOWNLIST.

R0125   5. 'DNCHAN 0' CANNOT BE USED.

R0126   6. 'DNPTR 0' CANNOT BE USED.

R0127   7. DNPTR CANNOT APPEAR IN A SUBLIST.

R0128


R0129   EBANK SETTINGS
R0130             IN THE PROCESS OF SETTING THE EBANK(WHEN PICKING UP DOWNLINK DATA) THE DOWN TELEMETRY PROGRAM PUTS
R0132             'GARBAGE' INTO BITS15-12 OF EBANK. HUGH BLAIR-SMITH WARNS US THAT BITS15-12 OF EBANK MAY BECOME
R0134             SIGNIFICANT SOMEDAY IN THE FUTURE. IF/WHEN THAT HAPPENS, THE PROGRAM SHOULD INSURE(BY MASKING ETC.)
R0136             THAT BITS15-12 OF EBANK ARE ZERO.
R0137   INITIALIZATION REQUIRED- TO INTERRUPT CURRENT LIST AND START A NEW ONE..
R0138       1.    ADRES OF DOWNLINK LIST INTO DNLSTADR
R0139       2.    NEGONE INTO SUBLIST
R0140       3.    NEGONE INTO DNECADR

 0143   REF    7  LAST 1037      4000                          SETLOC  FFTAG12
 0144                            4621                          BANK
 0145   REF   25  LAST  189      0337                          EBANK=  DNTMBUFF

 0146   REF    1                                              COUNT*  $$/DPROG
 0147   REF   21  LAST 1073      4621  54 016 1  DODOWNTM      TS      BANKRUPT
 0148                            4622  0 0006 1                EXTEND
 0149   REF   17  LAST 1073      4623  22 012 1                QXCH    QRUPT           SAVE Q
 0150   REF   33  LAST 1056      4624  3 4762 0                CA      BIT7            SET WORD ORDER CODE TO 1. EXCEPTION- AT
 0150?                           4625  0 0006 1                EXTEND
 0150?  REF   13  LAST 1061      4626  02 013 1                RAND    CHAN13
 0150?  REF  258  LAST 1089      4627  10 000 0                CCS     A
 0150?  REF    3  LAST  271      4630  0 0334 0                TC      DNTMGOTO
 0150?  REF    5  LAST 1061      4631  0 4542 0                TC      C13STALL
 0150?  REF   34  LAST 1096      4632  3 4762 0                CA      BIT7
 0151                            4633  0 0006 1                EXTEND          THE BEGINNING OF EACH LIST THE WORD
 0152   REF   14  LAST 1096      4634  05 013 0                WOR     CHAN13          CODE WILL BE SET BACK TO 0.
 0153   REF    4  LAST 1096      4635  0 0334 0                TC      DNTMGOTO        GO TO APPROPRIATE PHASE OF PROGRAM

 0153?  REF    2  LAST  179   05,2000                          SETLOC  DOWNTELM
 0153?                       05,3446                          BANK

 0153?  REF    1                                              COUNT*  $$/DPROG
 0154   REF   16  LAST  974   05,3446  3 7702 0  DNPHASE1     CA      NEGONE          INITIALIZE ALL CONTROL WORDS
 0155   REF    1             05,3447  54 336 0                TS      SUBLIST         WORDS TO MINUS ONE
 0156   REF    1             05,3450  54 335 0                TS      DNECADR
 0157   REF    1             05,3451  3 3574 1                CA      LDNPHAS2        SET DNTMGOTO =0 ALL SUBSEQUENT DOWNRUPTS
```

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0158  REF   5  LAST 1096   05,3452  54 334 1            TS      DNTMGOTO        GO TO DNPHASE2
0159  REF   1               05,3453  1 3467 0            TCF     NEWLIST
0160  REF   2  LAST 1096   05,3454  10 335 0  DNPHASE2  CCS     DNECADR         SENDING OF DATA IN PROGRESS
0161  REF   1               05,3455  0 3607 0  DODNADR   TC      FETCH2WD        YES - THEN FETCH THE NEXT 2 SP WORDS
0162  REF  33  LAST  837    05,3456   77753 0  MINTIME2-1DNADR   TIME2           NEGATIVE OF TIME2 1DNADR
0163                        05,3457  1 3460 1            TCF     +1              (ECADR OF  3776 + 74001 = 77777)

0164  REF   2  LAST 1096   05,3460  10 336 0            CCS     SUBLIST         IS THE SUBLIST IN CONTROL
0165  REF   1               05,3461  1 3622 0            TCF     NEXTINSL        YES
0166                        05,3462   74001 0  DNADRDCR  OCT     74001           DNADR COUNT AND ECADR DECREMENTER

0167  REF   1               05,3463  3 0333 1  CHKLIST   CA      CTLIST
0168                        05,3464  0 0006 1            EXTEND
0169  REF   2  LAST 1097   05,3465  6 3467 1            BZMF    NEWLIST         IT WILL BE NEGATIVE AT END OF LIST
0170  REF   1               05,3466  1 3474 1            TCF     NEXTINCL
0171  REF   8  LAST  795    05,3467  50 332 0  NEWLIST   INDEX   DNLSTCOD
0172  REF   1               05,3470  3 2362 1            CA      DNTABLE         INITIALIZE CTLIST WITH
0173  REF   2  LAST 1097   05,3471  54 333 0            TS      CTLIST            STARTING ADDRESS OF NEW LIST
0174  REF   9  LAST 1097   05,3472  4 0332 1            CS      DNLSTCOD
0175  REF   1               05,3473  1 3711 1            TCF     SENDID +3
0177  REF   3  LAST 1097   05,3474  50 333 1  NEXTINCL  INDEX   CTLIST
0178                        05,3475  3 0000 1            CA      C
0179  REF 259  LAST 1096   05,3476  10 000 0            CCS     A
0180  REF   4  LAST 1097   05,3477  24 333 1            INCR    CTLIST          SET POINTER TO PICK UP NEXT CTLIST WORD
0181                        05,3500  1 3504 1            TCF     +4              ON NEXT ENTRY TO PROG. (A SHOULD NOT =0)
0182  REF   5  LAST 1097   05,3501  56 333 1            XCH     CTLIST          SET CTLIST TO NEGATIVE AND PLACE(CODING)
0183                        05,3502  4 0000 0            COM                     UNCOMPLEMENTED DNADR INTO A.    (FOR LA)
0184  REF   6  LAST 1097   05,3503  56 333 1            XCH     CTLIST                                          (ST IN )
0185  REF 260  LAST 1097   05,3504  24 000 1  +4        INCR    A                                               (CTLIST)
0186  REF   3  LAST 1097   05,3505  54 335 0            TS      DNECADR         SAVE DNADR
0187  REF   1               05,3506  6 3456 0            AD      MINTIME2        TEST FOR TIME2 (NEG. OF ECADR)
0188  REF 261  LAST 1097   05,3507  10 000 0            CCS     A
0189  REF   1               05,3510  1 3514 0            TCF     SETWD +1        DON'T SET WORD ORDER CODE
0190                        05,3511   47777 0  MINB1314  OCT     47777           MINUS BIT 13 AND 14  (CAN'T GET HERE)
0191  REF   2  LAST 1097   05,3512  1 3514 0            TCF     SETWD +1        DON'T SET WORD ORDER CODE
0192  REF   1               05,3513  0 3536 1  SETWD     TC      WDZERO          GO SET WORD ORDER CODE TO ZERO.
0193  REF   4  LAST 1097   05,3514  3 0335 1  +1        CA      DNECADR         RELOAD A WITH THE DNADR.
0194  REF   1               05,3515  6 3511 1  +2        AD      MINB1314        IS THIS A REGULAR DNADR?
0195                        05,3516  0 0006 1            EXTEND
0196  REF   2  LAST 1097   05,3517  6 3607 0            BZMF    FETCH2WD        YES. (A MUST NEVER BE ZERO)
0197  REF   1               05,3520  6 7674 0            AD      MINB12          NO- IS IT A POINTER (DNPTR) OR A
0198                        05,3521  0 0006 1            EXTEND                      CHANNEL(DNCHAN)
0199  REF   1               05,3522  6 3545 0            BZMF    DODNPTR         IT'S A POINTER. (A MUST NEVER BE ZERO)

0200                        05,3523  0 0006 1  DODNCHAN  TC      6               (EXECUTED AS EXTEND) IT S A CHANNEL
0201  REF   5  LAST 1097   05,3524  50 335 1            INDEX   DNECADR
0202                        05,3525  44'000 1            INDEX   0 -4000         (EXECUTED AS READ)
0203  REF 125  LAST 1089   05,3526  54 001 1            TS      L
0204                        05,3527  0 0006 1            TC      6               (EXECUTED AS EXTEND)
0205  REF   6  LAST 1097   05,3530  50 335 1            INDEX   DNECADR
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0206                          05,3531  43'777 1          INDEX  0 -4001       (EXECUTED AS READ)
0207  REF   7  LAST 1097     05,3532  54 335 0          TS     DNECADR       SET DNECADR
0208  REF  17  LAST 1096     05,3533  3 7702 0          CA     NEGONE            TO MINUS
0209  REF   8  LAST 1098     05,3534  56 335 1          XCH    DNECADR                WHILE PRESERVING A.
0210  REF   1                05,3535  1 3635 0          TCF    DNTMEXIT      GO SEND CHANNELS

0211                          05,3536  0 0006 1  WOZERO  EXTEND
02113 REF  28  LAST 1014     05,3537  22 070 0          QXCH   RUPTREG1
02115 REF   6  LAST 1096     05,3540  0 4542 0          TC     C13STALL
02117 REF  35  LAST 1096     05,3541  4 4762 1          CS     BIT7
0212                          05,3542  0 0006 1          EXTEND
0213  REF  15  LAST 1096     05,3543  03 013 0          WAND   CHAN13        SET WORD ORDER CODE TO ZERO
0214  REF  29  LAST 1098     05,3544  0 0070 0          TC     RUPTREG1      RETURN TO CALLER

0215  REF   9  LAST 1098     05,3545  50 335 1  DODNPTR INDEX  DNECADR       DNECADR CONTAINS ADRES OF SUBLIST
0216                          05,3546  0 0000 1          0      0             CLEAR AND ADD LIST ENTRY INTO A.
0217  REF 262  LAST 1097     05,3547  10 000 0          CCS    A             IS THIS A SNAPSHOT SUBLIST
0218  REF  10  LAST 1098     05,3550  3 0335 1          CA     DNECADR       NO, IT IS A REGULAR SUBLIST.
0219  REF   1                05,3551  1 3621 0          TCF    DOSUBLST      A MUST NOT BE ZERO.

0220  REF  11  LAST 1098     05,3552  56 335 1          XCH    DNECADR       YES, IT IS A SNAPSHOT SUBLIST.
0221  REF   3  LAST 1097     05,3553  54 336 0          TS     SUBLIST       C(DNECADR) INTO SUBLIST
0222  REF 204  LAST 1089     05,3554  3 4772 1          CAF    ZERO              A    INTO    A
0223  REF   3  LAST   74     05,3555  56 335 1          XCH    TMINDEX       (NOTE.. TMINDEX = DNECADR)

R0224  THE FOLLOWING CODING (FROM SNAPLOOP TO SNAPEND)IS FOR THE PURPOSE OF TAKING A SNAPSHOT OF 12 DP REGISTERS.
R0226  THIS IS DONE BY SAVING 11 DP REGISTERS IN DNTMBUFF AND SENDING THE FIRST DP WORD IMMEDIATELY.
R0228  THE SNAPSHOT PROCESSING IS THE MOST TIME CONSUMING AND THEREFORE THE CODING AND LIST STRUCTURE WERE DESIGNED
R0230  TO MINIMIZE TIME. THE TIME OPTIMIZATION RESULTS IN RULES UNIQUE TO THE SNAPSHOT PORTION OF THE DOWNLIST.
R0232  THESE RULES ARE.....
R0233        1.   ONLY 1DNADR'S CAN APPEAR IN THE SNAPSHOT SUBLIST
R0234        2.   THE 1DNADR'S CANNOT REFER TO THE FIRST LOCATION IN ANY  BANK.

 0236  REF  26  LAST  905     05,3556  54 003 0  SNAPLOOP TS     EBANK         SET EBANK
 0237  REF   3  LAST  384     05,3557  7 4350 1          MASK   LOW8          ISOLATE RELATIVE ADDRESS
 0238                         05,3560  0 0006 1          EXTEND
 0239  REF 263  LAST 1098     05,3561  5 0000 1          INDEX  A
 0240                         E3,1401                    EBANK= 1401
 0241                         05,3562  3 1402 0          DCA    1401          PICK UP 2 SNAPSHOT WORDS.
 0242  REF  26  LAST 1096       0337                     EBANK= DNTMBUFF
 0243  REF   4  LAST 1098     05,3563  50 335 1          INDEX  TMINDEX
 0244  REF  27  LAST 1098     05,3564  52 340 1          DXCH   DNTMBUFF      STORE 2 SNAPSHOT WORDS IN BUFFER
 0245  REF   5  LAST 1098     05,3565  24 335 1          INCR   TMINDEX       SET BUFFER INDEX FOR NEXT 2 WORDS.
 0246  REF   6  LAST 1098     05,3566  24 335 1          INCR   TMINDEX
 0247  REF   4  LAST 1098     05,3567  24 336 1  SNAPAGN INCR   SUBLIST       SET POINTER TO NEXT 2 WORDS OF SNAPSHOT
 0248  REF   5  LAST 1098     05,3570  50 336 1          INDEX  SUBLIST
 0249                         05,3571  0 0000 1          0      0             = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
 0250  REF 264  LAST 1098     05,3572  10 000 0          CCS    A             TEST FOR LAST TWO WORDS OF SNAPSHOT.
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0251   REF   1                05,3573  1 3556 0          TCF     SNAPLOOP        NOT LAST TWO.
0252   REF   1                05,3574   03454 1  LDNPHAS2 GENADR  DNPHASE2
0253   REF   6  LAST 1098     05,3575  54 336 0          TS      SUBLIST         YES, LAST.  SAVE A.
0254   REF  18  LAST 1098     05,3576  3 7702 0          CA      NEGONE          SET DNECADR AND
0255   REF  12  LAST 1098     05,3577  54 335 0          TS      DNECADR             SUBLIST POINTERS
0256   REF   7  LAST 1099     05,3600  56 336 1          XCH     SUBLIST                 TO NEGATIVE VALUES.
0257   REF  27  LAST 1098     05,3601  54 003 0          TS      EBANK
0258   REF   4  LAST 1098     05,3602  7 4350 1          MASK    LOW8
0259                          05,3603  0 0006 1          EXTEND
0260   REF 265  LAST 1098     05,3604  5 0000 1          INDEX   A
0261                          E3,1401                    EBANK=  1401
0262                          05,3605  3 1402 0          DCA     1401            PICK UP FIRST 2 WORDS OF SNAPSHOT.
0263   REF  28  LAST 1098        0337                    EBANK=  DNTMBUFF
0264   REF   2  LAST 1098     05,3606  1 3635 0  SNAPEND TCF     DNTMEXIT            NOW GO SEND THEM.

0265   REF  13  LAST 1099     05,3607  3 0335 1  FETCH2WD CA      DNECADR
0266   REF  28  LAST 1099     05,3610  54 003 0          TS      EBANK           SET EBANK
0267   REF   5  LAST 1099     05,3611  7 4350 1          MASK    LOW8            ISOLATE RELATIVE ADDRESS
0268   REF 126  LAST 1097     05,3612  54 001 1          TS      L
0269   REF   1                05,3613  3 3462 1          CA      DNADRDCR        DECREMENT COUNT AND ECADR
0270   REF  14  LAST 1099     05,3614  26 335 0          ADS     DNECADR
0271                          05,3615  0 0006 1          EXTEND
0272   REF 127  LAST 1099     05,3616  5 0001 0          INDEX   L
0273                          E3,1400                    EBANK=  1400
0274                          05,3617  3 1401 0          DCA     1400            PICK UP 2 DATA WORDS
0275   REF  29  LAST 1099        0337                    EBANK=  DNTMBUFF
0276   REF   3  LAST 1099     05,3620  1 3635 0          TCF     DNTMEXIT            NOW GO SEND THEM.

0277   REF   8  LAST 1099     05,3621  54 336 0  DOSUBLST TS      SUBLIST         SET SUBLIST POINTER
0278   REF   9  LAST 1099     05,3622  50 336 1  NEXTINSL INDEX   SUBLIST
0279                          05,3623  0 0000 1           0       0               = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
0280   REF 266  LAST 1099     05,3624  10 000 0          CCS     A               IS IT THE END OF THE SUBLIST
0281   REF  10  LAST 1099     05,3625  24 336 1          INCR    SUBLIST         NO-
0282                          05,3626  1 3632 1          TCF     +4
0283   REF  11  LAST 1099     05,3627  54 336 0          TS      SUBLIST         SAVE A.
0284   REF  19  LAST 1099     05,3630  3 7702 0          CA      NEGONE          SET SUBLIST TO MINUS
0285   REF  12  LAST 1099     05,3631  56 336 1          XCH     SUBLIST         RETRIEVE A.
0286   REF 267  LAST 1099     05,3632  24 000 1  +4      INCR    A
0287   REF  15  LAST 1099     05,3633  54 335 0          TS      DNECADR         SAVE DNADR
0288   REF   3  LAST 1097     05,3634  1 3515 1          TCF     SETWD +2        GO USE COMMON CODING(PROBLEMS WOULD
A0289                                                                             OCCUR IF THE PROGRAM ENCOUNTERED A
A0290                                                                             DNPTR NOW)

0291                          05,3635  0 0006 1  DNTMEXIT EXTEND                  DOWN-TELEMETRY EXIT
0292   REF   1                05,3636  01 034 1          WRITE   DNTM1           TO SEND A + L TO CHANNELS 34 + 35
0293   REF 128  LAST 1099     05,3637  3 0001 0          CA      L               RESPECTIVELY
0294                          05,3640  0 0006 1  TMEXITL  EXTEND
0295   REF   1                05,3641  01 035 0          WRITE   DNTM2
0296   REF  45  LAST 1091     05,3642  1 5323 1  TMRESUME TCF     RESUME          EXIT TELEMETRY PROGRAM VIA RESUME.
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0297 REF 2 LAST 393 7674 MINB12 EQUALS -1/8

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R0301   SUBROUTINE NAME- DNDUMP
R0302   FUNCTIONAL DESCRIPTION - TO SEND (DUMP) ALL 8 BANKS OF ERASABLE STORAGE TWICE.  BANKS ARE SENT ONE AT A TIME
R0304           EACH BANK IS PRECEEDED BY AN ID WORD, SYNCH BITS, ECADR AND TIME1 FOLLOWED BY THE 256D WORDS OF EACH
R0306           EBANK. EBANKS ARE DUMPED IN ORDER(I.E. EBANK 0 FIRST, THEN EBANK1 ETC.)
R0308   CALLING SEQUENCE- THE GROUND OR ASTRONAUT BY KEYING V74E CAN INITIALIZE THE DUMP.
R0310           AFTER KEYING IN V74E THE CURRENT DOWNLIST WILL BE IMMEDIATELY TERMINATED AND THE DOWNLINK ERASABLE DUMP
R0312           WILL BEGIN.
R0313           ONCE INITIATED THE DOWNLINK ERASABLE DUMP CAN BE TERMINATED (AND INTERRUPTED DOWNLIST REINSTATED) ONLY
R0315           BY THE FOLLOWING:
R0316            1. A FRESH START
R0317            2. COMPLETION OF BOTH COMPLETE DUMPS
R0320            3. AND INVOLUNTARILY BY A RESTART.
R0321   NORMAL EXIT MODE- TCF DNPHASE1
R0322   ALARM OR ABORT MODE- NONE
R0323   *SUBROUTINES CALLED- NONE.
R0324   ERASABLE INITIALIZATION REQUIRED-
R0325           NONE
R0328   DEBRIS- DUMPLOC, DUMPSW, DNTMGOTO, EBANK AND CENTRAL REGISTERS
R0329   TIMING-   TIME(IN SECS) = ((NO.DUMPS)*(NO.EBANKS)* (WDSPEREBANK + NO.IDWDS)) / NO.WDSPERSEC
R0331           TIME(IN SECS) =  (   4    )*(    8    )* (    256     +     4    ) /     100
R0333        THUS TIME(IN SECS TO SEND DUMP OF ERASABLE 4 TIMES VIA DOWNLINK) = 83.2 SECONDS

R0335   STRUCTURE OF ONE EBANK AS IT IS SENT BY DOWNLINK PROGRAM-
R0336      (REMINDER-THIS ONLY DESCRIBES ONE OF THE 8 EBANKS X 4 (DUMPS) = 32 EBANKS WHICH WILL BE SENT BY DNDUMP)
R0338           DOWNLIST                                    W
R0339            WORD   TAKEN FROM CONTENTS OF    EXAMPLE 0  COMMENTS

R0340              1    ERASID                     0177X  0  DOWNLIST I.D. FOR DOWNLINK ERASABLE DUMP (X=7 CSM, 6 LM)
R0342              2    LOWIDCOD                   77340  1  DOWNLINK SYNCH BITS.(SAME ONE USED IN ALL OTHER DOWNLISTS)
R0344              3    DUMPLOC                    13400  1  (SEE NOTES ON DUMPLOC)1= 3RD ERAS DUMP, 3400=ECADR OF 5TH WD
R0346              4    TIME1                      14120  1  TIME IN CENTISECONDS
R0347              5    FIRST WORD OF EBANK X      03400  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1400 (ECADR 3400)
R0349              6    2ND   WORD OF EBANK X      00142  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1401 (ECADR 3401)
R0351              7    3RD   WORD OF EBANK X      00142  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1402 (ECADR 3402)
R0353              .                               1
R0354              .                               1
R0355              .                               1
R0356            260D   256TH WORD OF EBANK X      03777  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1777 (ECADR 3777)

R0358   NOTE- DUMPLOC CONTAINS THE COUNTER AND ECADR FOR EACH WORD BEING SENT.
R0359         THE BIT STRUCTURE OF DUMPLOC IS FOLLOWS---
R0360                                          X = NOT USED
R0361              X ABC EEE RRRRRRRR        ABC = ERASABLE DUMP COUNTER(I.E. ABC = 0,1,2 OR 3 WHICH MEANS THAT
R0363                                              COMPLETE ERASABLE DUMP NUMBER  1,2,3 OR 4 RESPECTIVELY IS IN PROGRESS)
R0365                                        EEE = EBANK BITS
R0366                                  RRRRRRRR = RELATIVE ADDRESS WITHIN AN EBANK.

 0368   REF 205  LAST 1098   05,3643  3 4772 1  DNDUMPI  CA    ZERO        INITIALIZE DOWNLINK
 0369   REF   1              05,3644  54 335 0            TS    DUMPLOC     ERASABLE DUMP
 0370   REF   2  LAST 1097   05,3645  0 3706 0   +2       TC    SENDID      GO SEND ID AND SYNCH BITS
```

L DOWN-TELEMETRY PROGRAM USER'S PAGE NO. 10 ED S3

```
0371  REF   1                  05,3646  3 3655 1              CA     LDNDUMP1      SET DNTMGOTO
0372  REF   6  LAST 1097       05,3647  54 334 1              TS     DNTMGOTO      TO LOCATION FOR NEXT PASS
0373  REF  22  LAST 1091       05,3650  3 0025 0              CA     TIME1         PLACE TIME1
0374  REF 129  LAST 1099       05,3651  56 001 0              XCH    L             INTO L
0375  REF   2  LAST 1101       05,3652  3 0335 1              CA     DUMPLOC       AND ECADR OF THIS EBANK INTO A
0376  REF   4  LAST 1099       05,3653  1 3635 0              TCF    DNTMEXIT      SEND DUMPLOC AND TIME1

0377  REF   1                  05,3654   03656 1  LDNDUMP     ADRES  DNDUMP
0378  REF   1                  05,3655   03670 0  LDNDUMP1    ADRES  DNDUMP1

0379  REF  47  LAST 1087       05,3656  3 4767 0  DNDUMP      CA     TWO           INCREMENT ECADR IN DUMPLOC
0380  REF   3  LAST 1102       05,3657  26 335 0              ADS    DUMPLOC       TO NEXT DP WORD TO BE
0381  REF   6  LAST 1099       05,3660  7 4350 1              MASK   LOW8          DUMPED AND SAVE IT.
0382  REF 268  LAST 1099       05,3661  10 000 0              CCS    A             IS THIS THE BEGINNING OF A NEW EBANK
0383  REF   1                  05,3662  1 3672 0              TCF    DNDUMP2       NO- THEN CONTINUE DUMPING
0384  REF   4  LAST 1102       05,3663  3 0335 1              CA     DUMPLOC       YES- IS THIS THE END OF THE
0385  REF  36  LAST 1032       05,3664  7 4754 1              MASK   BIT13         SECOND COMPLETE ERASABLE DUMP?
0386                           05,3665  0 0006 1              EXTEND
0387  REF   2  LAST  271       05,3666  1 3645 1              BZF    DNDUMP1 +2    NO - GO BACK AND INITIALIZE NEXT BANK
0390  REF   2  LAST  205       05,3667  1 3446 0              TCF    DNPHASE1      YES - SEND DOWNLIST AGAIN
0391  REF   1                  05,3670  3 3654 0  DNDUMP1     CA     LDNDUMP       SET DNTMGOTO
0392  REF   7  LAST 1102       05,3671  54 334 1              TS     DNTMGOTO      FOR WORDS 3 TO 256D OF CURRENT EBANK

0393  REF   5  LAST 1102       05,3672  3 0335 1  DNDUMP2     CA     DUMPLOC
0394  REF  29  LAST 1099       05,3673  54 003 0              TS     EBANK         SET EBANK
0395  REF   7  LAST 1102       05,3674  7 4350 1              MASK   LOW8          ISOLATE RELATIVE ADDRESS.
0396  REF 186  LAST 1085       05,3675  54 002 1              TS     Q             (NOTE: MASK INSTRUCTION IS USED TO PICK
0397  REF  16  LAST  744       05,3676  3 4771 1              CA     NEG0          UP ERASABLE REGISTERS SO THAT EDITING
0398  REF 130  LAST 1102       05,3677  54 001 1              TS     L             REGISTERS 20-23 WILL NOT BE ALTERED.)
0399  REF 187  LAST 1102       05,3700  50 002 0              INDEX  Q
0400                           E3,1400                        EBANK= 1400          PICK UP LOW ORDER REGISTER OF PAIR
0401                           05,3701  7 1401 1              MASK   1401          OF ERASABLE REGISTERS.
0402  REF 131  LAST 1102       05,3702  56 001 0              XCH    L
0403  REF 188  LAST 1102       05,3703  50 002 0              INDEX  Q             PICK UP HIGH ORDER REGISTER OF PAIR
0404                           05,3704  7 1400 0              MASK   1400          OF ERASABLE REGISTERS.
0405  REF  30  LAST 1099        0337                          EBANK= DNTMBUFF
0406  REF   5  LAST 1102       05,3705  1 3635 0              TCF    DNTMEXIT      GO SEND THEM


0407                           05,3706  0 0006 1  SENDID      EXTEND               **ENTRANCE USED BY ERASABLE DUMP PROG.**
0408  REF   8  LAST 1102       05,3707  22 334 0              QXCH   DNTMGOTO      SET DNTMGOTO SO NEXT TIME PROG WILL GO
0409  REF   1                  05,3710  3 5041 1              CAF    ERASID        TO LOCATION FOLLOWING :TC SENDID:

0410  REF  15  LAST  278       05,3711  54 061 1     +3       TS     ITEMP1        ** ENTRANCE USED BY REGULAR DOWNLINK
A04101                                                                            PROGRAM  **
0411  REF   2  LAST 1097       05,3712  0 3536 1              TC     WOZERO        GO SET WORD ORDER CODE TO ZERO
0412  REF   1                  05,3713  3 2000 0              CAF    LOWIDCOD      PLACE SPECIAL ID CODE INTO L
0413  REF 132  LAST 1102       05,3714  56 001 0              XCH    L             AND ID BACK INTO A
04135 REF  16  LAST 1102       05,3715  3 0061 0              CA     ITEMP1
0414  REF   6  LAST 1102       05,3716  1 3635 0              TCF    DNTMEXIT      SEND DOWNLIST ID CODE(S).
```

L DOWN-TELEMETRY PROGRAM USER'S PAGE NO. 11 E0 S3

L INTER-BANK COMMUNICATION USER'S PAGE NO. 1 E0 S3

```
R0001           THE FOLLOWING ROUTINE CAN BE USED TO CALL A SUBROUTINE IN ANOTHER BANK. IN THE BANKCALL VERSION, THE
R0003   CADR OF THE SUBROUTINE IMMEDIATELY FOLLOWS THE  TC BANKCALL  INSTRUCTION, WITH C(A) AND C(L) PRESERVED.

 00045  REF   3  LAST  432      4000                        SETLOC FFTAG1
 0005                            4636                        BANK

 00055  REF   1                                             COUNT* $$/BANK
 0006   REF   4  LAST  424      4636  52 134 0  BANKCALL    DXCH   BUF2          SAVE INCOMING A,L.
 0007   REF 189  LAST 1102      4637  50 002 0              INDEX  Q             PICK UP CADR.
 0008                            4640  3 0000 1              CA     0
 0009   REF 190  LAST 1104      4641  24 002 0    -1        INCR   Q             SO WE RETURN TO THE LOC. AFTER THE CADR.

R0010           SWCALL IS IDENTICAL TO BANKCALL, EXCEPT THAT THE CADR ARRIVES IN A.

 0012   REF 133  LAST 1102      4642  54 001 1  SWCALL      TS     L
 0013   REF   3  LAST  592      4643  22 004 0              LXCH   FBANK         SWITCH BANKS, SAVING RETURN.
 0014   REF   5  LAST  424      4644  7 5041 0              MASK   LOW10          GET SUB-ADDRESS OF CADR.
 0015   REF 191  LAST 1104      4645  56 002 0              XCH    Q             A,L NOW CONTAINS DP RETURN.
 0016   REF   5  LAST 1104      4646  52 134 0              DXCH   BUF2          RESTORING INPUTS IF THIS IS A BANKCALL.
 0017   REF 192  LAST 1104      4647  50 002 0              INDEX  Q
 0018                            4650  0 2000 0              TC     10000         SETTING Q TO SWRETURN.

 0019   REF   6  LAST 1104      4651  56 134 1  SWRETURN    XCH    BUF2 +1       COMES HERE TO RETURN TO CALLER. C(A,L)
 0020   REF   4  LAST 1104      4652  56 004 0              XCH    FBANK         ARE PRESERVED FOR RETURN.
 0021   REF   7  LAST 1104      4653  56 134 1              XCH    BUF2 +1
 0022   REF   8  LAST 1104      4654  0 0133 0              TC     BUF2

R0023           THE FOLLOWING ROUTINE CAN BE USED AS A UNILATERAL JUMP WITH C(A,L) PRESERVED AND THE CADR IMMEDIATELY
R0025   FOLLOWING THE TC POSTJUMP INSTRUCTION.

 0026   REF 193  LAST 1104      4655  56 002 0  POSTJUMP    XCH    Q             SAVE INCOMING C(A).
 0027   REF 269  LAST 1102      4656  50 000 1              INDEX  A             GET CADR.
 0028                            4657  3 0000 1              CA     0

R0029           BANKJUMP IS THE SAME AS POSTJUMP, EXCEPT THAT THE CADR ARRIVES IN A.

 0031   REF   5  LAST 1104      4660  54 004 1  BANKJUMP    TS     FBANK
 0032   REF   6  LAST 1104      4661  7 5041 0              MASK   LOW10
 0033   REF 194  LAST 1104      4662  56 002 0              XCH    Q             RESTORING INPUT C(A) IF THIS WAS A
 0034   REF 195  LAST 1104      4663  50 002 0  Q+10000     INDEX  Q             POSTJUMP.
 0035                            4664  1 2000 1  PRIO12      TCF    10000         PRIO12 = TCF   10000 = 12000
```

L INTER-BANK COMMUNICATION USER'S PAGE NO. 2 E0 53

P0036 THE FOLLOWING ROUTINE GETS THE RETURN CADR SAVED BY SWCALL OR BANKCALL AND LEAVES IT IN A.

```
C0038  REF   7  LAST 1104    4665  3 5041 1  MAKECADR CAF    LOWIO
C0039  REF   9  LAST 1104    4666  7 0133 1           MASK   BUF2
C0040  REF  10  LAST 1105    4667  6 0134 1           AD     BUF2 +1
C0041  REF 196  LAST 1104    4670  0 0002 0           TC     Q


C0465  REF   3  LAST  386    4671  54 135 1  SUPDACAL TS     MPTEMP
C0047  REF   6  LAST 1104    4672  56 004 0           XCH    FBANK          SET FBANK FOR DATA.
C0475                        4673  0 0006 1           EXTEND
C0048  REF   9  LAST  589    4674  04 007 1           ROR    SUPERBNK       SAVE FBANK IN BITS 15-11, AND
C0485  REF   4  LAST 1105    4675  56 135 0           XCH    MPTEMP          SUPERBANK IN BITS  7-5.
C0049  REF   8  LAST 1105    4676  7 5041 0           MASK   LOWIO
C0495  REF 134  LAST 1104    4677  56 001 0           XCH    L              SAVE REL. ADR. IN BANK, FETCH SUPERBITS.
C0050                        4700  0 0004 0           INHINT                BECAUSE RUPT DOES NOT SAVE SUPERBANK.
C0505                        4701  0 0006 1           EXTEND
C0051  REF  10  LAST 1105    4702  01 007 1           WRITE  SUPERBNK       SET SUPERBANK FOR DATA.
C0052  REF 135  LAST 1105    4703  50 001 0           INDEX  L
C0525                        4704  3 2000 0           CA     10000          PINBALL (FIX MEM DISP) PREVENTS DCA HERE
C0053  REF   5  LAST 1105    4705  56 135 0           XCH    MPTEMP         SAVE 1ST WD, FETCH OLD FBANK AND SBANK.
C0534                        4706  0 0006 1           EXTEND
C0535  REF  11  LAST 1105    4707  01 007 1           WRITE  SUPERBNK       RESTORE SUPERBANK.
C0054                        4710  0 0003 1           RELINT
C0545  REF   7  LAST 1105    4711  54 004 1           TS     FBANK          RESTORE FBANK.
C0055  REF   6  LAST 1105    4712  3 0135 0           CA     MPTEMP         RECOVER FIRST WORD OF DATA.
C0555                        4713  0 0002 0           RETURN                24 WDS. DATACALL 516 MU, SUPDACAL 432 MU
```

L INTER-BANK COMMUNICATION USER'S PAGE NO. 3 E0 S3

PC056 THE FOLLOWING ROUTINES ARE IDENTICAL TO BANKCALL AND SWCALL EXCEPT THAT THEY ARE USED IN INTERRUPT.

```
C058  REF   2 LAST  426   4714  52 073 1  IBNKCALL DXCH   RUPTREG3      USES RUPTREG3,4 FOR DP RETURN ADDRESS.
C059  REF 197 LAST 1105   4715  50 002 0            INDEX  Q
C060                      4716  3 0000 1            CAF    0
C061  REF 198 LAST 1106   4717  24 002 0            INCR   Q

C062  REF 136 LAST 1105   4720  54 001 1  ISWCALL   TS     L
C063  REF   8 LAST 1105   4721  22 004 0            LXCH   FBANK
C064  REF   9 LAST 1105   4722  7 5041 0            MASK   LOW10
C065  REF 199 LAST 1106   4723  56 002 0            XCH    Q
C066  REF   3 LAST 1106   4724  52 073 1            DXCH   RUPTREG3
C067  REF 200 LAST 1106   4725  50 002 0            INDEX  Q
C068                      4726  0 2000 0            TC     10000

C069  REF   3 LAST   69   4727  56 073 0  ISWRETRN  XCH    RUPTREG4
C070  REF   9 LAST 1106   4730  56 004 0            XCH    FBANK
C071  REF   4 LAST 1106   4731  56 073 0            XCH    RUPTREG4
C072  REF   4 LAST 1106   4732  0 0072 1            TC     RUPTREG3
```

RC090 2. USPRCADR ACCESSES INTERPRETIVE CODING IN OTHER THAN THE USER'S FBANK. THE CALLING SEQUENCE IS AS FOLLOWS:

```
AC092                                 L       TC     USPRCADR
AC093                                 L+1     CADR   INTPRETX      INTPRETX IS THE INTERPRETIVE CODING
AC094                                                               RETURN IS TO L+2

0103  REF   4 LAST  426   4733  54 164 0  USPRCADR  TS     LOC      SAVE A
0104  REF  28 LAST  961   4734  3 4761 0            CA     BIT8
0105  REF   7 LAST  379   4735  54 023 1            TS     EDOP     EXIT INSTRUCTION TO EDOP
0106  REF  12 LAST  424   4736  3 0006 1            CA     BBANK
0107  REF   1             4737  54 165 1            TS     BANKSET  USER'S BBANK TO BANKSET
0108  REF 201 LAST 1106   4740  50 002 0            INDEX  Q
0109                      4741  3 0000 1            CA     0
0110  REF  10 LAST 1106   4742  54 004 1            TS     FBANK    INTERPRETIVE BANK TO FBANK
0111  REF  10 LAST 1106   4743  7 5041 0            MASK   LOW10    YIELDS INTERPRETIVE RELATIVE ADDRESS
0112  REF 202 LAST 1106   4744  56 002 0            XCH    Q        INTERPRETIVE ADDRESS TO Q, FETCHING L+1
0113  REF   5 LAST 1106   4745  56 164 1            XCH    LOC      L+1 TO LOC, RETRIEVING ORIGINAL A
0114  REF   1             4746  1 4663 1            TCF    Q+1 000
```

L INTER-BANK COMMUNICATION

PC117 THERE ARE FOUR POSSIBLE SETTINGS FOR CHANNEL 07. (CHANNEL 07 CONTAINS THE SUPERBANK SETTING.)

SUPERBANK	SETTING	S-REG. VALUE	PSEUDO-FIXED BANK NUMBERS	OCTAL PSEUDO ADDRESSES	
SUPERBANK 3	0XX	2000 - 3777	30 - 37	70000 - 107777	(WHERE XX CAN BE ANYTHING AND WILL USUALLY BE SEEN AS 11)
SUPERBANK 4	100	2000 - 3777	40 - 47	110000 - 127777	(AS FAR AS IT CAN BE SEEN, ONLY BANKS 40-43 WILL EVER BE AND ARE PRESENTLY AVAILABLE)
SUPERBANK 5	101	2000 - 3777	50 - 57	130000 - 147777	(PRESENTLY NOT AVAILABLE TO THE USER)
SUPERBANK 6	110	2000 - 3777	60 - 67	150000 - 167777	(PRESENTLY NOT AVAILABLE TO THE USER)

L INTERPRETER USER'S PAGE NO. 1 EO S3

R0001 SECTION 1 DISPATCHER

R0002 ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST INSTRUCTION, BANKSET TO THE BBANK OF THE
R0004 OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN
R0006 VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS
R0008 (BIT15 OF FBANK = 1) DO NOT REFER TO LOWBANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPERBANKS.
R0010 E-BANK SWITCHING OCCURS WHENEVER GENERAL ERASABLE (100 - 3777) IS ADDRESSED.

```
0012   REF   1                  6000                          SETLOC  INTERF3
00125                           6006                          BANK

0013   REF   1                                                COUNT*  $$/INTER
00135                           6006  0 0003 1  INTPRET       RELINT
0014                            6007  0 0006 1                EXTEND                  SET LOC TO THE WORD FOLLOWING THE TC.
0015   REF   6  LAST 1106       6010  22 164 1    +2          QXCH    LOC

0016   REF  13  LAST 1106       6011  3 0006 1    +3          CA      BBANK           INTERPRETIVE BRANCHES FINISH HERE.
0017   REF   2  LAST 1106       6012  54 165 1                TS      BANKSET
0018   REF  39  LAST 1015       6013  7 4752 1                MASK    BIT15           GET 15TH BIT FOR INDEXABLE ADDRESSES.
0019   REF   4  LAST   70       6014  54 115 0                TS      INTBIT15

0020   REF   8  LAST 1106       6015  54 023 1                TS      EDOP            MAKE SURE NO INSTRUCTIONS LEFT OVER
0021   REF   1                  6016  1 6037 1                TCF     NEWOPS          PICK UP OP CODE PAIR AND BEGIN.

0022   REF  14  LAST 1108       6017  22 006 1  INTRSM       LXCH    BBANK           RESUME SUSPENDED INTERPRETIVE JOB
0023   REF 226  LAST  940       6020  1 6011 0                TCF     INTPRET +3
R0024                DLOAD LOADS MPAC, MPAC +1, LEAVING ZERO IN MPAC +2.

0025                            6021  0 0006 1  DLOAD        EXTEND
0026   REF   1                  6022  5 0116 1                INDEX   ADDRWD
0027                            6023  3 0001 0                DCA     0               LOAD DP C(C(ADDRWD)) INTO MPAC,MPAX +1
0028   REF 288  LAST  917       6024  52 155 1  SLOAD2       DXCH    MPAC
0029   REF 206  LAST 1101       6025  3 4772 1                CAF     ZERO            ZERO MPAC +2
```

```
P0030           AT THE END OF MOST INSTRUCTIONS, CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

 0032   REF 289  LAST 1108    6026  54 156 1   +2       TS     MPAC +2        AND DECLARE DP MODE
 0033   REF   4  LAST  543    6027  54 163 1   NEWMODE  TS     MODE           PROLOGUE FOR MODE-CHANGING INSTRUCTIONS.

 0034   REF   3  LAST 1108    6030   3 0165 0   DANZIG   CA     BANKSET        SET BBANK BEFORE TESTING NEWJOB SO THAT
 0035   REF  15  LAST 1108    6031  54 006 0              TS     BBANK          IT MAY BE SAVED DIRECTLY BY CHANJOB.

 0036   REF   9  LAST 1108    6032  10 023 1   NOIBNKSW CCS    EDOP           SEE IF AN ORDER CODE IS LEFT OVER FROM
 0037   REF   1               6033   1 6046 1              TCF    DPJUMP         THE LAST PAIR RETRIEVED. IF SO, EXECUTE.
A0038                                                                         EDOP IS SET TO ZERO ON ITS RE-EDITING.

 0039   REF   6  LAST  882    6034  10 067 1              CCS    NEWJOB         SEE IF A JOB OF HIGHER PRIORITY IS
 0040   REF   1               6035   1 5156 1              TCF    CHANG2         PRESENT, AND IF SO, CHANGE JOBS.

 0041   REF   7  LAST 1108    6036  24 164 1              INCR   LOC            ADVANCE THE LOCATION COUNTER.
R0042           ITRACE (1) REFERS TO "NEWOPS".
 0043   REF   8  LAST 1109    6037  50 164 1   NEWOPS   INDEX  LOC            ENTRY TO BEGIN BY PICKING OP CODE PAIR.
 0044                         6040   3 0000 1              CA     0              MAY BE AN OPCODE PAIR OR A STORE CODE.
 0045   REF 270  LAST 1104    6041  10 000 0              CCS    A              TEST SIGN AND GET DABS(A).
 0046   REF   1               6042   1 6331 1              TCF    DOSTORE        PROCESS STORE CODE.

 0047                         6043   00177 0   LOW7     OCT    177

 0048   REF  10  LAST 1109    6044  54 023 1              TS     EDOP           OP CODE PAIR. LEAVE THE OTHER IN EDOP
 0049   REF   6  LAST  379    6045   7 6043 1              MASK   LOW7           WHERE  CCS EDOP  WILL HONOR IT NEXT.

 0050   REF   7  LAST  384    6046  54 020 1   DPJUMP   TS     CYR            LOWWD ENTERS HERE IF A RIGHT-HAND OP
 0051   REF   8  LAST 1109    6047  10 020 1              CCS    CYR            CODE IS TO BE PROCESSED. TEST PREFICES.
 0052   REF   1               6050   1 6216 0              TCF    DPJUMP2        TEST SECOND PREFIX BIT.

 0053   REF   1               6051   1 6712 1              TCF    EXIT           +0 OP CODE IS EXIT.
```

L INTERPRETER USER'S PAGE NO. 3 E0 S3

```
P0054           PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

 0056   REF  60  LAST 1089     6052  7 4770 1  ADDRESS  MASK    BIT1     SEE IF ADDRESS IS INDEXED. CYR CONTAINED
 0057   REF 271  LAST 1109     6053  10 000 0            CCS     A        400XX, SO BIT 1 IS NOW AS IT WAS IN CYR.
 0058   REF   1                6054  1 6115 0            TCF     INDEX    FORM INDEXED ADDRESS.

 0059   REF   9  LAST 1109     6055  50 164 1  DIRADRES INDEX   LOC      LOOK AHEAD TO NEXT WORD TO SEE IF
 0060                          6056  4 0001 1  OCT40001 CS      1        ADDRESS IS GIVEN.
 0061   REF 272  LAST 1110     6057  10 000 0            CCS     A
 0062   REF   1                6060  1 6164 0            TCF     PUSHUP   IF NOT.

 0063                          6061   77773 1  NEG4     DEC     -4

 0064   REF  10  LAST 1110     6062  24 164 1            INCR    LOC      IF SO, TO SHOW WE PICKED UP A WORD.
 0065   REF   2  LAST 1108     6063  54 116 0            TS      ADDRWD
```

```
P0066           FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE
R0068   REQUIRED 12-BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED E OR F BANK SWITCHING DONE. ADDRESSES LESS
R0070   THAN 45D ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.


0072    REF   1                 6064  6 6220 1          AD      -ENDVAC         SEE IF ADDRESS RELATIVE TO WORK AREA.
0073    REF 273  LAST 1110      6065  10 000 0          CCS     A
0074    REF   1                 6066  6 7676 1          AD      -ENDERAS        IF NOT, SEE IF IN GENERAL ERASABLE.
0075    REF   1                 6067  1 6074 0          TCF     IERASTST

0076    REF  16  LAST  894      6070  3 0120 1  NETZERO  CA      FIXLOC          IF SO, LEAVE THE MODIFIED ADDRESS IN
0077    REF   3  LAST 1110      6071  26 116 0          ADS     ADDRWD          ADDRWD AND DISPATCH.
0078    REF   9  LAST 1109      6072  50 020 0  ITR15    INDEX   CYR             THIS INDEX MAKES THE NEXT INSTRUCTION
0079    REF   1                 6073  7 6242 1          7       INDJUMP -1      TCF INDJUMP + OP, EDITING CYR.

0080                            6074  0 0006 1  IERASTST EXTEND
0081    REF   1                 6075  6 6105 0          BZMF    GEADDR          GO PROCESS GENERAL-ERASABLE ADDRESS.

0082    REF  11  LAST 1106      6076  7 5041 0          MASK    LOW10           FIXED BANK ADDRESS. RESTORE AND ADD B15.
0083    REF  12  LAST 1111      6077  6 5041 1          AD      LOW10           SWITCH BANKS AND LEAVE SUBADDRESS IN
0084    REF   4  LAST 1111      6100  56 116 1          XCH     ADDRWD          ADDRWD FOR OPERAND RETRIEVAL. (THIS
0085    REF   5  LAST 1108      6101  6 0115 1          AD      INTBIT15        METHOD PRECLUDES USE OF THE LAST
0086    REF  11  LAST 1106      6102  54 004 1          TS      FBANK           LOCATION IN EACH FBANK.)
0087    REF  10  LAST 1111      6103  50 020 0  ITR12    INDEX   CYR
0088    REF   2  LAST 1111      6104  7 6242 1          7       INDJUMP -1

0089    REF   8  LAST 1102      6105  7 4350 1  GEADDR   MASK    LOW8
0090    REF   4  LAST  384      6106  6 5024 1          AD      OCT1400
0091    REF   5  LAST 1111      6107  56 116 1          XCH     ADDRWD
0092    REF  30  LAST 1102      6110  54 003 0          TS      EBANK
0093    REF  11  LAST 1111      6111  50 020 0  ITR10    INDEX   CYR
0094    REF   3  LAST 1111      6112  7 6242 1          7       INDJUMP -1
```

L INTERPRETER USER'S PAGE NO. 5 EC S3

```
PC095           THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY
R0097   CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM
R0099   BANK, OR ANY INTEGER IN THAT RANGE.

 0100   REF   1                 6113  3 7666 0  DODLOAD* CAF    CLOAD*          STODL* COMES HERE TO PROCESS LOAD ADR.
 0101   REF  12  LAST 1111      6114  54 020 1    +1     TS     CYR             (STOVL* ENTERS HERE).
 0102   REF  17  LAST 1111      6115  3 0120 1  INDEX    CA     FIXLOC          SET UP INDEX LOCATION.
 0103   REF   1                 6116  54 130 1          TS     INDEXLOC
 0104   REF  11  LAST 1110      6117  24 164 1          INCR   LOC             (ADDRESS ALWAYS GIVEN).
 0105   REF  12  LAST 1112      6120  50 164 1          INDEX  LOC
 0106                           6121  4 0000 0          CS     0
 0107   REF 274  LAST 1111      6122  10 000 0          CCS    A               INDEX 2 IF ADDRESS STORED COMPLEMENTED.
 0108   REF   2  LAST 1112      6123  24 130 0          INCR   INDEXLOC
 0109                           6124  16 125 0          NOOP

 0110   REF   6  LAST 1111      6125  54 116 0          TS     ADDRWD          14 BIT ADDRESS TO ADDRWD.
 0111   REF   2  LAST  141      6126  7 7675 0          MASK   HIGH4           IF ADDRESS GREATER THAN 2K, ADD INTBIT15
 0112                           6127  0 0006 1          EXTEND
 0113   REF   1                 6130  1 6133 1          BZF    INDEX2
 0114   REF   6  LAST 1111      6131  3 0115 1          CA     INTBIT15
 0115   REF   7  LAST 1112      6132  26 116 0          ADS    ADDRWD

 0116   REF   3  LAST 1112      6133  50 130 0  INDEX2  INDEX  INDEXLOC
 0117   REF  46  LAST  936      6134  4 0046 1          CS     X1
 0118   REF   8  LAST 1112      6135  26 116 0          ADS    ADDRWD          DO AUGMENT, IGNORING AND CORRECTING OVF.

 0119   REF   4  LAST  787      6136  7 7677 1          MASK   HIGH9           SEE IF ADDRESS IS IN WORK AREA.
 0120                           6137  0 0006 1          EXTEND
 0121   REF   1                 6140  1 6153 1          BZF    INDWORK
 0122   REF   3  LAST 1112      6141  7 7675 0          MASK   HIGH4           SEE IF IN FIXED BANK.
 0123                           6142  0 0006 1          EXTEND
 0124   REF   1                 6143  1 6155 1          BZF    INDERASE

 0125   REF   9  LAST 1112      6144  3 0116 1          CA     ADDRWD          IN FIXED - SWITCH BANKS AND CREATE
 0126   REF  12  LAST 1111      6145  54 004 1          TS     FBANK           SUB-ADDRESS.
 0127   REF  13  LAST 1111      6146  7 5041 0          MASK   LOW10
 0128   REF   1                 6147  6 4756 1          AD     2K
 0129   REF  10  LAST 1112      6150  54 116 0          TS     ADDRWD
 0130   REF  13  LAST 1112      6151  50 020 0  ITR11   INDEX  CYR
 0131   REF   4  LAST 1111      6152  3 6242 0          3      INDJUMP -1

 0132   REF  18  LAST 1112      6153  3 0120 1  INDWORK CA     FIXLOC          MAKE ADDRWD RELATIVE TO WORK AREA.
 0133   REF   1                 6154  1 6161 0          TCF    ITR13 -1

 0134   REF   5  LAST 1111      6155  3 5024 1  INDERASE CA    CCT1400
 0135   REF  11  LAST 1112      6156  56 116 1          XCH    ADDRWD
 0136   REF  31  LAST 1111      6157  54 003 0          TS     EBANK
 0137   REF   9  LAST 1111      6160  7 4350 1          MASK   LOW8
 0138   REF  12  LAST 1112      6161  26 116 0    -1    ADS    ADDRWD
 0139   REF  14  LAST 1112      6162  50 020 0  ITR13   INDEX  CYR
```

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```
0140   REF   5 LAST 1112      6163  3 6242 0          3      INDJUMP -1
```

```
R0141           PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN
R0143   LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED
R0145   IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED
R0147   BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT):

R0148           1.  VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR
R0150   RESULT, VXSC WANTS A SCALAR.

R0151           2.  THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS
R0153   INCLUDES VLOAD, DLOAD, TLOAD, PDDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0154           3.  SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION.
R0156   THIS INCLUDES SIGN WANTING DP AND TAD REQUIRING TP.

 0157   REF   1                  6164  3 4351 1  PUSHUP  CAF     OCT23           IF THE LOW 5 BITS OF CYR ARE LESS THAN
 0158   REF  15  LAST 1112       6165  7 0020 1          MASK    CYR             20, THIS OP REQUIRES SPECIAL ATTENTION.
 0159   REF   3  LAST  638       6166  6 6171 0          AD      -OCT10          (NO -0).
 0160   REF 275  LAST 1112       6167  10 000 0          CCS     A
 0161   REF   1                  6170  1 6202 0          TCF     REGUP           FOR ALL CODES GREATER THAN OCT 7.

 0162                            6171   77767 1  -OCT10  OCT     -10

 0163   REF   2  LAST 1048       6172  6 6061 0          AD      NEG4            WE NOW HAVE 7 - OP CODE(MOD4). SEE IF
 0164   REF 276  LAST 1114       6173  10 000 0          CCS     A               THE OP CODE (MOD4) IS THREE (REVERSE).
 0165   REF 277  LAST 1114       6174  50 000 1          INDEX   A               NO - THE MODE IS DEFINITE. PICK UP THE
 0166   REF   1                  6175  4 6213 0          CS      NO.WDS
 0167   REF   2  LAST 1114       6176  1 6204 0          TCF     REGUP +2

 0168   REF   5  LAST 1109       6177  50 163 0          INDEX   MODE            FOR VXSC AND V/SC WE WANT THE REQUIRED
 0169   REF   2  LAST  547       6200  4 6211 1          CS      REVCNT          PUSHLOC DECREMENT WITHOUT CHANGING THE
 0170   REF   3  LAST 1114       6201  1 6204 0          TCF     REGUP +2        MODE AT THIS TIME.

 0171   REF   6  LAST 1114       6202  50 163 0  REGUP   INDEX   MODE            MOST ALL OP CODES PUSHUP HERE.
 0172   REF   2  LAST 1114       6203  4 6213 0          CS      NO.WDS
 0173   REF   1                  6204  26 166 1  +2     ADS     PUSHLOC
 0174   REF  13  LAST 1112       6205  54 116 0          TS      ADDRWD
 0175   REF  16  LAST 1114       6206  50 020 0  ITR14   INDEX   CYR
 0176   REF   6  LAST 1113       6207  7 6242 1          7       INDJUMP -1      (THE INDEX MAKES THIS A TCF.)

 0177                            6210   00002 0          OCT     2               REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
 0178                            6211   00006 1  REVCNT  OCT     6               WORDS, SCALAR TAKES 6.
 0179                            6212   00006 1          OCT     6
 0180                            6213   00002 0  NO.WDS  OCT     2               CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
 0181                            6214   00003 1  OCTAL3  OCT     3               2 IN DP, AND 3 IN TP.
 0182                            6215   00006 1          OCT     6
```

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```
P0183                TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

 0185   REF  17  LAST 1114      6216  10 020 1  OPJUMP2  CCS    CYR          TEST SECOND PREFIX BIT.
 0186   REF   1                 6217  1 6232 0           TCF    OPJUMP3      TEST THIRD BIT TO SEE IF UNARY OR SHIFT.

 0187                           6220   77722 0  -ENDVAC  DEC    -45

R0188                THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUFFIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES
R0190   IN THE RANGE 0 - 52, ERASABLE ECADR CONSTANTS FROM 100 - 3777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE
R0192   IN CONTRAST TO SUFFIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

 0193   REF  13  LAST 1112      6221  24 164 1  15BITADR INCR   LOC          (ENTRY HERE FROM STCALL).
 0194   REF  14  LAST 1115      6222  50 164 1           INDEX  LOC          PICK UP ADDRESS WORD.
 0195                           6223  3 0000 1           CA     0
 0196   REF   5  LAST   70      6224  54 117 1           TS     POLISH       WE MAY NEED A SUBADDRESS LATER.

 0197   REF   1                 6225  3 5042 1           CAF    LOW7+2K      THESE INSTRUCTIONS ARE IN BANK 1.
 0198   REF  13  LAST 1112      6226  54 004 1           TS     FBANK
 0199   REF  18  LAST 1115      6227  7 0020 1           MASK   CYR
 0200   REF 278  LAST 1114      6230  50 000 1  ITR7     INDEX  A
 0201   REF   1                 6231  1 6303 0           TCF    MISCJUMP
```

```
P0202           COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

 0203   REF  14  LAST 1115      6232  54 004 1  OPJUMP3  TS      FBANK       CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
R0204           ITRACE (6) REFERS TO "OPJUMP3".
 0205   REF  19  LAST 1115      6233  10 020 1           CCS     CYR         TEST THIRD PREFIX BIT.
 0206   REF 279  LAST 1115      6234  50 000 1           INDEX   A           THE DECREMENTED UNARY CODE IS IN BITS
 0207   REF   1                 6235  1 2000 1           TCF     UNAJUMP     1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)

 0208   REF   7  LAST 1114      6236  10 163 1           CCS     MODE        ITS A SHORT SHIFT CODE. SEE IF PRESENT
 0209   REF   1                 6237  1 2017 1           TCF     SHORTT      SCALAR OR VECTOR.
 0210   REF   2  LAST 1116      6240  1 2017 1           TCF     SHORTT
 0211   REF   1                 6241  1 2121 0           TCF     SHORTV      CALLS THE APPROPRIATE ROUTINE.

 0212   REF   1                 4344                FBANKMSK EQUALS BANKMASK
 0213   REF  21  LAST  315      6242   00122 0      LVBUF    ADRES   VBUF
```

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P0214 THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

```
0216   REF   1                  6243  1 6454 0  INDJUMP  TCF    VLOAD    00 - LOAD MPAC WITH A VECTOR.
0217   REF   1                  6244  1 7040 0           TCF    TAD      01 - TRIPLE PRECISION ADD TO MPAC.
0218   REF   1                  6245  1 7611 1           TCF    SIGN     02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
0219   REF   1                  6246  1 7335 1           TCF    VXSC     03 - VECTOR TIMES SCALAR.
0220   REF   1                  6247  1 6652 1           TCF    CGOTO    04 - COMPUTED GO TO.
0221   REF   2  LAST  409       6250  1 6437 0           TCF    TLOAD    05 - LOAD MPAC WITH TRIPLE PRECISION.
0222   REF   1                  6251  1 6021 0           TCF    DLOAD    06 - LOAD MPAC WITH A DP SCALAR.
0223   REF   1                  6252  1 7560 1           TCF    V/SC     07 - VECTOR DIVIDED BY SCALAR.

0224   REF   1                  6253  1 6450 1           TCF    SLOAD    10 - LOAD MPAC IN SINGLE PRECISION.
0225   REF   1                  6254  1 6567 1           TCF    SSP      11 - SET SINGLE PRECISION INTO X.
0226   REF   1                  6255  1 6472 1           TCF    PDDL     12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
0227   REF   1                  6256  1 7270 1           TCF    MXV      13 - MATRIX POST-MULTIPLIED BY VECTOR.
0228   REF   1                  6257  1 6526 1           TCF    PDVL     14 - PUSH DOWN AND VECTOR LOAD.
0229   REF   1                  6260  1 6575 1           TCF    CCALL    15 - COMPUTED CALL.
0230   REF   1                  6261  1 7273 1           TCF    VXM      16 - MATRIX PRE-MULTIPLIED BY VECTOR.
0231   REF   1                  6262  1 7552 0           TCF    TSLC     17 - NORMALIZE MPAC (SCALAR ONLY).

0232   REF   1                  6263  1 7530 1           TCF    DMPR     20 - DP MULTIPLY AND ROUND.
0233   REF   1                  6264  1 7533 1           TCF    DDV      21 - DP DIVIDE BY.
0234   REF   1                  6265  1 7537 0           TCF    BDDV     22 - DP DIVIDE INTO.
0235   REF   1                  6266  1 7555 1           TCF    GSHIFT   23 - GENERAL SHIFT INSTRUCTION.
0236   REF   1                  6267  1 6720 0           TCF    VAD      24 - VECTOR ADD.
0237   REF   1                  6270  1 6716 0           TCF    VSU      25 - VECTOR SUBTRACT.
0238   REF   1                  6271  1 7005 1           TCF    BVSU     26 - VECTOR SUBTRACT FROM.
0239   REF   1                  6272  1 7265 0           TCF    DOT      27 - VECTOR DOT PRODUCT.

0240   REF   1                  6273  1 7414 0           TCF    VXV      30 - VECTOR CROSS PRODUCT.
0241   REF   1                  6274  1 7361 0           TCF    VPROJ    31 - VECTOR PROJECTION.
0242   REF   1                  6275  1 6754 0           TCF    DSU      32 - DP SUBTRACT.
0243   REF   1                  6276  1 7031 0           TCF    BDSU     33 - DP SUBTRACT FROM.
0244   REF   1                  6277  1 6744 1           TCF    DAD      34 - DP ADD.
0245                            6300  1 6300 0           TCF             35 - AVAILABLE
0246   REF   1                  6301  1 7526 0           TCF    DMP1     36 - DP MULTIPLY.
0247   REF   1                  6302  1 7547 1           TCF    SETPD    37 - SET PUSH DOWN POINTER (DIRECT ONLY)
```

R0248 CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.

P0250 THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

```
0252  REF  1   6303  1 2341 1  MISCJUMP TCF   AXT      00 - ADDRESS TO INDEX TRUE.
0253  REF  1   6304  1 2346 0            TCF   AXC      01 - ADDRESS TO INDEX COMPLEMENTED.
0254  REF  1   6305  1 2351 0            TCF   LXA      02 - LOAD INDEX FROM ERASABLE.
0255  REF  1   6306  1 2355 1            TCF   LXC      03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
0256  REF  1   6307  1 2361 0            TCF   SXA      04 - STORE INDEX IN ERASABLE.
0257  REF  1   6310  1 2367 0            TCF   XCHX     05 - EXCHANGE INDEX WITH ERASABLE.
0258  REF  1   6311  1 2403 0            TCF   INCR     06 - INCREMENT INDEX REGISTER.
0259  REF  1   6312  1 2412 0            TCF   TIX      07 - TRANSFER ON INDEX.

0260  REF  1   6313  1 2375 0            TCF   XAD      10 - INDEX REGISTER ADD FROM ERASABLE.
0261  REF  1   6314  1 2406 0            TCF   XSU      11 - INDEX SUBTRACT FROM ERASABLE.
0262  REF  1   6315  1 2464 1            TCF   BZE/GOTO 12 - BRANCH ZERO AND GOTO.
0263  REF  1   6316  1 2471 0            TCF   BPL/BMN  13 - BRANCH PLUS AND BRANCH MINUS.
0264  REF  1   6317  1 2444 0            TCF   RTB/BHIZ 14 - RETURN TO BASIC AND BRANCH HI ZERO.
0265  REF  1   6320  1 2504 0            TCF   CALL/ITA 15 - CALL AND STORE QPRET.
0266  REF  1   6321  1 2513 0            TCF   SW/      16 - SWITCH INSTRUCTIONS AND AVAILABLE.
0267  REF  1   6322  1 2454 1            TCF   BOV(B)   17 - BRANCH ON OVERFLOW TO BASIC OR INT.
```

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P0268 THE FOLLOWING JUMP TABLE APPIES TO UNARY INSTRUCTIONS.

```
0269  REF  1          00,2000                    SETLOC  INTERBO
C2695                 00,2000                    BANK

0270  REF  1                                     COUNT*  $$/INTER
0271  REF  1          00,2000  1 3206 1  UNAJUMP  TCF     SQRT       01 - SQUARE ROOT.
0272  REF  1          00,2001  1 3525 1          TCF     SINE       02 - SIN.
0273  REF  1          00,2002  1 3514 0          TCF     COSINE     03 - COS.
0274  REF  1          00,2003  1 3605 0          TCF     ARCSIN     04 - ARC SIN.
0275  REF  1          00,2004  1 3607 1          TCF     ARCCOS     05 - ARC COS.
0276  REF  1          00,2005  1 3173 0          TCF     DSQ        06 - DP SQUARE.
0277  REF  1          00,2006  1 2116 1          TCF     ROUND      07 - ROUND TO DP.

0278  REF  1          00,2007  1 7624 1          TCF     COMP       10 - COMPLEMENT VECTOR OR SCALAR.
0279  REF  1          00,2010  1 3231 0          TCF     VDEF       11 - VECTOR DEFINE.
0280  REF  1          00,2011  1 3022 0          TCF     UNIT       12 - UNIT VECTOR.
0281  REF  1          00,2012  1 3175 0          TCF     ABVALABS   13 - LENGTH OF VECTOR OR MAG OF SCALAR.
0282  REF  1          00,2013  1 3244 1          TCF     VSQ        14 - SQUARE OF LENGTH OF VECTOR
0283  REF  1          00,2014  1 6323 1          TCF     STADR      15 - PUSH UP ON STORE CODE.
0284  REF  1          00,2015  1 3273 0          TCF     RVQ        16 - RETURN VIA QPRET.
0285  REF  1          00,2016  1 3246 0          TCF     PUSH       17 - PUSH MPAC DOWN.
```

P0286 SECTION 2 LOAD AND STORE PACKAGE.

R0287 A SET OF EIGHT STORE CODES IS PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE
R0289 ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A
R0291 STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD
R0293 FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE:

R0295 1. STORE STORE MPAC. THE E ADDRESS MAY BE INDEXED.
R0297 2. STODL STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (THE LOAD MAY BE INDEXED).
R0299 3. STOVL STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).
R0301 4. STCALL STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0303 STODL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.

```
 0305  REF    2  LAST 1108      6000                      SETLOC  INTERF3
 03055                          6323                      BANK

 0306  REF    2 LAST 1108 TO 1119:   205   205*          COUNT*  $$/INTER
 0307  REF    4  LAST 1109      6323  3 0165 0  STADR     CA      BANKSET     THE STADR CODE (PUSHUP UP ON STORE
 0308  REF   15  LAST 1116      6324  54 004 1            TS      FBANK       ADDRESS) ENTERS HERE.
 0309  REF   15  LAST 1115      6325  24 164 1            INCR    LOC
 0310  REF   16  LAST 1120      6326  50 164 1  ITR1      INDEX   LOC         THE STORECODE WAS STORED COMPLEMENTED TO
 0311                          6327  4 0000 0            CS      0           MAKE IT LOOK LIKE AN OPCODE PAIR.
 0312  REF   20  LAST 1099      6330  6 7702 0            AD      NEGONE      (YUL CANT REMOVE 1 BECAUSE OF EARLY CCS)

 0313  REF   14  LAST 1114      6331  54 116 0  DOSTORE   TS      ADDRWD
 0314  REF    6  LAST  357      6332  7 4347 1            MASK    LOW11       ENTRY FROM DISPATCHER. SAVE THE ERASABLE
 0315  REF   15  LAST 1120      6333  56 116 1            XCH     ADDRWD      ADDRESS AND JUMP ON THE STORE CODE NO.
 0316  REF    1                 6334  7 7656 1            MASK    B12T14
 0317                          6335  0 0006 1            EXTEND
 0318  REF   30  LAST 1041      6336  7 4764 1            MP      BIT5        EACH TRANSFER VECTOR ENTRY IS TWO WORDS.
 0319  REF  280  LAST 1116      6337  50 000 1  ITRD      INDEX   A
 0320  REF    1                 6340  1 6341 0            TCF     STORJUMP
```

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P0321 STORE CODE JUMP TABLE. CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH
R0323 A SUPPLIED OPERATION CODE.

R03231 STORE STORE,1 AND STORE,2 RETURN TO DANZIG, THUS RESETTING THE EBANK TO ITS STATE AT INTPRET.

```
0324  REF   1                  6341  0 6371 1  STORJUMP TC    STORE          STORE.
0325  REF  10  LAST  804       6342  1 6030 0           TCF   DANZIG         PICK UP NEW OP CODE(S).
0326  REF   1                  6343  0 6363 1           TC    STORE,1
0327  REF  11  LAST 1121       6344  1 6030 0           TCF   DANZIG
0328  REF   1                  6345  0 6366 1           TC    STORE,2
0329  REF  12  LAST 1121       6346  1 6030 0           TCF   DANZIG

0330  REF   2  LAST 1121       6347  0 6371 1           TC    STORE          STODL.
0331  REF   1                  6350  1 6427 1           TCF   DODLOAD

0332  REF   3  LAST 1121       6351  0 6371 1           TC    STORE          STODL WITH INDEXED LOAD ADDRESS.
0333  REF   1                  6352  1 6113 0           TCF   DODLOAD*

0334  REF   4  LAST 1121       6353  0 6371 1           TC    STORE          STOVL.
0335  REF   1                  6354  1 6432 0           TCF   DOVLOAD

0336  REF   5  LAST 1121       6355  0 6371 1           TC    STORE          STOVL WITH INDEXED LOAD ADDRESS.
0337  REF   1                  6356  1 6435 1           TCF   DOVLOAD*
0338  REF   6  LAST 1121       6357  0 6371 1           TC    STORE          STOTC.
0339  REF   1                  6360  3 5002 0           CAF   CALLCODE
0340  REF  20  LAST 1116       6361  54 020 1           TS    CYR
0341  REF   1                  6362  1 6221 1           TCF   15BITADR       GET A 15 BIT ADDRESS.
```

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P0342 STORE CODE ADDRESS PROCESSOR.

```
0343  REF  19  LAST 1112   6363  50 120 1  STORE,1  INDEX  FIXLOC
0344  REF  47  LAST 1112   6364  4 0046 1           CS     X1
0345  REF   1              6365  1 6370 1           TCF    PRESTORE

0346  REF  20  LAST 1122   6366  50 120 1  STORE,2  INDEX  FIXLOC
0347  REF  29  LAST  940   6367  4 0047 0           CS     X2
0348  REF  16  LAST 1120   6370  26 116 0  PRESTORE ADS    ADDRWD      RESULTANT ADDRESS IS IN ERASABLE.

0349  REF  17  LAST 1122   6371  4 0116 0  STORE    CS     ADDRWD
0350  REF   2  LAST 1028   6372  6 5006 1           AD     DEC45
0351  REF 281  LAST 1120   6373  10 000 0           CCS    A           DOES THE ADDRESS POINT TO THE WORK AREA?
0352  REF  21  LAST 1122   6374  3 0120 1           CA     FIXLOC      YES.
0353  REF   1              6375  1 6402 0           TCF    AHEAD5
0354  REF   6  LAST 1112   6376  3 5024 1           CA     CCT1400     NO.  SET EBANK & MAKE UP SUBADDRESS.
0355  REF  18  LAST 1122   6377  56 116 1           XCH    ADDRWD
0356  REF  32  LAST 1112   6400  54 003 0           TS     EBANK
0357  REF  10  LAST 1112   6401  7 4350 1           MASK   LOW8
0358  REF  19  LAST 1122   6402  26 116 0  AHEAD5   ADS    ADDRWD
```

```
P0359           STORING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

 0360                          6403  0 0006 1  STARTSTO EXTEND              MPAC,+1 MUST BE STORED IN ANY EVENT.
R0361           ITRACE (5) REFERS TO "STARTSTO".
 0362   REF 290  LAST 1109     6404  3 0155 0           DCA     MPAC
 0363   REF  20  LAST 1122     6405  50 116 1           INDEX   ADDRWD
 0364                          6406  52 001 1           DXCH    0

 0365   REF   8  LAST 1116     6407  10 163 1           CCS     MODE
 0366   REF   1                6410  1 6423 0           TCF     TSTORE
 0367   REF 203  LAST 1106     6411  0 0002 0           TC      Q

 0368                          6412  0 0006 1  VSTORE   EXTEND
 0369   REF 291  LAST 1123     6413  3 0160 0           DCA     MPAC +3
 0370   REF  21  LAST 1123     6414  50 116 1           INDEX   ADDRWD
 0371                          6415  52 003 0           DXCH    2

 0372                          6416  0 0006 1           EXTEND
 0373   REF 292  LAST 1123     6417  3 0162 1           DCA     MPAC +5
 0374   REF  22  LAST 1123     6420  50 116 1           INDEX   ADDRWD
 0375                          6421  52 005 0           DXCH    4
 0376   REF 204  LAST 1123     6422  0 0002 0           TC      Q

 0377   REF 293  LAST 1123     6423  3 0156 0  TSTORE   CA      MPAC +2
 0378   REF  23  LAST 1123     6424  50 116 1           INDEX   ADDRWD
 0379                          6425  54 002 1           TS      2
 0380   REF 205  LAST 1123     6426  0 0002 0           TC      Q
```

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P0381 ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE-TYPE CODES EXCEPT STORE
R0383 ITSELF.

```
0384   REF   1                  6427  3 7665 0  DODLOAD  CAF   DLOADCOD
0385   REF  21  LAST 1121       6430  54 020 1           TS    CYR
0386   REF   1                  6431  1 6055 0           TCF   DIRADRES      GO GET A DIRECT ADDRESS.

0387   REF   1                  6432  3 4752 0  DOVLOAD  CAF   VLOADCOD
0388   REF  22  LAST 1124       6433  54 020 1           TS    CYR
0389   REF   2  LAST 1124       6434  1 6055 0           TCF   DIRADRES

0390   REF   1                  6435  3 6056 1  DOVLOAD* CAF   VLOAD*
0391   REF   2  LAST 1121       6436  1 6114 1           TCF   DODLOAD* +1    PROLOGUE TO INDEX ROUTINE.
```

```
P0392            THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

0394  REF  24  LAST 1123   6437  50 116 1  TLOAD    INDEX   ADDRWD
0395                       6440  3 0002 0           CA      2           LOAD A TRIPLE PRECISION ARGUMENT INTO
0396  REF 294  LAST 1123   6441  54 156 1           TS      MPAC +2     THE FIRST THREE MPAC REGISTERS, WITH THE
0397                       6442  0 0006 1           EXTEND              CONTENTS OF THE OTHER FOUR IRRELEVANT.
0398  REF  25  LAST 1125   6443  5 0116 1           INDEX   ADDRWD
0399                       6444  3 0001 0           DCA     0
0400  REF 295  LAST 1125   6445  52 155 1           DXCH    MPAC
0401  REF 126  LAST 1088   6446  3 4770 0  TMODE    CAF     ONE
0402  REF   1              6447  1 6027 0           TCF     NEWMODE     DECLARE TRIPLE PRECISION MODE.

0403                       6450  22 007 0  SLOAD    ZL                  LOAD A SINGLE PRECISION NUMBER INTO
0404  REF  26  LAST 1125   6451  50 116 1           INDEX   ADDRWD      MPAC, SETTING MPAC+1,2 TO ZERO. THE
0405                       6452  3 0000 1           CA      0           CONTENTS OF THE REMAINING MPAC REGISTERS
0406  REF   1              6453  1 6024 0           TCF     SLOAD2      ARE IRRELEVANT.

0407                       6454  0 0006 1  VLOAD    EXTEND              LOAD A DOUBLE PRECISION VECTOR INTO
0408  REF  27  LAST 1125   6455  5 0116 1           INDEX   ADDRWD      MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
0409                       6456  3 0001 0           DCA     0           CONTENTS OF MPAC +2 ARE IRRELEVANT.
0410  REF 296  LAST 1125   6457  52 155 1           DXCH    MPAC

0411                       6460  0 0006 1  ENDVLOAD EXTEND              PDVL COMES HERE TO FINISH UP FOR DP, TP.
0412  REF  28  LAST 1125   6461  5 0116 1           INDEX   ADDRWD
0413                       6462  3 0003 1           DCA     2
0414  REF 297  LAST 1125   6463  52 160 1           DXCH    MPAC +3

0415                       6464  0 0006 1  +4       EXTEND              TPDVL FINISHES HERE.
0416  REF  29  LAST 1125   6465  5 0116 1           INDEX   ADDRWD
0417                       6466  3 0005 1           DCA     4
0418  REF 298  LAST 1125   6467  52 162 0           DXCH    MPAC +5

0419  REF 127  LAST 1125   6470  4 4770 1  VMODE    CS      ONE         DECLARE VECTOR MODE.
0420  REF   2  LAST 1125   6471  1 6027 0           TCF     NEWMODE
```

```
P0421           THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0423           1.  PUSH            PUSHDOWN AND NO LOAD.
R0424           2.  PDDL            PUSHDOWN AND DOUBLE PRECISION LOAD.
R0425           3.  PDVL            PUSHDOWN AND VECTOR LOAD.

 0426                        6472  0 0006 1  PDDL    EXTEND
 0427  REF  30  LAST 1125   6473  5 0116 1          INDEX   ADDRWD          LOAD MPAC,+1, PUSHING THE FORMER
 0428                        6474  3 0001 0          DCA     0               CONTENTS DOWN.
 0429  REF 299  LAST 1125   6475  52 155 1          DXCH    MPAC
 0430  REF   2  LAST 1114   6476  50 166 0          INDEX   PUSHLOC
 0431                        6477  52 001 1          DXCH    0

 0432  REF   9  LAST 1123   6500  50 163 0          INDEX   MODE            ADVANCE THE PUSHDOWN POINTER APPRO-
 0433  REF   3  LAST 1114   6501  3 6213 1          CAF     NO.WDS          PRIATELY.
 0434  REF   3  LAST 1126   6502  26 166 1          ADS     PUSHLOC

 0435  REF  10  LAST 1126   6503  10 163 1          CCS     MODE
 0436  REF   1             6504  1 6521 0          TCF     ENDTPUSH
 0437  REF   1             6505  1 6517 0          TCF     ENDDPUSH

 0438  REF  11  LAST 1126   6506  54 163 1          TS      MODE            NOW DP.
 0439  REF 300  LAST 1126   6507  54 156 1  ENDVPUSH TS     MPAC +2
 0440  REF 301  LAST 1126   6510  52 160 1          DXCH    MPAC +3         PUSH DOWN THE REST OF THE VECTOR HERE.
 0441  REF   4  LAST 1126   6511  50 166 0          INDEX   PUSHLOC
 0442                        6512  51'775 0          DXCH    0 -4

 0443  REF 302  LAST 1126   6513  52 162 0          DXCH    MPAC +5
 0444  REF   5  LAST 1126   6514  50 166 0          INDEX   PUSHLOC
 0445                        6515  51'777 1          DXCH    0 -2

 0446  REF  13  LAST 1121   6516  1 6030 0          TCF     DANZIG

 0447  REF 303  LAST 1126   6517  54 156 1  ENDDPUSH TS     MPAC +2         SET MPAC +2 TO ZERO AND EXIT ON DP.
 0448  REF  14  LAST 1126   6520  1 6030 0          TCF     DANZIG

 0449  REF  12  LAST 1126   6521  54 163 1  ENDTPUSH TS     MODE
 0450  REF 304  LAST 1126   6522  56 156 0          XCH     MPAC +2         ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING
 0451  REF   6  LAST 1126   6523  50 166 0    +2    INDEX   PUSHLOC         DOWN THE OLD CONTENTS
 0452                        6524  53'777 0          TS      -1
 0453  REF  15  LAST 1126   6525  1 6030 0          TCF     DANZIG
```

```
P0454                PDVL - PUSHDOWN AND VECTOR LOAD.

 0455                                6526  0 0006 1  PDVL    EXTEND                 RELOAD MPAC AND PUSH DOWN ITS CONTENTS.
 0456  REF  31  LAST 1126           6527  5 0116 1          INDEX   ADDRWD
 0457                                6530  3 0001 0          DCA     0
 0458  REF 305  LAST 1126           6531  52 155 1          DXCH    MPAC
 0459  REF   7  LAST 1126           6532  50 166 0          INDEX   PUSHLOC
 0460                                6533  52 001 1          DXCH    0

 0461  REF  13  LAST 1126           6534  50 163 0          INDEX   MODE           ADVANCE THE PUSHDOWN POINTER.
 0462  REF   4  LAST 1126           6535  3 6213 1          CAF     NO.WDS
 0463  REF   8  LAST 1127           6536  26 166 1          ADS     PUSHLOC

 0464  REF  14  LAST 1127           6537  10 163 1          CCS     MODE           TEST PAST MODE.
 0465  REF   1                     6540  1 6557 1          TCF     TPDVL
 0466  REF   1                     6541  1 6460 1          TCF     ENDVLOAD       JUST LOAD LAST FOUR REGISTERS ON DP.

 0467                                6542  0 0006 1  VPDVL   EXTEND                 PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS
 0468  REF  32  LAST 1127           6543  5 0116 1          INDEX   ADDRWD
 0469                                6544  3 0003 1          DCA     2
 0470  REF 306  LAST 1127           6545  52 160 1          DXCH    MPAC +3
 0471  REF   9  LAST 1127           6546  50 166 0          INDEX   PUSHLOC
 0472                                6547  51'775 0          DXCH    0 -4

 0473                                6550  0 0006 1          EXTEND
 0474  REF  33  LAST 1127           6551  5 0116 1          INDEX   ADDRWD
 0475                                6552  3 0005 1          DCA     4
 0476  REF 307  LAST 1127           6553  52 162 0          DXCH    MPAC +5
 0477  REF  10  LAST 1127           6554  50 166 0          INDEX   PUSHLOC
 0478                                6555  51'777 1          DXCH    0 -2

 0479  REF  16  LAST 1126           6556  1 6030 0          TCF     DANZIG

 0480                                6557  0 0006 1  TPDVL   EXTEND                 ON TP, WE MUST LOAD THE Y COMPONENT
 0481  REF  34  LAST 1127           6560  5 0116 1          INDEX   ADDRWD         BEFORE STORING MPAC +2 INCASE THIS IS A
 0482                                6561  3 0003 1          DCA     2              PUSHUP.
 0483  REF 308  LAST 1127           6562  52 160 1          DXCH    MPAC +3

 0484  REF 309  LAST 1127           6563  3 0156 0          CA      MPAC +2
 0485  REF  11  LAST 1127           6564  50 166 0          INDEX   PUSHLOC        IN DP.
 0486                                6565  53'777 0          TS      0 -1
 0487  REF   2  LAST 1127           6566  1 6464 0          TCF     ENDVLOAD +4

R0488                SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.

 0489  REF  17  LAST 1120           6567  24 164 1  SSP     INCR    LOC            PICK UP THE WORD FOLLOWING THE GIVEN
 0490  REF  18  LAST 1127           6570  50 164 1          INDEX   LOC            ADDRESS AND STORE IT AT X.
 0491                                6571  3 0000 1          CA      0
 0492  REF  35  LAST 1127           6572  50 116 1  STORE1  INDEX   ADDRWD         SOME INDEX AND MISCELLANEOUS OPS END
 0493                                6573  54 000 0          TS      0              HERE.
```

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0494 REF 17 LAST 1127 6574 1 6030 0 TCF DANZIG

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P0495 SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0496 THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0498 1. GOTO GO TO.
R0499 2. CALL CALL SUBROUTINE SETTING QPRET.
R0500 3. CGOTO COMPUTED GO TO.
R0501 4. CCALL COMPUTED CALL.
R0502 7. BPL BRANCH IF MPAC POSITIVE OR ZERO.
R0503 8. BZE BRANCH IF MPAC ZERO.
R0504 9. BMN BRANCH IF MPAC NEGATIVE NON-ZERO.

```
0505   REF  19  LAST 1127    6575  24 164 1  CCALL   INCR   LOC       MAINTAIN LOC FOR QPRET COMPUTATION.
0506   REF  20  LAST 1129    6576  50 164 1          INDEX  LOC
0507                         6577  3 0000 1          CAF    0         GET BASE ADDRESS OF CADR LIST.
0508   REF  36  LAST 1127    6600  50 116 1          INDEX  ADDRWD
0509                         6601  6 0000 1          AD     0         ADD INCREMENT.
0510   REF  16  LAST 1120    6602  54 004 1          TS     FBANK     SELECT DESIRED CADR.
0511   REF  14  LAST 1112    6603  7 5041 0          MASK   LOW10
0512   REF 282  LAST 1122    6604  50 000 1          INDEX  A
0513                         6605  3 2000 0          CAF    10000
0514   REF   6  LAST 1115    6606  54 117 1          TS     POLISH

0515   REF   5  LAST 1120    6607  3 0165 0  CALL    CA     BANKSET   FOR ANY OF THE CALL OPTIONS, MAKE UP THE
0516   REF   2  LAST 1116    6610  7 4344 1          MASK   BANKMASK  ADDRESS OF THE NEXT OP-CODE PAIR/STORE
0517   REF   3  LAST 1129    6611  6 4344 0          AD     BANKMASK  CODE AND LEAVE IT IN QPRET.  NOTE THAT
0518   REF  21  LAST 1129    6612  6 0164 1          AD     LOC       BANKMASK = -(2000 - 1).
0519   REF  22  LAST 1122    6613  50 120 1          INDEX  FIXLOC
0520   REF   5  LAST  797    6614  54 052 1          TS     QPRET

0521   REF   7  LAST 1129    6615  3 0117 0  GOTO    CA     POLISH    BASIC BRANCHING SEQUENCE.
0522   REF   4  LAST 1112    6616  7 7675 0  +1      MASK   HIGH4
0523                         6617  0 0006 1          EXTEND
0524   REF   1                6620  1 6631 1          BZF    GOTOERS   SEE IF ADDRESS POINTS TO FIXED OR ERAS.
0525   REF   6  LAST 1129    6621  3 0165 0  +4      CA     BANKSET   SET EBANK PART OF BBANK. NEXT, SET UP
0526   REF  16  LAST 1109    6622  54 006 0          TS     BBANK     FBANK. THE COMBINATION IS PICKED UP &
0527   REF   8  LAST 1129    6623  3 0117 0          CA     POLISH    PUT INTO BANKSET AT INTPRET +2.
0528   REF  17  LAST 1129    6624  54 004 1          TS     FBANK
0529   REF  15  LAST 1129    6625  7 5041 0          MASK   LOW10
0530   REF   2  LAST 1112    6626  6 4756 1          AD     2K
0531   REF  22  LAST 1129    6627  54 164 0          TS     LOC
0532   REF 227  LAST 1108    6630  1 6011 0          TCF    INTPRET +3

0533                  E3,1400                       EBANK= 1400      SO YUL DOESN'T CUSS THE "CA 1400" BELOW.

0534   REF   9  LAST 1129    6631  3 0117 0  GOTOERS CA     POLISH    THE GIVEN ADDRESS IS IN ERASABLE - SEE
0535   REF   2  LAST 1111    6632  6 6220 1          AD     -ENDVAC   IF RELATIVE TO THE WORK AREA.
0536   REF 283  LAST 1129    6633  10 000 0          CCS    A
0537   REF  10  LAST 1129    6634  3 0117 0          CA     POLISH    GENERAL ERASABLE.
0538   REF   1                6635  1 6644 0          TCF    GOTOGE
```

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0539  REF  23  LAST 1129    6636  3 0120 1          CA      FIXLOC          WORK AREA.
0540  REF  11  LAST 1129    6637  6 0117 0          AD      POLISH
0541  REF 284  LAST 1129    6640  50 000 1          INDEX   A               USE THE GIVEN ADDRESS AS THE ADDRESS OF
0542                        6641  3 0000 1          CA      0               THE BRANCH ADDRESS.
0543  REF  12  LAST 1130    6642  54 117 1          TS      POLISH
0544  REF   1                 6643  1 6616 1          TCF     GOTO +1         ALLOWS ARBITRARY INDIRECTNESS LEVELS.

0545  REF  33  LAST 1122    6644  54 003 0  GOTOGE  TS      EBANK
0546  REF  11  LAST 1122    6645  7 4350 1          MASK    LOW8
0547  REF 285  LAST 1130    6646  50 000 1          INDEX   A               USE THE GIVEN ADDRESS AS THE ADDRESS OF
0548                        6647  3 1400 1          CA      1400            THE BRANCH ADDRESS.
0549  REF  13  LAST 1130    6650  54 117 1          TS      POLISH
0550  REF   2  LAST 1130    6651  1 6616 1          TCF     GOTO +1

0551  REF  23  LAST 1129    6652  50 164 1  CGOTO   INDEX   LOC             COMPUTED GO TO. PICK UP ADDRESS OF CADR
0552                        6653  3 0001 0          CA      1               LIST.
0553  REF  37  LAST 1129    6654  50 116 1          INDEX   ADDRWD          ADD MODIFIER.
0554                        6655  6 0000 1          AD      0
0555  REF  18  LAST 1129    6656  54 004 1          TS      FBANK           SELECT GOTO ADDRESS.
0556  REF  16  LAST 1129    6657  7 5041 0          MASK    LOW10
0557  REF 286  LAST 1130    6660  50 000 1          INDEX   A
0558                        6661  3 2000 0          CA      10000
0559  REF  14  LAST 1130    6662  54 117 1          TS      POLISH
0560  REF   3  LAST 1130    6663  1 6616 1          TCF     GOTO +1         WITH ADDRESS IN A.

0561  REF   7  LAST 1129    6664  3 0165 0  SWBRANCH CA     BANKSET         SWITCH INSTRUCTIONS WHICH ELECT TO
0562  REF  19  LAST 1130    6665  54 004 1          TS      FBANK           BRANCH COME HERE TO DO SO.
0563  REF  24  LAST 1130    6666  50 164 1          INDEX   LOC
0564                        6667  3 0001 0          CA      1
0565  REF  15  LAST 1130    6670  54 117 1          TS      POLISH
0566  REF   4  LAST 1130    6671  1 6616 1          TCF     GOTO +1
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P0567           TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS:

R0569           L+1  IF MPAC IS GREATER THAN ZERO.
R0570           L+2  IF MPAC IS EQUAL TO +0 OR -0.
R0571           L+3  IF MPAC IS LESS THAN ZERO.


 0572  REF 310  LAST 1127    6672  10 154 0  BRANCH  CCS    MPAC
 0573  REF 206  LAST 1123    6673  0 0002 0          TC     Q
 0574                        6674  1 6676 1          TCF    +2              ON ZERO.
 0575  REF   1               6675  1 6710 0          TCF    NEG

 0576  REF 311  LAST 1131    6676  10 155 1          CCS    MPAC +1
 0577  REF 207  LAST 1131    6677  0 0002 0          TC     Q
 0578                        6700  1 6702 0          TCF    +2
 0579  REF   2  LAST 1131    6701  1 6710 0          TCF    NEG

 0580  REF 312  LAST 1131    6702  10 156 1          CCS    MPAC +2
 0581  REF 208  LAST 1131    6703  0 0002 0          TC     Q
 0582                        6704  1 6706 1          TCF    +2
 0583  REF   3  LAST 1131    6705  1 6710 0          TCF    NEG

 0584  REF 209  LAST 1131    6706  50 002 0  Q+1     INDEX  Q
 0585                        6707  0 0001 0          TC     1
 0586  REF 210  LAST 1131    6710  50 002 0  NEG     INDEX  Q               IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
 0587                        6711  0 0002 0  TCQ     TC     2

 0588  REF   4  LAST 1131    6710             Q+2     =      NEG

R0589           ITRACE (3) REFERS TO "EXIT".
 0590  REF   8  LAST 1130    6712  3 0165 0  EXIT    CA     BANKSET         RESTORE USER'S BANK SETTING, AND LEAVE
 0591  REF  17  LAST 1129    6713  54 006 0          TS     BBANK           INTERPRETIVE MODE.
 0592  REF  25  LAST 1130    6714  50 164 1          INDEX  LOC
 0593                        6715  0 0001 0          TC     1
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R0594   SECTION 3 - ADD/SUBTRACT PACKAGE.

R0595           THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR
R0597   MPAC:

R0598           1.  DAD         DOUBLE PRECISION ADD.
R0599           2.  DSU         DOUBLE PRECISION SUBTRACT.
R0600           3.  BDSU        DOUBLE PRECISION SUBTRACT FROM.

R0601           4.  TAD         TRIPLE PRECISION ADD.

R0602           5.  VAD         VECTOR ADD.
R0603           6.  VSU         VECTOR SUBTRACT.
R0604           7.  BVSU        VECTOR SUBTRACT FROM.

R0605   THE INTERPRETIVE OVERFLOW INDICATOR OVFIND IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.

 0607   REF  40  LAST 1108     6716  3 4752 0  VSU     CAF     BIT15           CHANGES 0 TO DCS.
 0608                          6717  1 6721 1          TCF     +2

 0609   REF   9  LAST  988     6720  3 4346 1  VAD     CAF     PRIO30          CHANGES 0 TO DCA.
 0610   REF  38  LAST 1130     6721  26 116 0          ADS     ADDRWD
 0611                          6722  0 0006 1          EXTEND
 0612   REF  39  LAST 1132     6723  5 0116 1          INDEX   ADDRWD
 0613   REF   2  LAST  432     6724  00 003 1          READ    HISCALAR        DCA  2   OR   DCS  2
 0614   REF 313  LAST 1131     6725  20 160 1          DAS     MPAC +3
 0615                          6726  0 0006 1          EXTEND                  CHECK OVERFLOW.
 0616                          6727  1 6731 0          BZF     +2
 0617   REF   1                6730  0 6763 0          TC      OVERFLWY

 0618                          6731  0 0006 1          EXTEND
 0619   REF  40  LAST 1132     6732  5 0116 1          INDEX   ADDRWD
 0620   REF   8  LAST 1061     6733  00 005 1          READ    CHAN5           DCA  4   OR   DCS  4
 0621   REF 314  LAST 1132     6734  20 162 0          DAS     MPAC +5
 0622                          6735  0 0006 1          EXTEND
 0623                          6736  1 6740 0          BZF     +2
 0624   REF   1                6737  0 6760 0          TC      OVERFLWZ

 0625                          6740  0 0006 1          EXTEND
 0626   REF  41  LAST 1132     6741  5 0116 1          INDEX   ADDRWD
 0627   REF  15  LAST 1079     6742  00 001 0          READ    LCHAN           DCA  0   OR   DCS  0
 0628   REF   1                6743  1 6747 1          TCF     ENDVXV

 0629                          6744  0 0006 1  DAD     EXTEND
 0630   REF  42  LAST 1132     6745  5 0116 1          INDEX   ADDRWD
 0631                          6746  3 0001 0          DCA     0
 0632   REF 315  LAST 1132     6747  20 155 1  ENDVXV  DAS     MPAC            VXV FINISHES HERE.
 0633                          6750  0 0006 1          EXTEND
 0634   REF  18  LAST 1128     6751  1 6030 0          BZF     DANZIG
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0635   REF   1                  6752  0 6766 0  SETOVF   TC      OVERFLOW
0636   REF  19  LAST 1132       6753  1 6030 0           TCF     DANZIG
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0637                          6754  0 0006 1  DSU     EXTEND
0638  REF  43  LAST 1132     6755  5 0116 1          INDEX   ADDRWD
0639                          6756  4 0001 1          DCS     B
0640  REF   2  LAST 1132     6757  1 6747 1          TCF     ENDVXV

0641  REF 137  LAST 1106     6760  54 001 1  OVERFLWZ TS     L       ENTRY FOR THIRD COMPONENT.
0642  REF  25  LAST 1068     6761  3 4773 0          CAF     FIVE
0643                          6762  1 6765 1          TCF     +3

0644  REF 138  LAST 1134     6763  54 001 1  OVERFLWY TS     L       ENTRY FOR SECOND COMPONENT.
0645  REF  42  LAST 1090     6764  3 6214 0          CAF     THREE
0646  REF 139  LAST 1134     6765  56 001 0          XCH     L

0647  REF 287  LAST 1130     6766  50 000 1  OVERFLOW INDEX   A       ENTRY FOR 1ST COMP OR DP (L=0).
0648  REF   5  LAST 1065     6767  4 4751 1          CS      LIMITS  PICK UP POSMAX OR NEGMAX.
0649  REF  44  LAST  382     6770  54 130 1          TS      BUF
0650                          6771  0 0006 1          EXTEND
0651  REF 288  LAST 1134     6772  24 000 1          AUG     A       FORCE OVERFLOW.
0652  REF 140  LAST 1134     6773  50 001 0          INDEX   L
0653  REF 316  LAST 1132     6774  26 155 1          ADS     MPAC +1
0654                          6775  54 007 1          TS      7
0655  REF 207  LAST 1108     6776  3 4772 1          CAF     ZERO
0656  REF  45  LAST 1134     6777  6 0130 0          AD      BUF
0657  REF 141  LAST 1134     7000  50 001 0          INDEX   L
0658  REF 317  LAST 1134     7001  26 154 0          ADS     MPAC
0659                          7002  54 007 1          TS      7
0660  REF 211  LAST 1131     7003  0 0002 0          TC      Q               NO OVERFLOW EXIT.
0661  REF   1                 7004  1 7121 0          TCF     SETOVF2         SET OVFIND AND EXIT.

0662                          7005  0 0006 1  BVSU    EXTEND
0663  REF  44  LAST 1134     7006  5 0116 1          INDEX   ADDRWD
0664                          7007  3 0003 1          DCA     2
0665  REF 318  LAST 1134     7010  52 160 1          DXCH    MPAC +3
0666                          7011  0 0006 1          EXTEND
0667                          7012  4 0001 1          DCOM
0668  REF 319  LAST 1134     7013  20 160 1          DAS     MPAC +3
0669                          7014  0 0006 1          EXTEND
0670                          7015  1 7017 1          BZF     +2
0671  REF   2  LAST 1132     7016  0 6763 0          TC      OVERFLWY

0672                          7017  0 0006 1          EXTEND
0673  REF  45  LAST 1134     7020  5 0116 1          INDEX   ADDRWD
0674                          7021  3 0005 1          DCA     4
0675  REF 320  LAST 1134     7022  52 162 0          DXCH    MPAC +5
0676                          7023  0 0006 1          EXTEND
0677                          7024  4 0001 1          DCOM
0678  REF 321  LAST 1134     7025  20 162 0          DAS     MPAC +5
0679                          7026  0 0006 1          EXTEND
0680                          7027  1 7031 0          BZF     +2
0681  REF   2  LAST 1132     7030  0 6760 0          TC      OVERFLWZ
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0682                          7031  0 0006 1  BDSU    EXTEND
0683  REF  46  LAST 1134      7032  5 0116 1          INDEX   ADDRWD
0684                          7033  3 0001 0          DCA     0
0685  REF 322  LAST 1134      7034  52 155 1          DXCH    MPAC
0686                          7035  0 0006 1          EXTEND
0687                          7036  4 0001 1          DCOM
0688  REF   3  LAST 1134      7037  1 6747 1          TCF     ENDVXV
```

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```
P0689                TRIPLE PRECISION ADD ROUTINE.

 0690                                7040  0 0006 1  TAD      EXTEND
 0691  REF  47  LAST 1135            7041  5 0116 1           INDEX    ADDRWD
 0692                                7042  3 0002 0           DCA      1          ADD MINOR PARTS FIRST.
 0693  REF 323  LAST 1135            7043  20 156 1           DAS      MPAC +1
 0694  REF  48  LAST 1136            7044  50 116 1           INDEX    ADDRWD
 0695                                7045  6 0000 1           AD       0
 0696  REF 324  LAST 1136            7046  6 0154 1           AD       MPAC
 0697  REF 325  LAST 1136            7047  54 154 0           TS       MPAC
 0698  REF  20  LAST 1133            7050  1 6030 0           TCF      DANZIG

 0699  REF   1                       7051  1 6752 0           TCF      SETOVF     SET OVFIND IF SUCH OCCURS.
```

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P0700 ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

R0701 1. DMPSUB DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC,+1 BY THE DP WORD WHOSE ADDRESS
R0703 IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.
R0705 2. ROUNDSUB ROUND THE TRIPLE PRECISON CONTENTS OF MPAC TO DOUBLE PRECISION.
R0707 3. DOTSUB TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD
R0709 AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.
R0710 4. POLY USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND
R0712 COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION (SEE ROUTINE FOR DETAILS.)

```
0714   REF 212  LAST 1134    7052  50 002 0  DMP      INDEX  Q        BASIC SUBROUTINE FOR USE BY PINBALL, ETC
0715                         7053  3 0000 1           CAF    0        ADRES OF ARGUMENT FOLLOWS  TC DMP  .
0716   REF 213  LAST 1137    7054  24 002 0           INCR   Q
0717   REF  49  LAST 1136    7055  54 116 0   -1      TS     ADDRWD   (PROLOGUE FOR SETTING ADDRWD.)

0718   REF  50  LAST 1137    7056  50 116 1  DMPSUB   INDEX  ADDRWD   GET MINOR PART OF OPERAND AT C(ADDRWD).
0719                         7057  3 0001 0           CA     1
0720   REF 326  LAST 1136    7060  54 156 1           TS     MPAC +2  THIS WORKS FOR SQUARING MPAC AS WELL.
0721   REF 208  LAST 1134    7061  3 4772 1           CAF    ZERO     SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE
0722   REF 327  LAST 1137    7062  56 155 0           XCH    MPAC +1  THE PARTIAL PRODUCTS WITH DAS
0723   REF   7  LAST 1105    7063  54 135 1           TS     MPTEMP   INSTRUCTIONS.
0724                         7064  0 0006 1           EXTEND
0725   REF 328  LAST 1137    7065  7 0156 1           MP     MPAC +2  MINOR OF MPAC X MINOR OF C(ADDRWD).
0726   REF 329  LAST 1137    7066  56 156 0           XCH    MPAC +2  DISCARD MINOR PART OF ABOVE RESULT AND
0727                         7067  0 0006 1           EXTEND          FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
0728   REF 330  LAST 1137    7070  7 0154 0           MP     MPAC
0729   REF 331  LAST 1137    7071  20 156 1           DAS    MPAC +1  GUARANTEED NO OVERFLOW.

0730   REF  51  LAST 1137    7072  50 116 1           INDEX  ADDRWD   GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
0731                         7073  3 0000 1           CA     0
0732   REF   8  LAST 1137    7074  56 135 0           XCH    MPTEMP   SAVE AND BRING OUT MINOR OF MPAC.
0733                         7075  0 0006 1  DMPSUB2  EXTEND
0734   REF   9  LAST 1137    7076  7 0135 1           MP     MPTEMP   MAJOR OF C(ADDRWD) X MINOR OF MPAC.
0735   REF 332  LAST 1137    7077  20 156 1           DAS    MPAC +1  ACCUMULATE, SETTING A TO NET OVERFLOW.

0736   REF 333  LAST 1137    7100  56 154 1           XCH    MPAC     SETTING MPAC TO 0 OR +-1.
0737                         7101  0 0006 1           EXTEND
0738   REF  10  LAST 1137    7102  7 0135 1           MP     MPTEMP   MAJOR OF MPAC X MAJOR OF C(ADDRWD).
0739   REF 334  LAST 1137    7103  20 155 1           DAS    MPAC     GUARANTEED NO OVERFLOW.
0740   REF 214  LAST 1137    7104  0 0002 0           TC     Q        49 MCT = .573 MS. INCLUDING RETURN.
```

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PC741 ROUND MPAC TO DOUBLE PRECISION, SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

```
0743   REF 209  LAST 1137   7105  3 4772 1  ROUNDSUB CAF    ZERO       SET MPAC +2 = 0 FOR SCALARS AND CHANGE
0744   REF  15  LAST 1127   7106  54 163 1   +1       TS     MODE       MODE TO DP.

0745   REF 335  LAST 1137   7107  56 156 0  VROUND   XCH    MPAC +2    BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
0746                        7110  6 0000 1             DOUBLE
0747   REF 142  LAST 1134   7111  54 001 1             TS     L
0748   REF 215  LAST 1137   7112  0 0002 0             TC     Q

0749   REF 336  LAST 1138   7113  6 0155 0             AD     MPAC +1    ADD ROUNDING BIT IF MPAC +2 WAS GREATER
0750   REF 337  LAST 1138   7114  54 155 1             TS     MPAC +1    THAN .5 IN MAGNITUDE.
0751   REF 216  LAST 1138   7115  0 0002 0             TC     Q

0752   REF 338  LAST 1138   7116  6 0154 1             AD     MPAC       PROPAGATE INTERFLOW.
0753   REF 339  LAST 1138   7117  54 154 0             TS     MPAC
0754   REF 217  LAST 1138   7120  0 0002 0             TC     Q

0755   REF   2  LAST  898   7121  54 121 1  SETOVF2   TS     OVFIND     (RARE).
0756   REF 218  LAST 1138   7122  0 0002 0             TC     Q
```

```
P0757           THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX
R0759   REGISTER VECTOR WHOSE ADDRESS IS IN ADDRWD. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO
R0761   6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.

 0763   REF  48  LAST 1102    7123  3 4767 0  PREDOT   CAF     TWO          PROLOGUE TO SET DOTINC TO 2.
 0764   REF   4  LAST   71    7124  54 136 1           TS      DOTINC

 0765                         7125  0 0006 1  DOTSUB   EXTEND
 0766   REF   5  LAST   71    7126  22 137 1           QXCH    DOTRET       SAVE RETURN.
 0767   REF   1               7127  0 7056 0           TC      DMPSUB       DOT X COMPONENTS.
 0768   REF 340  LAST 1138    7130  52 160 1           DXCH    MPAC +3      POSITION Y COMPONENT OF MPAC FOR
 0769   REF 341  LAST 1139    7131  52 155 1           DXCH    MPAC         MULTIPLICATION WHILE SAVING RESULT IN
 0770   REF  46  LAST 1134    7132  52 131 0           DXCH    BUF          THREE WORD BUFFER, BUF.
 0771   REF 342  LAST 1139    7133  3 0156 0           CA      MPAC +2
 0772   REF  47  LAST 1139    7134  54 132 0           TS      BUF +2

 0773   REF   5  LAST 1139    7135  3 0136 0           CA      DOTINC       ADVANCE ADDRWD TO Y COMPONENT OF
 0774   REF  52  LAST 1137    7136  26 116 0           ADS     ADDRWD       OTHER ARGUMENT.
 0775   REF   2  LAST 1139    7137  0 7056 0           TC      DMPSUB
 0776   REF 343  LAST 1139    7140  52 156 1           DXCH    MPAC +1      ACCUMULATE PARTIAL PRODUCTS.
 0777   REF  48  LAST 1139    7141  20 132 0           DAS     BUF +1
 0778   REF 344  LAST 1139    7142  6 0154 1           AD      MPAC
 0779   REF  49  LAST 1139    7143  6 0130 0           AD      BUF
 0780   REF  50  LAST 1139    7144  54 130 1           TS      BUF
 0781                         7145  1 7147 0           TCF     +2
 0782   REF   3  LAST 1138    7146  54 121 1           TS      OVFIND       IF OVERFLOW OCCURS.

 0783   REF 345  LAST 1139    7147  52 162 0           DXCH    MPAC +5      MULTIPLY Z COMPONENTS.
 0784   REF 346  LAST 1139    7150  52 155 1           DXCH    MPAC
 0785   REF   6  LAST 1139    7151  3 0136 0           CA      DOTINC
 0786   REF  53  LAST 1139    7152  26 116 0           ADS     ADDRWD
 0787   REF   3  LAST 1139    7153  0 7056 0           TC      DMPSUB
 0788   REF  51  LAST 1139    7154  52 132 0  ENDDOT   DXCH    BUF +1       LEAVE FINAL ACCUMULATION IN MPAC.
 0789   REF 347  LAST 1139    7155  20 156 1           DAS     MPAC +1
 0790   REF 348  LAST 1139    7156  6 0154 1           AD      MPAC
 0791   REF  52  LAST 1139    7157  6 0130 0           AD      BUF
 0792   REF 349  LAST 1139    7160  54 154 0           TS      MPAC
 0793   REF   6  LAST 1139    7161  0 0137 1           TC      DOTRET

 0794   REF   2  LAST 1133    7162  0 6766 0           TC      OVERFLOW     ON OVERFLOW HERE.
 0795   REF   7  LAST 1139    7163  0 0137 1           TC      DOTRET
```

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P0796 DOUBLE PRECISION POLYNOMIAL EVALUATOR

R0797
R0798 THIS ROUTINE EVALUATES $A_N X^N + A_{N-1} X^{N-1} + \cdots + A_1 X + A_0$ LEAVING THE DP RESULT IN MPAC ON EXIT.
R0800

R0801 THE ROUTINE HAS TWO ENTRIES

R0802 1. ENTRY THRU POWRSERS. THE COEFFICIENTS MAY BE EITHER IN FIXED OR ERASABLE, THE CALL IS BY
R0804 TC POWRSERS, AND THE RETURN IS TO LOC(TC POWRSERS)+1. THE ENTERING DATA MUST BE AS FOLLOWS

```
A0806                                   A       SP      LOC-3           ADDRESS FOR REFERENCING COEF TABLE
A0807                                   L       SP      N-1             N IS THE DEGREE OF THE POWER SERIES
A0808                                   MPAC    DP      X               ARGUMENT

A0809                                   LOC-2N  DP      A(0)
A0810                                                   ...
A0811                                   LOC     DP      A(N)
```

R0812 2. ENTRY THRU POLY. THE CALL TO POLY AND THE ENTERING DATA MUST BE AS FOLLOWS

```
A0814                                   MPAC    DP      X               ARGUMENT

A0815                                   LOC     TC      POLY
A0816                                   LOC+1   SP      N-1
A0817                                   LOC+2   DP      A(0)
A0818                                                   ...
A0819                                   LOC+2N+2 DP     A(N)            RETURN IS TO LOC+2N+4

 0820                           7164  0 0006 1 POWRSERS EXTEND
 0821   REF   1                7165  22 141 0          QXCH    POLYRET         RETURN ADDRESS
 0822   REF  16  LAST 1130     7166  54 117 1          TS      POLISH          POWER SERIES ADDRESS
 0823   REF   1                7167  22 140 1          LXCH    POLYCNT         N-1 TO COUNTER
 0824   REF   1                7170  1 7201 1          TCF     POLYCOM         SKIP SET UP BY POLY

 0825   REF 219  LAST 1138     7171  50 002 0 POLY     INDEX   Q
 0826                          7172  3 0000 1          CAF     0
 0827   REF   2  LAST 1140     7173  54 140 0          TS      POLYCNT         N-1 TO COUNTER
 0828                          7174  6 0000 1          DOUBLE
 0829   REF 220  LAST 1140     7175  6 0002 0          AD      Q
 0830   REF  17  LAST 1140     7176  54 117 1          TS      POLISH          L(A(N))-3 TO POLISH
 0831   REF  26  LAST 1134     7177  6 4773 0          AD      FIVE
 0832   REF   2  LAST 1140     7200  54 141 1          TS      POLYRET         STORE RETURN ADDRESS

 0833   REF   1                7201  3 6242 0 POLYCOM  CAF     LVBUF           INCOMING X WILL BE MOVED TO VBUF, SO
 0834   REF  54  LAST 1139     7202  54 116 0          TS      ADDRWD          SET ADDRWD SO DMPSUB WILL MPY BY VBUF.

 0835                          7203  0 0006 1          EXTEND
 0836   REF  18  LAST 1140     7204  5 0117 0          INDEX   POLISH
 0837                          7205  3 0004 0          DCA     3
```

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```
0838  REF 350  LAST 1139    7206  52 155 1                DXCH   MPAC      LOAD A(N) INTO MPAC,
0839  REF  22  LAST 1116    7207  52 123 0                DXCH   VBUF      SAVING X IN VBUF
0840  REF   1               7210  1 7214 0                 TCF    POLY2

0841  REF   3  LAST 1140    7211  54 140 0  POLYLOOP      TS     POLYCNT   SAVE DECREMENTED LOOP COUNTER
0842  REF  49  LAST 1139    7212  4 4767 1                 CS     TWO
0843  REF  19  LAST 1140    7213  26 117 1                ADS    POLISH    REGRESS COEFFICIENT POINTER

0844  REF   4  LAST 1139    7214  0 7056 0  POLY2         TC     DMPSUB    MULTIPLY BY X
0845                        7215  0 0006 1                 EXTEND
0846  REF  20  LAST 1141    7216  5 0117 0                 INDEX  POLISH
0847                        7217  3 0002 0                 DCA    1         ADD IN NEXT COEFFICIENT
0848  REF 351  LAST 1141    7220  20 155 1                 DAS    MPAC      USERS RESPONSIBILITY TO ASSURE NO OVFLOW

0849  REF   4  LAST 1141    7221  10 140 0                 CCS    POLYCNT
0850  REF   1               7222  1 7211 0                 TCF    POLYLOOP
0851  REF   3  LAST 1140    7223  0 0141 0                 TC     POLYRET   RETURN CALLER
```

P0852 MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

```
 085398 REF 210  LAST 1138    7224  3 4772 1  DPAGREE   CAF     ZERO          DOUBLE PRECISION ENTRY -
 085399 REF 352  LAST 1141    7225  54 156 1   BUFAGREE  TS      MPAC +2
 0854   REF 221  LAST 1140    7226  22 002 0   TPAGREE   LXCH    Q             FORCE SIGN AGREEMENT AMONG THE TRIPLE
 0855   REF   1                7227  0 6672 1             TC      BRANCH        PRECISION CONTENTS OF MPAC.  RETURNING
 0856   REF   1                7230  1 7234 1             TCF     ARG+          WITH SIGNUM OF THE INPUT IN A.
 0857   REF   1                7231  1 7254 1             TCF     ARGZERO

 0858   REF  27  LAST 1072    7232  4 4750 0             CS      POSMAX        IF NEGATIVE.
 0859                         7233  1 7235 0             TCF     +2

 0860   REF  28  LAST 1142    7234  3 4750 1  ARG+       CAF     POSMAX
 0861   REF 222  LAST 1142    7235  54 002 1             TS      Q
 0862                         7236  0 0006 1             EXTEND
 0863   REF 289  LAST 1134    7237  24 000 1             AUG     A             FORMS +-1.0.
 0864   REF 353  LAST 1142    7240  6 0156 0             AD      MPAC +2
 0865   REF 354  LAST 1142    7241  54 156 1             TS      MPAC +2
 0866   REF 211  LAST 1142    7242  3 4772 1             CAF     ZERO
 0867   REF 223  LAST 1142    7243  6 0002 0             AD      Q
 0868   REF 355  LAST 1142    7244  6 0155 0             AD      MPAC +1
 0869   REF 356  LAST 1142    7245  54 155 1             TS      MPAC +1
 0870   REF 212  LAST 1142    7246  3 4772 1             CAF     ZERO
 0871   REF 224  LAST 1142    7247  6 0002 0             AD      Q             Q STILL HAS POSMAX OR NEGMAX IN IT.
 0872   REF 357  LAST 1142    7250  6 0154 1             AD      MPAC
 0873   REF 358  LAST 1142    7251  54 154 0  ARGZERO2   TS      MPAC          ALWAYS SKIPPING UNLESS ARGZERO.
 0874   REF 359  LAST 1142    7252  54 155 1             TS      MPAC +1
 0875   REF 143  LAST 1138    7253  0 0001 0             TC      L             RETURN VIA L.

 0876   REF 360  LAST 1142    7254  54 156 1  ARGZERO    TS      MPAC +2       SET ALL THREE MPAC REGISTERS TO ZERO.
 0877   REF   1                7255  1 7251 1             TCF     ARGZERO2
```

R0878 SHORTMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

```
 0880   REF  11  LAST 1137    7256  54 135 1  SHORTMP    TS      MPTEMP
 0881                         7257  0 0006 1     +1      EXTEND
 0882   REF 361  LAST 1142    7260  7 0156 1             MP      MPAC +2
 0883   REF 362  LAST 1142    7261  54 156 1             TS      MPAC +2
 0884   REF 213  LAST 1142    7262  3 4772 1  SHORTMP2   CAF     ZERO          SO SUBSEQUENT DAS WILL WORK.
 0885   REF 363  LAST 1142    7263  56 155 0             XCH     MPAC +1
 0886   REF   1                7264  1 7075 0             TCF     DMPSUB2
```

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P0904 MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0905 1. DOT DP VECTOR DOT PRODUCT.
R0906 2. VXV DP VECTOR CROSS PRODUCT.
R0907 3. VXSC DP VECTOR TIMES SCALAR.
R0908 4. V/SC DP VECTOR DIVIDED BY SCALAR.
R0909 5. VPROJ DP VECTOR PROJECTION. ((MPAC.X)MPAC).
R0910 6. VXM DP VECTOR POST-MULTIPLIED BY MATRIX.
R0911 7. MXV DP VECTOR PRE-MULTIPLIED BY MATRIX.

```
0912  REF   1                7265  0 7123 0  DOT     TC    PREDOT    DO THE DOT PRODUCT AND EXIT, CHANGING
0913  REF 214  LAST 1142     7266  3 4772 1  DMODE   CAF   ZERO      THE MODE TO DP SCALAR.
0914  REF   3  LAST 1125     7267  1 6027 0          TCF   NEWMODE

0915  REF  50  LAST 1141     7270  3 4767 0  MXV     CAF   TWO       SET UP MATINC AND DOTINC FOR ROW
0916  REF   5  LAST   71     7271 54 140  0          TS    MATINC    VECTORS.
0917  REF   1                7272  1 7276 1          TCF   VXM/MXV   GO TO COMMON PORTION.

0918  REF   9  LAST 1069     7273  4 4355 1  VXM     CS    TEN       SET MATINC AND DOTINC TO REFER TO MATRIX
0919  REF   6  LAST 1143     7274 54 140  0          TS    MATINC    AS THREE COLUMN VECTORS.
0920  REF  29  LAST 1056     7275  3 6211 0          CAF   SIX
```

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```
PC921           COMMON PORTION OF MXV AND VXM.

 0922  REF   7  LAST 1139     7276  54 136 1  VXM/MXV  TS      DOTINC
RC923           ITRACE (2) REFERS TO "VXM/MXV".
 0924  REF   1                7277  0 7466 1           TC      MPACVBUF      SAVE VECTOR IN MPAC FOR FURTHER USE.

 0925  REF   1                7300  0 7125 0           TC      DOTSUB        GO DOT TO GET X COMPONENT OF ANSWER.
 0926                         7301  0 0006 1           EXTEND
 0927  REF  23  LAST 1141     7302  3 0123 1           DCA     VBUF          MOVE MPAC VECTOR BACK INTO MPAC, SAVING
 0928  REF 364  LAST 1142     7303  52 155 1           DXCH    MPAC          NEW X COMPONENT IN BUF2.
 0929  REF  11  LAST 1105     7304  52 134 0           DXCH    BUF2
 0930                         7305  0 0006 1           EXTEND
 0931  REF  24  LAST 1144     7306  3 0125 1           DCA     VBUF +2
 0932  REF 365  LAST 1144     7307  52 160 1           DXCH    MPAC +3
 0933                         7310  0 0006 1           EXTEND
 0934  REF  25  LAST 1144     7311  3 0127 0           DCA     VBUF +4
 0935  REF 366  LAST 1144     7312  52 162 0           DXCH    MPAC +5
 0936  REF   7  LAST 1143     7313  3 0140 1           CA      MATINC        INITIALIZE ADDRWD FOR NEXT DOT PRODUCT.
 0937  REF  55  LAST 1140     7314  26 116 0           ADS     ADDRWD        FORMS BASE ADDRESS OF NEXT COLUMN(ROW).

 0938  REF   2  LAST 1144     7315  0 7125 0           TC      DOTSUB
 0939  REF  26  LAST 1144     7316  52 123 0           DXCH    VBUF          MOVE GIVEN VECTOR BACK TO MPAC, SAVING Y
 0940  REF 367  LAST 1144     7317  52 155 1           DXCH    MPAC          COMPONENT OF ANSWER IN VBUF +2.
 0941  REF  27  LAST 1144     7320  52 125 0           DXCH    VBUF +2
 0942  REF 368  LAST 1144     7321  52 160 1           DXCH    MPAC +3
 0943  REF  28  LAST 1144     7322  52 127 1           DXCH    VBUF +4
 0944  REF 369  LAST 1144     7323  52 162 0           DXCH    MPAC +5
 0945  REF   8  LAST 1144     7324  3 0140 1           CA      MATINC        FORM ADDRESS OF LAST COLUMN OR ROW.
 0946  REF  56  LAST 1144     7325  26 116 0           ADS     ADDRWD

 0947  REF   3  LAST 1144     7326  0 7125 0           TC      DOTSUB
 0948  REF  12  LAST 1144     7327  52 134 0           DXCH    BUF2          ANSWER NOW COMPLETE. PUT COMPONENTS INTO
 0949  REF 370  LAST 1144     7330  52 155 1           DXCH    MPAC          PROPER MPAC REGISTERS.
 0950  REF 371  LAST 1144     7331  52 162 0           DXCH    MPAC +5
 0951  REF  29  LAST 1144     7332  52 125 0           DXCH    VBUF +2
 0952  REF 372  LAST 1144     7333  52 160 1           DXCH    MPAC +3
 0953  REF  21  LAST 1136     7334  1 6030 0           TCF     DANZIG        EXIT.
```

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```
P0954                VXSC - VECTOR TIMES SCALAR.

 0955   REF  16  LAST 1138    7335  10 163 1  VXSC    CCS    MODE     TEST PRESENT MODE.
 0956   REF   1               7336  1 7364 0           TCF    DVXSC    SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
 0957   REF   2  LAST 1145    7337  1 7364 0           TCF    DVXSC

 0958   REF   5  LAST 1141    7340  0 7056 0  VVXSC   TC     DMPSUB   COMPUTE X COMPONENT
 0959   REF   1               7341  0 7107 0           TC     VROUND   AND ROUND IT.
 0960   REF 373  LAST 1144    7342  52 160 1           DXCH   MPAC +3  PUT Y COMPONENT INTO MPAC SAVING MPAC IN
 0961   REF 374  LAST 1145    7343  52 155 1           DXCH   MPAC     MPAC +3.
 0962   REF 375  LAST 1145    7344  52 160 1           DXCH   MPAC +3

 0963   REF   6  LAST 1145    7345  0 7056 0           TC     DMPSUB   DO SAME FOR Y AND Z COMPONENTS.
 0964   REF   2  LAST 1145    7346  0 7107 0           TC     VROUND
 0965   REF 376  LAST 1145    7347  52 162 0           DXCH   MPAC +5
 0966   REF 377  LAST 1145    7350  52 155 1           DXCH   MPAC
 0967   REF 378  LAST 1145    7351  52 162 0           DXCH   MPAC +5

 0968   REF   7  LAST 1145    7352  0 7056 0           TC     DMPSUB
 0969   REF   3  LAST 1145    7353  0 7107 0           TC     VROUND
 0970   REF 379  LAST 1145    7354  52 155 1  VROTATEX DXCH   MPAC     EXIT USED TO RESTORE MPAC AFTER THIS
 0971   REF 380  LAST 1145    7355  52 162 0           DXCH   MPAC +5  TYPE OF ROTATION. CALLED BY VECTOR SHIFT
 0972   REF 381  LAST 1145    7356  52 160 1           DXCH   MPAC +3  RIGHT, V/SC, ETC.
 0973   REF 382  LAST 1145    7357  52 155 1           DXCH   MPAC

 0974   REF  22  LAST 1144    7360  1 6030 0           TCF    DANZIG
```

```
P0975                   DP VECTOR PROJECTION ROUTINE.

 0976   REF   2  LAST 1143     7361  0 7123 0  VPROJ   TC      PREDOT      (MPAC.X)MPAC IS COMPUTED AND LEFT IN
 0977   REF  16  LAST 1058     7362  4 4766 0          CS      FOUR        MPAC. DO DOT AND FALL INTO DVXSC.
 0978   REF  57  LAST 1144     7363 26 116 0          ADS     ADDRWD

R0979                   VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.

 0980                           7364  0 0006 1  DVXSC   EXTEND              SAVE SCALAR IN MPAC +3 AND GET X
 0981   REF 383  LAST 1145     7365  3 0155 0          DCA     MPAC        COMPONENT OF ANSWER.
 0982   REF 384  LAST 1146     7366 52 160 1          DXCH    MPAC +3
 0983   REF   8  LAST 1145     7367  0 7056 0          TC      DMPSUB
 0984   REF   4  LAST 1145     7370  0 7107 0          TC      VROUND

 0985   REF  51  LAST 1143     7371  3 4767 0          CAF     TWO         ADVANCE ADDRWD TO Y COMPONENT OF X.
 0986   REF  58  LAST 1146     7372 26 116 0          ADS     ADDRWD
 0987                           7373  0 0006 1          EXTEND
 0988   REF 385  LAST 1146     7374  3 0160 0          DCA     MPAC +3     PUT SCALAR BACK INTO MPAC AND SAVE
 0989   REF 386  LAST 1146     7375 52 155 1          DXCH    MPAC        X RESULT IN MPAC +5.
 0990   REF 387  LAST 1146     7376 52 162 0          DXCH    MPAC +5
 0991   REF   9  LAST 1146     7377  0 7056 0          TC      DMPSUB
 0992   REF   5  LAST 1146     7400  0 7107 0          TC      VROUND

 0993   REF  52  LAST 1146     7401  3 4767 0          CAF     TWO
 0994   REF  59  LAST 1146     7402 26 116 0          ADS     ADDRWD      TO Z COMPONENT.
 0995   REF 388  LAST 1146     7403 52 160 1          DXCH    MPAC +3     BRING SCALAR BACK, PUTTING Y RESULT IN
 0996   REF 389  LAST 1146     7404 52 155 1          DXCH    MPAC        THE PROPER PLACE.
 0997   REF 390  LAST 1146     7405 52 160 1          DXCH    MPAC +3
 0998   REF  10  LAST 1146     7406  0 7056 0          TC      DMPSUB
 0999   REF   6  LAST 1146     7407  0 7107 0          TC      VROUND

 1000   REF 391  LAST 1146     7410 52 155 1          DXCH    MPAC        PUT Z COMPONENT IN PROPER PLACE, ALSO
 1001   REF 392  LAST 1146     7411 52 162 0          DXCH    MPAC +5     POSITIONING X.
 1002   REF 393  LAST 1146     7412 52 155 1          DXCH    MPAC

 1003   REF   1                7413  1 6470 0          TCF     VMODE       MODE HAS CHANGED TO VECTOR.
```

P1004 THE VECTOR CROSS PRODUCT ROUTINE CALCULATES (X M -X M ,X M -X M ,X M -X M) WHERE M IS THE VECTOR IN
R1006 3 2 2 3 1 3 3 1 2 1 1 2
R1008 MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.

```
1009                                7414  0 0006 1  VXV     EXTEND
1010  REF 394  LAST 1146           7415  3 0162 1          DCA     MPAC +5         FORM UP M3X1, LEAVING M1 IN VBUF.
1011  REF 395  LAST 1147           7416  52 155 1          DXCH    MPAC
1012  REF  30  LAST 1144           7417  52 123 0          DXCH    VBUF
1013  REF  11  LAST 1146           7420  0 7056 0          TC      DMPSUB          BY X1.

1014                                7421  0 0006 1          EXTEND
1015  REF 396  LAST 1147           7422  4 0160 1          DCS     MPAC +3         CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
1016  REF 397  LAST 1147           7423  52 155 1          DXCH    MPAC
1017  REF  31  LAST 1147           7424  52 125 0          DXCH    VBUF +2
1018  REF  12  LAST 1147           7425  0 7056 0          TC      DMPSUB

1019  REF  53  LAST 1146           7426  3 4767 0          CAF     TWO             ADVANCE ADDRWD TO X2.
1020  REF  60  LAST 1146           7427  26 116 0          ADS     ADDRWD
1021                                7430  0 0006 1          EXTEND
1022  REF 398  LAST 1147           7431  4 0162 0          DCS     MPAC +5         PREPARE TO GET -X2M3, SAVING -X1M2 IN
1023  REF 399  LAST 1147           7432  52 155 1          DXCH    MPAC            MPAC +5.
1024  REF 400  LAST 1147           7433  52 162 0          DXCH    MPAC +5
1025  REF  13  LAST 1147           7434  0 7056 0          TC      DMPSUB

1026                                7435  0 0006 1          EXTEND
1027  REF  32  LAST 1147           7436  3 0123 1          DCA     VBUF            GET X2M1, SAVING -X2M3 IN VBUF +4.
1028  REF 401  LAST 1147           7437  52 155 1          DXCH    MPAC
1029  REF  33  LAST 1147           7440  52 127 1          DXCH    VBUF +4
1030  REF  14  LAST 1147           7441  0 7056 0          TC      DMPSUB

1031  REF  54  LAST 1147           7442  3 4767 0          CAF     TWO             ADVANCE ADDRWD TO X3.
1032  REF  61  LAST 1147           7443  26 116 0          ADS     ADDRWD
1033                                7444  0 0006 1          EXTEND
1034  REF  34  LAST 1147           7445  4 0123 0          DCS     VBUF            GET -X3M1, ADDING X2M1 TO MPAC +5 TO
1035  REF 402  LAST 1147           7446  52 155 1          DXCH    MPAC            COMPLETE THE Z COMPONENT OF THE ANSWER.
1036  REF 403  LAST 1147           7447  20 162 0          DAS     MPAC +5

1037                                7450  0 0006 1          EXTEND
1038                                7451  1 7453 0          BZF     +2
1039  REF   3  LAST 1134           7452  0 6760 0          TC      OVERFLWZ

1040  REF  15  LAST 1147           7453  0 7056 0          TC      DMPSUB
1041  REF  35  LAST 1147           7454  52 125 0          DXCH    VBUF +2         MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
1042  REF 404  LAST 1147           7455  52 160 1          DXCH    MPAC +3         AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
1043  REF 405  LAST 1147           7456  52 155 1          DXCH    MPAC            Y COMPONENT OF THE RESULT.
1044  REF 406  LAST 1147           7457  20 160 1          DAS     MPAC +3

1045                                7460  0 0006 1          EXTEND
1046                                7461  1 7463 0          BZF     +2
```

```
 1047   REF   3  LAST 1134      7462  0 6763 0          TC      OVERFLWY

 1048   REF  16  LAST 1147      7463  0 7056 0          TC      DMPSUB
 1049   REF  36  LAST 1147      7464  52 127 1          DXCH    VBUF +4          GO ADD -X2M3 TO X3M2 TO COMPLETE THE X
 1050   REF   4  LAST 1135      7465  1 6747 1          TCF     ENDVXV           COMPONENT (TAIL END OF DAD).

R1051                THE MPACVBUF SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUF WITHOUT CLOBBERING MPAC.

 1053                           7466  0 0006 1  MPACVBUF EXTEND                  CALLED BY MXV, VXM, AND UNIT.
 1054   REF 407  LAST 1147      7467  3 0155 0          DCA     MPAC
 1055   REF  37  LAST 1148      7470  52 123 0          DXCH    VBUF
 1056                           7471  0 0006 1          EXTEND
 1057   REF 408  LAST 1148      7472  3 0160 0          DCA     MPAC +3
 1058   REF  38  LAST 1148      7473  52 125 0          DXCH    VBUF +2
 1059                           7474  0 0006 1          EXTEND
 1060   REF 409  LAST 1148      7475  3 0162 1          DCA     MPAC +5
 1061   REF  39  LAST 1148      7476  52 127 1          DXCH    VBUF +4
 1062   REF 225  LAST 1142      7477  0 0002 0          TC      Q                RETURN TO CALLER.


R1063                DOUBLE PRECISION SIGN AGREE ROUTINE. ARRIVE WITH INPUT IN A+L. OUTPUT IS IN A + L.

 1065   REF 290  LAST 1142      7500  10 000 0  ALSIGNAG CCS     A                TEST UPPER PART.
 1066   REF   1                 7501  1 7505 1          TCF     UPPOS            IT IS POSITIVE
 1067   REF 226  LAST 1148      7502  0 0002 0          TC      Q                ZERO
 1068   REF   1                 7503  1 7515 0          TCF     UPNEG            NEGATIVE
 1069   REF 227  LAST 1148      7504  0 0002 0          TC      Q                ZERO

 1070   REF 144  LAST 1142      7505  56 001 0  UPPOS    XCH     L                SAVE DECREMENTED UPPER PART.
 1071   REF  11  LAST 1092      7506  6 4753 1          AD      HALF
 1072   REF  12  LAST 1148      7507  6 4753 1          AD      HALF
 1073   REF 291  LAST 1148      7510  54 000 0          TS      A                SKIPS ON OVERFLOW
 1074                           7511  1 7513 0          TCF     +2
 1075   REF 145  LAST 1148      7512  24 001 0          INCR    L                RESTORE UPPER TO ROIGINAL VALUE
 1076   REF 146  LAST 1148      7513  56 001 0          XCH     L                SWAP A + L BACK.
 1077   REF 228  LAST 1148      7514  0 0002 0          TC      Q

 1078   REF 147  LAST 1148      7515  56 001 0  UPNEG    XCH     L                SAVE COMPLEMENTED + DECREMENTED UPPER PT
 1079   REF  11  LAST 1061      7516  6 4752 0          AD      NEGMAX
 1080   REF  21  LAST 1120      7517  6 7702 0          AD      NEGONE
 1081   REF 292  LAST 1148      7520  54 000 0          TS      A
 1082                           7521  1 7523 0          TCF     +2               DONT INCREMENT IF NO OVERFLOW.
 1083   REF 148  LAST 1148      7522  24 001 0          INCR    L
 1084   REF 149  LAST 1148      7523  56 001 0          XCH     L
 1085                           7524  4 0000 0          COM                      MAKE NEGATIVE AGAIN.
 1086   REF 229  LAST 1148      7525  0 0002 0          TC      Q
```

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P1087 INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

```
1089   REF  17  LAST 1148    7526  0 7056 0  DMP1    TC      DMPSUB          DMP INSTRUCTION.
1090   REF  23  LAST 1145    7527  1 6030 0           TCF     DANZIG

1091   REF  18  LAST 1149    7530  0 7056 0  DMPR    TC      DMPSUB
1092   REF   1               7531  0 7106 1           TC      ROUNDSUB +1     (C(A) = +0).
1093   REF  24  LAST 1149    7532  1 6030 0           TCF     DANZIG

1094                         7533  0 0006 1  DDV     EXTEND
1095   REF  62  LAST 1147    7534  5 0116 1           INDEX   ADDRWD          MOVE DIVIDEND INTO BUF.
1096                         7535  3 0001 0           DCA     0
1097   REF   2  LAST 1117    7536  1 7543 0           TCF     BDDV +4

1098                         7537  0 0006 1  BDDV    EXTEND                  MOVE DIVISOR INTO MPAC SAVING MPAC, THE
1099   REF  63  LAST 1149    7540  5 0116 1           INDEX   ADDRWD          DIVIDEND, IN BUF.
1100                         7541  3 0001 0           DCA     0
1101   REF 410  LAST 1148    7542 52 155 1           DXCH    MPAC
1102   REF  53  LAST 1139    7543 52 131 0  +4      DXCH    BUF
1103   REF 215  LAST 1143    7544  3 4772 1           CAF     ZERO            DIVIDE ROUTINES IN BANK 0.
1104   REF  20  LAST 1130    7545 54 004 1           TS      FBANK
1105   REF   1               7546  1 2353 1           TCF     DDV/BDDV

1106   REF  64  LAST 1149    7547  3 0116 1  SETPD   CA      ADDRWD          MUST SET TC WORK AREA, OR EBANK TROUBLE.
1107   REF  12  LAST 1127    7550 54 166 1           TS      PUSHLOC
1108   REF   1               7551  1 6032 1           TCF     NOIBNKSW        NO FBANK SWITCH REQUIRED.

1109   REF 216  LAST 1149    7552  3 4772 1  TSLC    CAF     ZERO            SHIFTING ROUTINES LOCATED IN BANK 00.
1110   REF  21  LAST 1149    7553 54 004 1           TS      FBANK
1111   REF   1               7554  1 2172 0           TCF     TSLC2

1112   REF   7  LAST 1109    7555  3 6043 0  GSHIFT  CAF     LOW7            USED AS MASK AT GENSHIFT. THIS PROCESSES
1113   REF  22  LAST 1149    7556 54 004 1           TS      FBANK           ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH
1114   REF   1               7557  1 2214 0           TCF     GENSHIFT        AN ADDRESS (ROUTINES IN BANK 0).
```

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P1115 THE FOLLOWING IS THE PROLOGUE TO V/SC. IF THE PRESENT MODE IS VECTOR, IT SAVES THE SCALAR AT X IN BUF
R1117 AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING
R1119 THE SCALAR IN MPAC IN BUF BEFORE CALLING THE V/SC ROUTINE IN BANK 0.

```
1120  REF  17  LAST 1145   7560  10 163 1  V/SC    CCS     MODE
1121  REF   1              7561  1 7572 1           TCF     DV/SC          MOVE VECTOR INTO MPAC.
1122  REF   2  LAST 1150   7562  1 7572 1           TCF     DV/SC

1123                       7563  0 0006 1  VV/SC   EXTEND
1124  REF  65  LAST 1149   7564  5 0116 1           INDEX   ADDRWD
1125                       7565  3 0001 0           DCA     0
1126  REF  54  LAST 1149   7566  52 131 0  V/SC1   DXCH    BUF            IN BOTH CASES, VECTOR IS NOW IN MPAC AND
1127  REF 217  LAST 1149   7567  3 4772 1           CAF     ZERO           SCALAR IN BUF.
1128  REF  23  LAST 1149   7570  54 004 1           TS      FBANK
1129  REF   1              7571  1 2653 1           TCF     V/SC2

1130                       7572  0 0006 1  DV/SC   EXTEND
1131  REF  66  LAST 1150   7573  5 0116 1           INDEX   ADDRWD
1132                       7574  3 0003 1           DCA     2
1133  REF 411  LAST 1149   7575  52 160 1           DXCH    MPAC +3
1134                       7576  0 0006 1           EXTEND
1135  REF  67  LAST 1150   7577  5 0116 1           INDEX   ADDRWD
1136                       7600  3 0005 1           DCA     4
1137  REF 412  LAST 1150   7601  52 162 0           DXCH    MPAC +5

1138  REF 128  LAST 1125   7602  4 4770 1           CS      ONE            CHANGE MODE TO VECTOR.
1139  REF  18  LAST 1150   7603  54 163 1           TS      MODE

1140                       7604  0 0006 1           EXTEND
1141  REF  68  LAST 1150   7605  5 0116 1           INDEX   ADDRWD
1142                       7606  3 0001 0           DCA     0
1143  REF 413  LAST 1150   7607  52 155 1           DXCH    MPAC
1144  REF   1              7610  1 7566 1           TCF     V/SC1          FINISH PROLOGUE AT COMMON SECTION.
```

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P1145 SIGN AND COMPLEMENT INSTRUCTIONS.

1146	REF 69	LAST 1150	7611	50 116 1	SIGN	INDEX	ADDRWD	CALL COMP INSTRUCTION IF WORD AT X IS
1147			7612	10 000 0		CCS	0	NEGATIVE NON-ZERO.
1148	REF 25	LAST 1149	7613	1 6030 0		TCF	DANZIG	
1149			7614	1 7616 0		TCF	+2	
1150	REF 2	LAST 1119	7615	1 7624 1		TCF	COMP	DO THE COMPLEMENT.
1151	REF 70	LAST 1151	7616	50 116 1		INDEX	ADDRWD	
1152			7617	10 001 1	CCSL	CCS	1	
1153	REF 26	LAST 1151	7620	1 6030 0		TCF	DANZIG	
1154	REF 27	LAST 1151	7621	1 6030 0		TCF	DANZIG	
1155	REF 3	LAST 1151	7622	1 7624 1		TCF	COMP	
1156	REF 28	LAST 1151	7623	1 6030 0		TCF	DANZIG	
1157			7624	0 0006 1	COMP	EXTEND		COMPLEMENT DP MPAC IN EVERY CASE.
1158	REF 414	LAST 1150	7625	4 0155 1		DCS	MPAC	
1159	REF 415	LAST 1151	7626	52 155 1		DXCH	MPAC	
1160	REF 19	LAST 1150	7627	10 163 1		CCS	MODE	EITHER COMPLEMENT MPAC +3 OR THE REST OF
1161	REF 1		7630	1 7641 1		TCF	DCOMP	THE VECTOR ACCUMULATOR.
1162	REF 2	LAST 1151	7631	1 7641 1		TCF	DCOMP	
1163			7632	0 0006 1		EXTEND		VECTOR COMPLEMENT.
1164	REF 416	LAST 1151	7633	4 0160 1		DCS	MPAC +3	
1165	REF 417	LAST 1151	7634	52 160 1		DXCH	MPAC +3	
1166			7635	0 0006 1		EXTEND		
1167	REF 418	LAST 1151	7636	4 0162 0		DCS	MPAC +5	
1168	REF 419	LAST 1151	7637	52 162 0		DXCH	MPAC +5	
1169	REF 29	LAST 1151	7640	1 6030 0		TCF	DANZIG	
1170	REF 420	LAST 1151	7641	4 0156 1	DCOMP	CS	MPAC +2	
1171	REF 421	LAST 1151	7642	54 156 1		TS	MPAC +2	
1172	REF 30	LAST 1151	7643	1 6030 0		TCF	DANZIG	

P1173 THE FOLLOWING SHORT SHIFT CODES REQUIRE NO ADDRESS WORD:

R1174 1. SR1 TO SR4 SCALAR SHIFT RIGHT.
R1175 2. SR1R TO SR4R SCALAR SHIFT RIGHT AND ROUND.
R1176 3. SL1 TO SL4 SCALAR SHIFT LEFT.
R1177 4. SL1R TO SL4R SCALAR SHIFT LEFT AND ROUND.

R1178 5. VSR1 TO VSR8 VECTOR SHIFT RIGHT (ALWAYS ROUNDS).
R1179 6. VSL1 TO VSL8 VECTOR SHIFT LEFT (NEVER ROUNDS).

R1180 THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED:*

R1181 1. SR SCALAR SHIFT RIGHT.
R1182 2. SRR SCALAR SHIFT RIGHT AND ROUND.
R1183 3. SL SCALAR SHIFT LEFT.
R1184 4. SLR SCALAR SHIFT LEFT AND ROUND.

R1185 5. VSR VECTOR SHIFT RIGHT.
R1186 6. VSL VECTOR SHIFT LEFT.

R1187 * IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE
R1189 ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.

```
1190   REF   2 LAST 1119    00,2000                    SETLOC INTERBO
11905                       00,2017                    BANK

1191   REF   2 LAST 1119 TO 1120:    15    15*         COUNT* $$/INTER
1192   REF  30 LAST 1143    00,2017  3 6211 0  SHORTT   CAF    SIX      SCALAR SHORT SHIFTS COME HERE. THE SHIFT
1193   REF  23 LAST 1124    00,2020  7 0020 1           MASK   CYR      COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE
1194   REF  17 LAST 1091    00,2021  54 021 0           TS     SR       ROUNDING BIT IS IN BIT1 AT THIS POINT.

1195   REF  24 LAST 1152    00,2022  10 020 1           CCS    CYR      SEE IF RIGHT OR LEFT SHIFT DESIRED.
1196   REF   1              00,2023  1 2101 1           TCF    TSSL     SHIFT LEFT.

1197                        00,2024   00024 1  SRDDV     DEC    20       MPTEMP SETTING FOR SR BEFORE DDV.

1198   REF  18 LAST 1152    00,2025  50 021 1  TSSR      INDEX  SR       GET SHIFTING BIT.
1199   REF  51 LAST 1038    00,2026  3 4753 1           CAF    BIT14
1200   REF  12 LAST 1142    00,2027  54 135 1           TS     MPTEMP

1201   REF  25 LAST 1152    00,2030  10 020 1           CCS    CYR      SEE IF A ROUND IS DESIRED.
1202   REF   1              00,2031  0 2050 0  RIGHTR    TC     MPACSRND YES - SHIFT RIGHT AND ROUND.
1203   REF   4 LAST 1143    00,2032  1 6027 0           TCF    NEWMODE  SET MODE TO DP (C(A) = 0).
1204   REF  13 LAST 1152    00,2033  3 0135 0  MPACSHR   CA     MPTEMP   DO A TRIPLE PRECISION SHIFT RIGHT.
1205                        00,2034  0 0006 1           EXTEND
1206   REF 422 LAST 1151    00,2035  7 0156 1           MP     MPAC +2
1207   REF 423 LAST 1152    00,2036  54 156 1    +3     TS     MPAC +2  (EXIT FROM SQRT AND ABVAL).
1208   REF  14 LAST 1152    00,2037  3 0135 0           CA     MPTEMP
1209                        00,2040  0 0006 1           EXTEND
```

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```
1210   REF 424  LAST 1152   00,2041  7 0154 0          MP      MPAC        SHIFT MAJOR PART INTO A,L AND PLACE IN
1211   REF 425  LAST 1153   00,2042  52 155 1          DXCH    MPAC        MPAC,+1.
1212   REF  15  LAST 1152   00,2043  3 0135 0          CA      MPTEMP
1213                        00,2044  0 0006 1          EXTEND
1214   REF 150  LAST 1148   00,2045  7 0001 1          MP      L           ORIGINAL C(MPAC +1).
1215   REF 426  LAST 1153   00,2046  20 156 1          DAS     MPAC +1     GUARANTEED NO OVERFLOW.
1216   REF  31  LAST 1151   00,2047  1 6030 0          TCF     DANZIG

R1217          MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

1218   REF 427  LAST 1153   00,2050  3 0156 0  MPACSRND CA      MPAC +2     WE HAVE TO DO ALL THREE MULTIPLIES SINCE
1219                        00,2051  0 0006 1          EXTEND                 MPAC +1 AND MPAC +2 MIGHT HAVE SIGN
1220   REF  16  LAST 1153   00,2052  7 0135 1          MP      MPTEMP      DISAGREEMENT WITH A SHIFT RIGHT OF 1.
1221   REF 428  LAST 1153   00,2053  56 155 0          XCH     MPAC +1
1222                        00,2054  0 0006 1          EXTEND
1223   REF  17  LAST 1153   00,2055  7 0135 1          MP      MPTEMP
1224   REF 429  LAST 1153   00,2056  56 155 0          XCH     MPAC +1     TRIAL MINOR PART.
1225   REF 151  LAST 1153   00,2057  6 0001 0          AD      L

1226                        00,2060  6 0000 1  VSHR2    DOUBLE              (FINISH VECTOR COMPONENT SHIFT RIGHT
1227   REF 430  LAST 1153   00,2061  54 156 1          TS      MPAC +2     AND ROUND.
1228                        00,2062  1 2064 0          TCF     +2
1229   REF 431  LAST 1153   00,2063  26 155 1          ADS     MPAC +1     GUARANTEED NO OVERFLOW.

1230   REF 218  LAST 1150   00,2064  3 4772 1          CAF     ZERO
1231   REF 432  LAST 1153   00,2065  54 156 1          TS      MPAC +2
1232   REF 433  LAST 1153   00,2066  56 154 1          XCH     MPAC        SETTING TO ZERO SO FOLLOWING DAS WORKS.
1233                        00,2067  0 0006 1          EXTEND
1234   REF  18  LAST 1153   00,2070  7 0135 1          MP      MPTEMP
1235   REF 434  LAST 1153   00,2071  20 155 1          DAS     MPAC        AGAIN NO OVERFLOW.
1236   REF 230  LAST 1148   00,2072  0 0002 0          TC      Q

1237   REF  19  LAST 1153   00,2073  3 0135 0  VSHRRND  CA      MPTEMP      ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN
1238                        00,2074  0 0006 1          EXTEND                 MPAC CONTAINS A VECTOR COMPONENT.
1239   REF 435  LAST 1153   00,2075  7 0155 1          MP      MPAC +1
1240   REF 436  LAST 1153   00,2076  54 155 1          TS      MPAC +1
1241   REF 152  LAST 1153   00,2077  56 001 0          XCH     L
1242   REF   1              00,2100  1 2060 1          TCF     VSHR2       GO ADD ONE IF NECESSARY AND FINISH.
```

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P1243 ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

1244	REF 19	LAST 1152	00,2101	3 0021 1	TSSL	CA	SR		GET SHIFT COUNT FOR SR.
1245	REF 20	LAST 1153	00,2102	54 135 1	+1	TS	MPTEMP		
1246			00,2103	0 0006 1	+2	EXTEND			ENTRY HERE FROM SL FOR SCALARS.
1247	REF 437	LAST 1153	00,2104	3 0156 0		DCA	MPAC +1		SHIFTING LEFT ONE PLACE AT A TIME IS
1248	REF 438	LAST 1154	00,2105	20 156 1		DAS	MPAC +1		FASTER THAN DOING THE WHOLE SHIFT WITH
1249	REF 439	LAST 1154	00,2106	6 0154 1		AD	MPAC		MULTIPLIES ASSUMING THAT FREQUENCY OF
1250	REF 440	LAST 1154	00,2107	6 0154 1		AD	MPAC		SHIFT COUNTS GOES DOWN RAPIDLY AS A
1251	REF 441	LAST 1154	00,2110	54 154 0		TS	MPAC		FUNCTION OF THEIR MAGNITUDE.
1252			00,2111	1 2113 1		TCF	+2		
1253	REF 4	LAST 1139	00,2112	54 121 1		TS	OVFIND		OVERFLOW. (LEAVES OVERFLOW-CORRECTED
A1254									RESULT ANYWAY).
1255	REF 21	LAST 1154	00,2113	10 135 1		CCS	MPTEMP		LOOP ON DECREMENTED SHIFT COUNT.
1256	REF 2	LAST 1152	00,2114	1 2102 1		TCF	TSSL +1		
1257	REF 26	LAST 1152	00,2115	10 020 1		CCS	CYR		SEE IF ROUND WANTED.
1258	REF 2	LAST 1149	00,2116	0 7105 1	ROUND	TC	ROUNDSUB		YES - ROUND AND EXIT.
1259	REF 32	LAST 1153	00,2117	1 6030 0		TCF	DANZIG		SL LEAVES A ZERO IN CYR FOR NO ROUND.
1260	REF 33	LAST 1154	00,2120	1 6030 0		TCF	DANZIG		NO - EXIT IMMEDIATL

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P1261 VECTOR SHIFTING ROUTINES.

```
1262  REF   2  LAST  221   00,2121  3 4774 1  SHORTV   CAF    LOW3     SAVE 3 BIT SHIFT COUNT - 1 WITHOUT
1263  REF  27  LAST 1154   00,2122  7 0020 1           MASK   CYR      EDITING CYR.
1264  REF  22  LAST 1154   00,2123  54 135 1           TS     MPTEMP
1265  REF  28  LAST 1155   00,2124  10 020 1           CCS    CYR      SEE IF LEFT OR RIGHT SHIFT.
1266  REF   1             00,2125  1 2145 1           TCF    VSSL     VECTOR SHIFT LEFT.
1267                      00,2126   00176 1  OCT176    OCT    176      USED IN PROCESSED SHIFTS WITH - COUNT.

1268  REF  23  LAST 1155   00,2127  50 135 0  VSSR     INDEX  MPTEMP   (ENTRY FROM SR). PICK UP SHIFTING BIT.
1269  REF  52  LAST 1152   00,2130  3 4753 1           CAF    BIT14    MPTEMP CONTAINS THE SHIFT COUNT - 1.
1270  REF  24  LAST 1155   00,2131  54 135 1           TS     MPTEMP
1271  REF   1             00,2132  0 2073 1           TC     VSHRRND  SHIFT X COMPONENT.

1272  REF 442  LAST 1154   00,2133  52 155 1           DXCH   MPAC     SWAP X AND Y COMPONENTS.
1273  REF 443  LAST 1155   00,2134  52 160 1           DXCH   MPAC +3
1274  REF 444  LAST 1155   00,2135  52 155 1           DXCH   MPAC
1275  REF   2  LAST 1155   00,2136  0 2073 1           TC     VSHRRND  SHIFT Y COMPONENT.

1276  REF 445  LAST 1155   00,2137  52 155 1           DXCH   MPAC     SWAP Y AND Z COMPONENTS.
1277  REF 446  LAST 1155   00,2140  52 162 0           DXCH   MPAC +5
1278  REF 447  LAST 1155   00,2141  52 155 1           DXCH   MPAC
1279  REF   3  LAST 1155   00,2142  0 2073 1           TC     VSHRRND  SHIFT Z COMPONENT.

1280  REF   1             00,2143  1 7354 0           TCF    VROTATEX RESTORE COMPONENTS TO PROPER PLACES.
```

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```
P1281   VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.
 1282   REF  25  LAST 1155   00,2144  54 135 1   -1      TS      MPTEMP          SHIFTING LOOP.

 1283                        00,2145  0 0006 1   VSSL    EXTEND
 1284   REF 448  LAST 1155   00,2146  3 0155 0           DCA     MPAC
 1285   REF 449  LAST 1156   00,2147  20 155 1           DAS     MPAC
 1286                        00,2150  0 0006 1           EXTEND
 1287                        00,2151  1 2153 0           BZF     +2
 1288   REF   3  LAST 1139   00,2152  0 6766 0           TC      OVERFLOW

 1289                        00,2153  0 0006 1           EXTEND
 1290   REF 450  LAST 1156   00,2154  3 0160 0           DCA     MPAC +3
 1291   REF 451  LAST 1156   00,2155  20 160 1           DAS     MPAC +3
 1292                        00,2156  0 0006 1           EXTEND
 1293                        00,2157  1 2161 1           BZF     +2
 1294   REF   4  LAST 1148   00,2160  0 6763 0           TC      OVERFLWY

 1295                        00,2161  0 0006 1           EXTEND
 1296   REF 452  LAST 1156   00,2162  3 0162 1           DCA     MPAC +5
 1297   REF 453  LAST 1156   00,2163  20 162 0           DAS     MPAC +5
 1298                        00,2164  0 0006 1           EXTEND
 1299                        00,2165  1 2167 1           BZF     +2
 1300   REF   4  LAST 1147   00,2166  0 6760 0           TC      OVERFLWZ

 1301   REF  26  LAST 1156   00,2167  10 135 1           CCS     MPTEMP          LOOP ON DECREMENTED SHIFT COUNTER.
 1302   REF   2  LAST 1155   00,2170  1 2144 0           TCF     VSSL -1
 1303   REF  34  LAST 1154   00,2171  1 6030 0           TCF     DANZIG          EXIT.
```

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P1304 TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING
R1306 THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X.

```
1307  REF  27  LAST 1156  00,2172  54 135 1  TSLC2     TS      MPTEMP      START BY ZEROING SHIFT COUNT (IN A NOW).
1308  REF   2  LAST 1142  00,2173  0 6672 1             TC      BRANCH      EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
1309                       00,2174  1 2176 1             TCF     +2
1310  REF   1             00,2175  1 2212 0             TCF     ENDTSLC     STORES ZERO SHIFT COUNT IN THIS CASE.

1311  REF   4  LAST  349  00,2176  0 7226 0             TC      TPAGREE     MAY CAUSE UPSHIFT OF ONE EXTRA PLACE.

1312  REF 454  LAST 1156  00,2177  3 0154 1             CA      MPAC        BEGIN NORMALIZATION LOOP.
1313  REF   1             00,2200  1 2207 1             TCF     TSLCTEST

1314  REF  28  LAST 1157  00,2201  24 135 0  TSLCLOOP  INCR    MPTEMP      INCREMENT SHIFT COUNTER.
1315                       00,2202  0 0006 1             EXTEND
1316  REF 455  LAST 1157  00,2203  3 0156 0             DCA     MPAC +1
1317  REF 456  LAST 1157  00,2204  20 156 1             DAS     MPAC +1
1318  REF 457  LAST 1157  00,2205  6 0154 1             AD      MPAC
1319  REF 458  LAST 1157  00,2206  26 154 0             ADS     MPAC
1320                       00,2207  6 0000 1  TSLCTEST  DOUBLE              SEE IF (ANOTHER) SHIFT IS REQUIRED.
1321                       00,2210  54 000 0             OVSK
1322  REF   1             00,2211  1 2201 1             TCF     TSLCLOOP    YES - INCREMENT COUNT AND SHIFT AGAIN.

1323  REF  29  LAST 1157  00,2212  4 0135 1  ENDTSLC   CS      MPTEMP
1324  REF   1             00,2213  1 6572 0             TCF     STORE1      STORE SHIFT COUNT AND RETURN TO DANZIG.
```

P1325 THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.
R1327 THE GIVEN ADDRESS IS DECODED AS FOLLOWS:

R1328	BITS 1-7	SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.
R1329	BIT 8	PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).
R1331	BIT 9	0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.
R1332	BIT 10	1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.
R1333	BITS 11-13	0.
R1334	BIT 14	1.
R1335	BIT 15	0.

R1336 THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.

```
1337  REF  71  LAST 1151  00,2214  7 0116 0  GENSHIFT MASK   ADDRWD    GET SHIFT COUNT, TESTING FOR ZERO.
1338  REF 293  LAST 1148  00,2215  10 000 0            CCS    A         (ARRIVES WITH C(A) = LOW7).
1339  REF   1             00,2216  1 2224 0            TCF    GENSHFT2  IF NON-ZERO, PROCEED WITH DECREMENTED CT

1340  REF  24  LAST  721  00,2217  3 4757 0            CAF    BIT1      ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
1341  REF  72  LAST 1158  00,2220  7 0116 0            MASK   ADDRWD    WE MIGHT HAVE TO ROUND MPAC ON SLR AND
1342  REF 294  LAST 1158  00,2221  10 000 0            CCS    A         SRR (SCALAR ONLY).
1343  REF   3  LAST 1154  00,2222  0 7105 1            TC     ROUNDSUB
1344  REF  35  LAST 1156  00,2223  1 6030 0            TCF    DANZIG

1345  REF  30  LAST 1157  00,2224  54 135 1  GENSHFT2 TS     MPTEMP    DECREMENTED SHIFT COUNT TO MPTEMP.
1346  REF  29  LAST 1106  00,2225  3 4761 0            CAF    BIT8      TEST MEANING OF LOW SEVEN BIT COUNT IN
1347                      00,2226  0 0006 1            EXTEND           MPTEMP NOW.
1348  REF  73  LAST 1158  00,2227  7 0116 0            MP     ADDRWD
1349  REF   1             00,2230  7 6214 1            MASK   LOW2      JUMPS ON SHIFT DIRECTION (BIT8) AND
1350  REF 295  LAST 1158  00,2231  50 000 1            INDEX  A
1351                      00,2232  1 2233 0            TCF    +1        ORIGINAL SHIFT DIRECTION (BIT 9).
1352  REF   1             00,2233  1 2332 0            TCF    RIGHT-    NEGATIVE SHIFT COUNT FOR SL OR SLR.
1353  REF   1             00,2234  1 2342 1            TCF    LEFT      SL OR SLR.
1354  REF   1             00,2235  1 2336 1            TCF    LEFT-     NEGATIVE SHIFT COUNT WITH SR OR SRR.
```

P1355 GENERAL SHIFT RIGHT.

1356	REF 20	LAST 1151	00,2236	10 163 1	RIGHT	CCS	MODE		SEE IF VECTOR OR SCALAR.
1357	REF 1		00,2237	1 2277 0		TCF	GENSCR		
1358	REF 2	LAST 1159	00,2240	1 2277 0		TCF	GENSCR		
1359	REF 31	LAST 1158	00,2241	3 0135 0		CA	MPTEMP		SEE IF SHIFT COUNT LESS THAN 14D.
1360	REF 1		00,2242	6 3726 1	VRIGHT2	AD	NEG12		
1361			00,2243	0 0006 1		EXTEND			
1362	REF 1		00,2244	6 2127 1		BZMF	VSSR		IF SO, BRANCH AND SHIFT IMMEDIATELY.
1363	REF 22	LAST 1148	00,2245	6 7702 0		AD	NEGONE		IF NOT, REDUCE MPTEMP BY A TOTAL OF 14,
1364	REF 32	LAST 1159	00,2246	54 135 1		TS	MPTEMP		AND DO A SHIFT RIGHT AND ROUND BY 14.
1365	REF 219	LAST 1153	00,2247	3 4772 1		CAF	ZERO		THE ROUND AT THIS STAGE MAY INTRODUCE A
1366	REF 153	LAST 1153	00,2250	54 001 1		TS	L		ONE BIT ERROR IN A SHIFT RIGHT 15D.
1367	REF 459	LAST 1157	00,2251	56 154 1		XCH	MPAC		
1368	REF 460	LAST 1159	00,2252	56 155 0		XCH	MPAC +1		
1369	REF 1		00,2253	0 2272 1		TC	SETROUND		X COMPONENT NOW SHIFTED, SO MAKE UP THE
1370	REF 461	LAST 1159	00,2254	20 155 1		DAS	MPAC		ROUNDING QUANTITY (0 IN A AND 0 OR +-1
A1371									IN L).
1372	REF 462	LAST 1159	00,2255	56 157 1		XCH	MPAC +3		REPEAT THE ABOVE PROCESS FOR Y AND Z.
1373	REF 463	LAST 1159	00,2256	56 160 0		XCH	MPAC +4		
1374	REF 2	LAST 1159	00,2257	0 2272 1		TC	SETROUND		
1375	REF 464	LAST 1159	00,2260	20 160 1		DAS	MPAC +3		NO OVERFLOW ON THESE ADDS.
1376	REF 465	LAST 1159	00,2261	56 161 1		XCH	MPAC +5		
1377	REF 466	LAST 1159	00,2262	56 162 1		XCH	MPAC +6		
1378	REF 3	LAST 1159	00,2263	0 2272 1		TC	SETROUND		
1379	REF 467	LAST 1159	00,2264	20 162 0		DAS	MPAC +5		
1380	REF 33	LAST 1159	00,2265	10 135 1		CCS	MPTEMP		SEE IF DONE, DOING FINAL DECREMENT.
1381	REF 34	LAST 1159	00,2266	54 135 1		TS	MPTEMP		
1382	REF 1		00,2267	1 2242 0		TCF	VRIGHT2		
1383			00,2270	04604 1	BIASLO	DEC	.2974 B-1		SQRT CONSTANT
1384	REF 36	LAST 1158	00,2271	1 6030 0		TCF	DANZIG		
1385			00,2272	6 0000 1	SETROUND	DOUBLE			MAKES UP ROUNDING QUANTITY FROM ARRIVING
1386	REF 468	LAST 1159	00,2273	54 156 1		TS	MPAC +2		C(A). L IS ZERO INITIALLY.
1387	REF 220	LAST 1159	00,2274	3 4772 1		CAF	ZERO		
1388	REF 154	LAST 1159	00,2275	56 001 0		XCH	L		
1389	REF 231	LAST 1153	00,2276	0 0002 0		TC	Q		RETURN AND DO THE DAS, RESETTING L TO 0.

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P1390 PROCESS SR AND SRR FOR SCALARS.

1391	REF	35	LAST 1159	00,2277	3 0135 0	GENSCR	CA	MPTEMP	SEE IF THE ORIGINAL SHIFT COUNT WAS LESS
1392	REF	2	LAST 1159	00,2300	6 3726 1	+1	AD	NEG12	THAN 14D.
1393				00,2301	0 0006 1		EXTEND		
1394	REF	1		00,2302	6 2322 0		BZMF	DOSSHFT	DO THE SHIFT IMMEDIATELY IF SO.
1395	REF	23	LAST 1159	00,2303	6 7702 0	+4	AD	NEGONE	IF NOT, DECREMENT SHIFT COUNT BY 14D AND
1396	REF	36	LAST 1160	00,2304	54 135 1		TS	MPTEMP	SHIFT MPAC RIGHT 14 PLACES.
1397	REF	221	LAST 1159	00,2305	3 4772 1		CAF	ZERO	
1398	REF	469	LAST 1159	00,2306	56 154 1		XCH	MPAC	
1399	REF	470	LAST 1160	00,2307	56 155 0		XCH	MPAC +1	
1400	REF	471	LAST 1160	00,2310	54 156 1		TS	MPAC +2	
1401	REF	37	LAST 1160	00,2311	10 135 1		CCS	MPTEMP	SEE IF FINISHED, DO FINAL DECREMENT.
1402	REF	38	LAST 1160	00,2312	54 135 1		TS	MPTEMP	
1403	REF	3	LAST 1159	00,2313	0 2300 0		TC	GENSCR +1	
1404				00,2314	22650 1	SLOPEHI	DEC	.5884	SQRT CONSTANT.
1405	REF	25	LAST 1158	00,2315	3 4757 0		CAF	BIT1	FINISHED WITH SHIFT. SEE IF ROUND
1406	REF	74	LAST 1158	00,2316	7 0116 0		MASK	ADDRWD	WANTED.
1407	REF	296	LAST 1158	00,2317	10 000 0		CCS	A	
1408	REF	4	LAST 1158	00,2320	0 7105 1		TC	ROUNDSUB	
1409	REF	37	LAST 1159	00,2321	1 6030 0		TCF	DANZIG	DO SO AND/OR EXIT.
1410	REF	39	LAST 1160	00,2322	50 135 0	DOSSHFT	INDEX	MPTEMP	PICK UP SHIFTING BIT.
1411	REF	53	LAST 1155	00,2323	3 4753 1		CAF	BIT14	
1412	REF	40	LAST 1160	00,2324	54 135 1		TS	MPTEMP	
1413	REF	26	LAST 1160	00,2325	3 4757 0		CAF	BIT10	SEE IF TERMINAL ROUND DESIRED.
1414	REF	75	LAST 1160	00,2326	7 0116 0		MASK	ADDRWD	
1415	REF	297	LAST 1160	00,2327	10 000 0		CCS	A	
1416	REF	1		00,2330	1 2031 0		TCF	RIGHTR	YES.
1417	REF	1		00,2331	1 2033 1		TCF	MPACSHR	JUST SHIFT RIGHT.

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P1418 PROCESS THE RIGHT- (SL(R) WITH A NEGATIVE COUNT), LEFT-, AND LEFT OPTIONS.

```
1420  REF  41  LAST 1160  00,2332  4 0135 1  RIGHT-  CS    MPTEMP   GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
1421  REF   1              00,2333  6 2126 0          AD    OCT176   UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
1422  REF  42  LAST 1161  00,2334  54 135 1          TS    MPTEMP   WAS 1 INITIALLY.
1423  REF   1              00,2335  1 2236 0          TCF   RIGHT    DO NORMAL SHIFT RIGHT.

1424  REF   2  LAST 1161  00,2336  4 2126 1  LEFT-   CS    OCT176   SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
1425  REF  43  LAST 1161  00,2337  6 0135 0          AD    MPTEMP   SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
1426                      00,2340  4 0000 0          COM
1427  REF  44  LAST 1161  00,2341  54 135 1          TS    MPTEMP

1428  REF  21  LAST 1159  00,2342  10 163 1  LEFT    CCS   MODE     SINCE LEFT SHIFTING IS SONE ONE PLACE AT
1429  REF   1              00,2343  1 2346 0          TCF   GENSCL   A TIME, NO COMPARISON WITH 14 NEED BE
1430  REF   2  LAST 1161  00,2344  1 2346 0          TCF   GENSCL   DONE. FOR SCALARS, SEE IF TERMINAL ROUND
1431  REF   3  LAST 1156  00,2345  1 2145 1          TCF   VSSL     DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.

1432  REF  76  LAST 1160  00,2346  4 0116 0  GENSCL  CS    ADDRWD   PUT ROUNDING BIT (BIT 10 OF ADDRWD)INTO
1433                      00,2347  0 0006 1          EXTEND         BIT 15 OF CYR WHERE THE ROUNDING BIT OF
1434  REF  32  LAST 1010  00,2350  7 4763 0          MP    BIT6     A SHORT SHIFT LEFT WOULD BE
1435  REF  29  LAST 1155  00,2351  54 020 1          TS    CYR
1436  REF   3  LAST 1154  00,2352  1 2103 0          TCF   TSSL +2  DO THE SHIFT.
```

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P1437 SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC
R1439 AND THE DIVISOR IN BUF.

1440	REF 129	LAST 1150	00,2353	4 4770 1	DDV/BDDV	CS	ONE	INITIALIZATION.
1441	REF 1		00,2354	54 136 1		TS	DVSIGN	+-1 FOR POSITIVE QUOTIENT - -0 FOR NEG.
1442	REF 1		00,2355	54 137 0		TS	DVNORMCT	DIVIDEND NORMALIZATION COUNT.
1443	REF 1		00,2356	54 140 0		TS	MAXDVSW	NEAR-ONE DIVIDE FLAG.
1444	REF 55	LAST 1150	00,2357	10 130 1		CCS	BUF	FORCE BUF POSITIVE WITH THE MAJOR PART
1445	REF 1		00,2360	1 2515 0		TCF	BUFPOS	NON-ZERO.
1446			00,2361	1 2363 1		TCF	+2	
1447	REF 1		00,2362	1 2530 1		TCF	BUFNEG	
1449	REF 1		00,2363	0 7225 0	BUFZERO	TC	BUFAGREE	
1450	REF 472	LAST 1160	00,2364	10 154 0		CCS	MPAC	TEST TO SEE IF MPAC NON-ZERO. (TOO BIG)
1451	REF 1		00,2365	1 2413 1		TCF	OVF+	MAJOR PART OF DIVIDEND IS POSITIVE NON-0
1452			00,2366	1 2370 0		TCF	+2	
1453	REF 2	LAST 1162	00,2367	1 2412 0		TCF	OVF+ -1	MAJOR PART OF DIVIDEND IS NEG. NON-ZERO
1454	REF 56	LAST 1162	00,2370	56 131 1		XCH	BUF +1	SHIFT DIVIDEND AND DIVISOR LEFT 14.
1455	REF 57	LAST 1162	00,2371	56 130 0		XCH	BUF	
1456	REF 473	LAST 1162	00,2372	56 155 0		XCH	MPAC +1	
1457	REF 474	LAST 1162	00,2373	56 154 1		XCH	MPAC	
1458	REF 58	LAST 1162	00,2374	10 130 1		CCS	BUF	TRY AGAIN ON FORMER MINOR PART.
1459	REF 1		00,2375	1 2421 0		TCF	BUF+	
1460			00,2376	1 2400 0		TCF	+2	OVERFLOW ON ZERO DIVISOR.
1461	REF 1		00,2377	1 2415 1		TCF	BUF-	
1462	REF 475	LAST 1162	00,2400	4 0154 0		CS	MPAC	SIGN OF MPAC DETERMINES SIGN OF RESULT.
1463			00,2401	0 0006 1	SGNDVOVF	EXTEND		
1464			00,2402	6 2404 0		BZMF	+2	
1465	REF 2	LAST 1162	00,2403	24 136 0		INCR	DVSIGN	NEGMAX IN MPAC PERHAPS.
1466	REF 29	LAST 1142	00,2404	3 4750 1	DVOVF	CAF	POSMAX	ON DIVISION OVERFLOW OF ANY SORT, SET
1467	REF 476	LAST 1162	00,2405	54 154 0		TS	MPAC	SET DP MPAC TO +-POSMAX.
1468	REF 1		00,2406	0 2627 0		TC	FINALDV +3	
1469	REF 130	LAST 1162	00,2407	3 4770 0		CAF	ONE	SET OVERFLOW INDICATOR AND EXIT.
1470	REF 5	LAST 1154	00,2410	54 121 1		TS	OVFIND	
1471	REF 38	LAST 1160	00,2411	0 6030 1		TC	DANZIG	
1472	REF 3	LAST 1162	00,2412	24 136 0	-1	INCR	DVSIGN	
1473	REF 59	LAST 1162	00,2413	4 0131 0	OVF+	CS	BUF +1	LOAD LOWER ORDER PART OF DIVISOR.
1474	REF 1		00,2414	1 2401 1		TCF	SGNDVOVF	GET SIGN OF RESULT.
1475			00,2415	0 0006 1	BUF-	EXTEND		IF BUF IS NEGATIVE, COMPLEMENT IT AND
1476	REF 60	LAST 1162	00,2416	4 0131 0		DCS	BUF	MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.
1477	REF 61	LAST 1162	00,2417	52 131 0		DXCH	BUF	
1478	REF 4	LAST 1162	00,2420	24 136 0		INCR	DVSIGN	NOW -0.
1479	REF 477	LAST 1162	00,2421	10 154 0	BUF+	CCS	MPAC	FORCE MPAC POSITIVE, CHECKING FOR ZERO

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1480   REF   1                 00,2422  1 2436 0          TCF    MPAC+      DIVIDEND IN THE PROCESS.
1481                             00,2423  1 2425 1          TCF    +2
1482   REF   1                 00,2424  1 2432 1          TCF    MPAC-
1483   REF 478  LAST 1162       00,2425  10 155 1          CCS    MPAC +1
1484   REF   2  LAST 1163       00,2426  1 2436 0          TCF    MPAC+
1485   REF  39  LAST 1162       00,2427  1 6030 0          TCF    DANZIG     EXIT IMMEDIATELY ON ZERO DIVIDEND.
1486   REF   2  LAST 1163       00,2430  1 2432 1          TCF    MPAC-
1487   REF  40  LAST 1163       00,2431  1 6030 0          TCF    DANZIG

1488                             00,2432  0 0006 1  MPAC-   EXTEND             FORCE MPAC POSITIVE AS BUF IN BUF-.
1489   REF 479  LAST 1163       00,2433  4 0155 1          DCS    MPAC
1490   REF 480  LAST 1163       00,2434  52 155 1          DXCH   MPAC
1491   REF   5  LAST 1162       00,2435  24 136 0          INCR   DVSIGN     NOW +1 OR -0.
```

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1492	REF 481	LAST 1163	00,2436	4 0154 0	MPAC+	CS	MPAC	CHECK FOR DIVISION OVERFLOW. IF THE
1493	REF 24	LAST 1160	00,2437	6 7702 0		AD	NEGONE	MAJOR PART OF THE DIVIDEND IS LESS THAN
1494	REF 62	LAST 1162	00,2440	6 0130 0		AD	BUF	THE MAJOR PART OF THE DIVISOR BY AT
1495	REF 298	LAST 1160	00,2441	10 000 0		CCS	A	LEAST TWO, WE CAN PROCEED IMMEDIATELY
1496	REF 1		00,2442	1 2504 0		TCF	DVNORM	WITHOUT NORMALIZATION PRODUCING A DVMAX.
1497			00,2443	60001 0	-1/2+2	OCT	60001	USED IN SQRTSUB.
1498			00,2444	1 2445 1		TCF	+1	IF THE ABOVE DOES NOT HOLD, FORCE SIGN
1499	REF 13	LAST 1148	00,2445	3 4753 1		CAF	HALF	AGREEMENT IN NUMERATOR AND DENOMINATOR
1500			00,2446	6 0000 1		DOUBLE		TO FACILITATE OVERFLOW AND NEAR-ONE
1501	REF 482	LAST 1164	00,2447	6 0155 0		AD	MPAC +1	CHECKING.
1502	REF 483	LAST 1164	00,2450	54 155 1		TS	MPAC +1	
1503	REF 222	LAST 1160	00,2451	3 4772 1		CAF	ZERO	
1504	REF 30	LAST 1162	00,2452	6 4750 1		AD	POSMAX	
1505	REF 484	LAST 1164	00,2453	26 154 0		ADS	MPAC	
1506	REF 14	LAST 1164	00,2454	3 4753 1		CAF	HALF	SAME FOR BUF.
1507			00,2455	6 0000 1		DOUBLE		
1508	REF 63	LAST 1164	00,2456	6 0131 1		AD	BUF +1	
1509	REF 64	LAST 1164	00,2457	54 131 0		TS	BUF +1	
1510	REF 223	LAST 1164	00,2460	3 4772 1		CAF	ZERO	
1511	REF 31	LAST 1164	00,2461	6 4750 1		AD	POSMAX	
1512	REF 65	LAST 1164	00,2462	26 130 1		ADS	BUF	
1513	REF 485	LAST 1164	00,2463	4 0154 0		CS	MPAC	CHECK MAGNITUDE OF SIGN-CORRECTED
1514	REF 66	LAST 1164	00,2464	6 0130 0		AD	BUF	OPERANDS.
1515	REF 299	LAST 1164	00,2465	10 000 0		CCS	A	
1516	REF 2	LAST 1164	00,2466	1 2504 0		TCF	DVNORM	DIVIDE OK - WILL NOT BECOME MAXDV CASE.
1517	REF 13	LAST 1144	00,2467	00133 0	LBUF2	ADRES	BUF2	
1518	REF 1		00,2470	1 2404 1		TCF	DVOVF	DIVISOR NOT LESS THAN DIVIDEND - OVF.
1519	REF 2	LAST 1162	00,2471	54 140 0		TS	MAXDVSW	IF THE MAJOR PARTS OF THE DIVIDEND AND
1520	REF 486	LAST 1164	00,2472	4 0155 1		CS	MPAC +1	DIVISOR ARE EQUAL, A SPECIAL APPROXIMA-
1521	REF 67	LAST 1164	00,2473	6 0131 1		AD	BUF +1	TION IS USED (PROVIDED THE DIVISION IS
1522			00,2474	0 0006 1		EXTEND		POSSIBLE, OF COURSE).
1523	REF 2	LAST 1164	00,2475	6 2404 0		BZMF	DVOVF	
1524	REF 3	LAST 1164	00,2476	1 2504 0		TCF	DVNORM	IF NO OVERFLOW.

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1525				00,2477	0 0006 1	BUFNORM	EXTEND		ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
1526	REF	2	LAST 1162	00,2500	24 137 1		AUG	DVNORMCT	LEFT ONE PLACE.
1527				00,2501	0 0006 1		EXTEND		
1528	REF	68	LAST 1164	00,2502	3 0131 1		DCA	BUF	
1529	REF	69	LAST 1165	00,2503	20 131 0		DAS	BUF	
1530	REF	70	LAST 1165	00,2504	3 0130 0	DVNORM	CA	BUF	SEE IF DIVISOR NORMALIZED YET.
1531				00,2505	6 0000 1		DOUBLE		
1532				00,2506	54 000 0		DVSK		
1533	REF	1		00,2507	1 2477 0		TCF	BUFNORM	NO - SHIFT LEFT ONE AND TRY AGAIN.
1534	REF	487	LAST 1164	00,2510	52 155 1		DXCH	MPAC	CALL DIVIDEND NORMALIZATION SEQUENCE
1535	REF	3	LAST 1165	00,2511	50 137 1		INDEX	DVNORMCT	PRIOR TO DOING THE DIVIDE.
1536	REF	1		00,2512	0 2564 1		TC	MAXTEST	
1537	REF	488	LAST 1165	00,2513	54 156 1		TS	MPAC +2	RETURNS WITH DIVISION DONE AND C(A) = 0.
1538	REF	41	LAST 1163	00,2514	1 6030 0		TCF	DANZIG	
1539	REF	300	LAST 1164	00,2515	10 000 0	BUFPOS	CCS	A	
1540	REF	2	LAST 1162	00,2516	1 2421 0		TCF	BUF+	TO BUF+ IF BUF IS GREATER THAN +1.
1541	REF	71	LAST 1165	00,2517	4 0131 0		CS	BUF +1	IF BUF IS +1, FORCING SIGN AGREEMENT
1542				00,2520	0 0006 1		EXTEND		MAY CAUSE BUF TO BECOME ZERO.
1543	REF	3	LAST 1165	00,2521	6 2421 1		BZMF	BUF+	BRANCH IF SIGNS AGREE.
1544	REF	15	LAST 1164	00,2522	3 4753 1		CA	HALF	SIGNS DISAGREE. FORCE AGREEMENT.
1545				00,2523	6 0000 1	+6	DOUBLE		
1546	REF	72	LAST 1165	00,2524	26 131 0		ADS	BUF +1	
1547	REF	224	LAST 1164	00,2525	3 4772 1		CA	ZERO	
1548	REF	73	LAST 1165	00,2526	54 130 1		TS	BUF	
1549	REF	1		00,2527	1 2363 1		TCF	BUFZERO	
1550	REF	301	LAST 1165	00,2530	10 000 0	BUFNEG	CCS	A	
1551	REF	2	LAST 1162	00,2531	1 2415 1		TCF	BUF-	TO BUF- IF BUF IS LESS THAN -1.
1552	REF	74	LAST 1165	00,2532	3 0131 1		CA	BUF +1	IF BUF IS -1, FORCING SIGN AGREEMENT
1553				00,2533	0 0006 1		EXTEND		MAY CAUSE BUF TO BECOME ZERO.
1554	REF	3	LAST 1165	00,2534	6 2415 0		BZMF	BUF-	BRANCH IF SIGNS AGREE.
1555	REF	16	LAST 1165	00,2535	4 4753 0		CS	HALF	SIGNS DISAGREE. FORCE AGREEMENT.
1556	REF	2	LAST 1162	00,2536	1 2523 0		TCF	BUFPOS +6	

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P1557 THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

```
1559  REF  20  LAST 1154   00,2537  22 021 1   -21D   LXCH   SR          SPECIAL PROLOGUE FOR UNIT WHEN THE
1560                       00,2540  0 0006 1           EXTEND             LENGTH OF THE ARGUMENT WAS NOT LESS THAN
1561  REF  17  LAST 1165   00,2541  7 4753 0           MP     HALF        .5. IN THIS CASE, EACH COMPONENT MUST BE
1562  REF 155  LAST 1159   00,2542  56 001 0           XCH    L           SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT
1563  REF  21  LAST 1166   00,2543  6 0021 1           AD     SR          VECTOR.
1564  REF 156  LAST 1166   00,2544  56 001 0           XCH    L
1565  REF   1              00,2545  1 2570 0           TCF    GENDDV +1   WITH DP DIVIDEND IN A,L.

1566                       00,2546  20 001 1           DDOUBL             PROLOGUE WHICH NORMALIZES THE DIVIDEND
1567                       00,2547  20 001 1           DDOUBL             WHEN IT IS KNOWN THAT NO DIVISION
1568                       00,2550  20 001 1           DDOUBL             OVERFLOW WILL OCCUR.
1569                       00,2551  20 001 1           DDOUBL
1570                       00,2552  20 001 1           DDOUBL
1571                       00,2553  20 001 1           DDOUBL
1572                       00,2554  20 001 1           DDOUBL
1573                       00,2555  20 001 1           DDOUBL
1574                       00,2556  20 001 1           DDOUBL
1575                       00,2557  20 001 1           DDOUBL
1576                       00,2560  20 001 1           DDOUBL
1577                       00,2561  20 001 1           DDOUBL
1578                       00,2562  20 001 1           DDOUBL
1579  REF 489  LAST 1165   00,2563  52 155 1   -1      DXCH   MPAC
1580  REF   3  LAST 1164   00,2564  10 140 0   MAXTEST CCS    MAXDVSW     0 IF MAJORS MIGHT BE =, -1 OTHERWISE.
1581                       00,2565   06552 0   BIASHI  DEC    .4192 B-1   SQRT CONSTANTS

1582  REF   1              00,2566  1 2641 1           TCF    MAXDV       CHECK TO SEE IF THEY ARE NOW EQUAL.
```

P1583 THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES
R1585 THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED:

R1586 1. THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R1587 2. THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF
R1589 (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R1591 UNDERSTANDING THAT A/B = Q + S(R/B) WHERE S = 2(-14) AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-
R1593 TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY C - SD AND NEGLECTING TERMS OF
R1595 ORDER S-SQUARED (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R1597 $\frac{A + SB}{C + SD} = Q + S\left(\frac{R - QD}{C}\right)$ WHERE Q AND R ARE QUOTIENT AND REMAINDER OF $\frac{A + SB}{C}$ RESPECTIVELY.
R1601

```
1603  REF 490  LAST 1166  00,2567  52 155 1  GENDDV  DXCH   MPAC      WE NEED A AND B ONLY FOR FIRST DV.
1604                      00,2570  0 0006 1   +1      EXTEND          (SPECIAL UNIT PROLOGUE ENTERS HERE).
1605  REF  75  LAST 1165  00,2571  10 130 1           DV     BUF       A NOW CONTAINS Q AND L, R.
1606  REF 491  LAST 1167  00,2572  52 155 1           DXCH   MPAC

1607  REF 492  LAST 1167  00,2573  4 0154 0          CS     MPAC      FORM DIVIDEND FOR MINOR PART OF RESULT.
1608                      00,2574  0 0006 1          EXTEND
1609  REF  76  LAST 1167  00,2575  7 0131 0          MP     BUF +1
1610  REF 493  LAST 1167  00,2576  6 0155 0          AD     MPAC +1   OVERFLOW AT THIS POINT IS POSITIVE SINCE
1611                      00,2577  54 000 0          OVSK             R IS POSITIVE IN EVERY CASE.
1612                      00,2600  1 2605 1          TCF    +5

1613                      00,2601  0 0006 1          EXTEND           OVERFLOW CAN BE REMOVED BY SUBTRACTING C
1614  REF  77  LAST 1167  00,2602  60 130 0          SU     BUF       (BUF) ONCE SINCE R IS ALWAYS LESS THAN C
1615  REF 494  LAST 1167  00,2603  24 154 1          INCR   MPAC      IN THIS CASE. INCR COMPENSATES SUBTRACT.
1616  REF   1             00,2604  1 2607 0          TCF    +DOWN     (SINCE C(A) IS STILL POSITIVE).

1617                      00,2605  0 0006 1  +5      EXTEND           C(A) CAN BE MADE LESS THAN C IN MAGNI-
1618  REF   1             00,2606  6 2617 0          BZMF   -UP       TUDE BY DIMINISHING IT BY C (SINCE C IS
A1619                                                                 NOT LESS THAN .5) UNLESS C(A) = 0.
```

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```
1620                          00,2607  0 0006 1  +DOWN    EXTEND
1621  REF  78  LAST 1167     00,2610  60 130 0           SU      BUF       IF POSITIVE, REDUCE ONLY IF NECESSARY
1622                          00,2611  0 0006 1          EXTEND            SINCE THE COMPENSATING INCR MIGHT CAUSE
1623                          00,2612  1 2615 0          BZF     +3        OVERFLOW.
1624                          00,2613  0 0006 1          EXTEND            DONT SUBTRACT UNLESS RESULT IS POSITIVE
1625  REF   1                 00,2614  6 2623 1          BZMF    ENDMAXDV  OR ZERO.

1626  REF 495  LAST 1167      00,2615  24 154 1   +3     INCR    MPAC      KEEP SUBTRACT HERE AND COMPENSATE.
1627  REF   2  LAST 1162      00,2616  1 2624 1           TCF     FINALDV

1628                          00,2617  0 0006 1  -UP      EXTEND            IF ZERO, SET MINOR PART OF RESULT TO
1629  REF   3  LAST 1168      00,2620  1 2627 1           BZF     FINALDV +3 ZERO.

1630                          00,2621  0 0006 1          EXTEND            IF NEGATIVE, ADD C TO A, SUBTRACTING ONE
1631  REF 496  LAST 1168      00,2622  26 154 0          DIM     MPAC      TO COMPENSATE. DIM IS OK HERE SINCE THE
1632  REF  79  LAST 1168      00,2623  6 0130 0  ENDMAXDV AD      BUF       MAJOR PART NEVER GOES NEGATIVE.
```

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```
1633                          00,2624  22 007 0  FINALDV  ZL                  DO DV TO OBTAIN MINOR PART OF RESULT.
1634                          00,2625  0 0006 1           EXTEND
1635  REF  80  LAST 1168      00,2626  10 130 1           DV       BUF
1636  REF 497  LAST 1168      00,2627  54 155 1  +3       TS       MPAC +1

1637  REF   6  LAST 1163      00,2630  10 136 1           CCS      DVSIGN     LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
1638  REF 232  LAST 1159      00,2631  0 0002 0           TC       Q          -0.
1639  REF 233  LAST 1169      00,2632  0 0002 0           TC       Q
1640  REF 234  LAST 1169      00,2633  0 0002 0           TC       Q

1641                          00,2634  0 0006 1           EXTEND
1642  REF 498  LAST 1169      00,2635  4 0155 1           DCS      MPAC
1643  REF 499  LAST 1169      00,2636  52 155 1           DXCH     MPAC
1644  REF 225  LAST 1165      00,2637  3 4772 1           CAF      ZERO       SO WE ALWAYS RETURN WITH C(A) = 0.
1645  REF 235  LAST 1169      00,2640  0 0002 0           TC       Q
```

P1646 IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE
R1648 DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS
R1650 ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, & D POSITIVE).

$$\text{R1652-1654}\qquad \frac{C + SB}{C + SD} = 37777 + S\left(\frac{C + B - D}{C}\right)$$

R1655 THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.

```
1657  REF 500  LAST 1169   00,2641  4 0154 0  MAXDV   CS      MPAC      SEE IF MAXDV CASE STILL HOLDS AFTER
1658  REF  81  LAST 1169   00,2642  6 0130 0          AD      BUF       NORMALIZATION.
1659                       00,2643  0 0006 1          EXTEND
1660                       00,2644  1 2646 0          BZF     +2
1661  REF   2  LAST 1166   00,2645  1 2567 0          TCF     GENDDV    MPAC NOW LESS THAN BUF - DIVIDE AS USUAL

1662  REF  32  LAST 1164   00,2646  3 4750 1  +2      CAF     POSMAX    SET MAJOR PART OF RESULT.
1663  REF 501  LAST 1170   00,2647  54 154 0          TS      MPAC

1664  REF  82  LAST 1170   00,2650  4 0131 0          CS      BUF +1    FORM DIVIDEND OF MINOR PART OF RESULT.
1665  REF 502  LAST 1170   00,2651  6 0155 0          AD      MPAC +1
1666  REF   2  LAST 1168   00,2652  1 2623 0          TCF     ENDMAXDV  GO ADD C AND DO DIVIDE, ATTACHING SIGN
A1667                                                                  BEFORE EXITING.
```

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P1668 VECTOR DIVIDED BY SCALAR, V/SC, IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUF.

```
1670   REF 131  LAST 1162   00,2653  4 4770 1  V/SC2   CS     ONE          INITIALIZE DIVIDEND NORMALIZATION COUNT
1671   REF   4  LAST 1165   00,2654  54 137 0          TS     DVNORMCT     AND DIVISION SIGN REGISTER.
1672   REF  40  LAST 1148   00,2655  54 127 1          TS     VBUF +5

1673   REF   1              00,2656  0 3007 0          TC     VECAGREE     FORCE SIGN AGREEMENT IN VECTOR

1674   REF  83  LAST 1170   00,2657  52 131 0          DXCH   BUF
1675   REF   1              00,2660  0 7500 0          TC     ALSIGNAG     SIGN AGREE BUF
1676   REF  84  LAST 1171   00,2661  52 131 0          DXCH   BUF
1677   REF  85  LAST 1171   00,2662  10 130 1          CCS    BUF          FORCE DIVISOR POSITIVE WITH MAJOR PART
1678   REF   1              00,2663  1 2720 1          TCF    /BUF+        NON-ZERO (IF POSSIBLE).
1679                        00,2664  1 2666 1          TCF    +2
1680   REF   1              00,2665  1 2714 0          TCF    /BUF-

1681   REF  86  LAST 1171   00,2666  56 131 1          XCH    BUF +1       SHIFT VECTOR AND SCALAR LEFT 14.
1682   REF  87  LAST 1171   00,2667  56 130 0          XCH    BUF
1683   REF 503  LAST 1170   00,2670  56 155 0          XCH    MPAC +1
1684   REF 504  LAST 1171   00,2671  56 154 1          XCH    MPAC
1685                        00,2672  0 0006 1          EXTEND                CHECK FOR OVERFLOW IN EACH CASE.
1686                        00,2673  1 2675 0          BZF    +2
1687   REF   3  LAST 1164   00,2674  1 2404 1          TCF    DVOVF

1688   REF 505  LAST 1171   00,2675  56 160 0          XCH    MPAC +4
1689   REF 506  LAST 1171   00,2676  56 157 1          XCH    MPAC +3
1690                        00,2677  0 0006 1          EXTEND
1691                        00,2700  1 2702 1          BZF    +2
1692   REF   4  LAST 1171   00,2701  1 2404 1          TCF    DVOVF

1693   REF 507  LAST 1171   00,2702  56 162 1          XCH    MPAC +6
1694   REF 508  LAST 1171   00,2703  56 161 1          XCH    MPAC +5
1695                        00,2704  0 0006 1          EXTEND
1696                        00,2705  1 2707 1          BZF    +2
1697   REF   5  LAST 1171   00,2706  1 2404 1          TCF    DVOVF

1698   REF  88  LAST 1171   00,2707  10 130 1          CCS    BUF
1699   REF   2  LAST 1171   00,2710  1 2720 1          TCF    /BUF+
1700   REF   6  LAST 1171   00,2711  1 2404 1          TCF    DVOVF        ZERO DIVISOR - OVERFLOW.
1701   REF   2  LAST 1171   00,2712  1 2714 0          TCF    /BUF-
1702   REF   7  LAST 1171   00,2713  1 2404 1          TCF    DVOVF

1703                        00,2714  0 0006 1  /BUF-    EXTEND               ON NEGATIVE, COMPLEMENT BUF AND MAINTAIN
1704   REF  89  LAST 1171   00,2715  4 0131 0          DCS    BUF          DVSIGN IN VBUF +5.
1705   REF  90  LAST 1171   00,2716  52 131 0          DXCH   BUF
1706   REF  41  LAST 1171   00,2717  24 127 0          INCR   VBUF +5
```

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```
1707                          00,2720  0 0006 1  /BUF+   EXTEND
1708  REF  91  LAST 1171     00,2721  3 0131 1           DCA     BUF          LEAVE ABS(ORIG DIVISOR) IN BUF2
1709  REF  14  LAST 1164     00,2722  52 134 0           DXCH    BUF2         FOR OVERFLOW TESTING
1710  REF   1                00,2723  1 2731 1           TCF     /NORM        NORMALIZE DIVISOR IN BUF.

1711                          00,2724  0 0006 1  /NORM2   EXTEND               IF LESS THAN .5, AUGMENT DVNORMCT AND
1712  REF   5  LAST 1171     00,2725  24 137 1           AUG     DVNORMCT     DOUBLE DIVISOR.
1713                          00,2726  0 0006 1           EXTEND
1714  REF  92  LAST 1172     00,2727  3 0131 1           DCA     BUF
1715  REF  93  LAST 1172     00,2730  20 131 0           DAS     BUF

1716  REF  94  LAST 1172     00,2731  3 0130 0  /NORM    CA      BUF          SEE IF DIVISOR NORMALIZED.
1717                          00,2732  6 0000 1           DOUBLE
1718                          00,2733  54 000 0           DVSK
1719  REF   1                00,2734  1 2724 0           TCF     /NORM2       DOUBLE AND TRY AGAIN IF NOT.

1720  REF   1                00,2735  0 2747 1           TC      V/SCDV       DO X COMPONENT DIVIDE.
1721  REF 509  LAST 1171     00,2736  52 160 1           DXCH    MPAC +3      SUPPLY ARGUMENTS IN USUAL SEQUENCE.
1722  REF 510  LAST 1172     00,2737  52 155 1           DXCH    MPAC
1723  REF 511  LAST 1172     00,2740  52 160 1           DXCH    MPAC +3

1724  REF   2  LAST 1172     00,2741  0 2747 1           TC      V/SCDV       Y COMPONENT.
1725  REF 512  LAST 1172     00,2742  52 162 0           DXCH    MPAC +5
1726  REF 513  LAST 1172     00,2743  52 155 1           DXCH    MPAC
1727  REF 514  LAST 1172     00,2744  52 162 0           DXCH    MPAC +5

1728  REF   3  LAST 1172     00,2745  0 2747 1           TC      V/SCDV       Z COMPONENT.
1729  REF   2  LAST 1155     00,2746  1 7354 0           TCF     VROTATEX     GO RE-ARRANGE COMPONENTS BEFORE EXIT.
```

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P1730 SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC,+1 BY THE SCALAR GIVEN IN BUF.

```
1732   REF  42  LAST 1171   00,2747  3 0127 0  V/SCDV   CA     VBUF +5      REFLECTS SIGN OF SCALAR.
1733   REF   7  LAST 1169   00,2750  54 136 1           TS     DVSIGN

1734   REF 515  LAST 1172   00,2751  10 154 0           CCS    MPAC         FORCE MPAC POSITIVE, EXITING ON ZERO.
1735   REF   1              00,2752  1 2766 0           TCF    /MPAC+
1736                        00,2753  1 2755 0           TCF    +2
1737   REF   1              00,2754  1 2762 1           TCF    /MPAC-

1738   REF 516  LAST 1173   00,2755  10 155 1           CCS    MPAC +1
1739   REF   2  LAST 1173   00,2756  1 2766 0           TCF    /MPAC+
1740   REF 236  LAST 1169   00,2757  0 0002 0           TC     Q
1741   REF   2  LAST 1173   00,2760  1 2762 1           TCF    /MPAC-
1742   REF 237  LAST 1173   00,2761  0 0002 0           TC     Q

1743                        00,2762  0 0006 1  /MPAC-    EXTEND               USUAL COMPLEMENTING AND SETTING OF SIGN.
1744   REF 517  LAST 1173   00,2763  4 0155 1           DCS    MPAC
1745   REF 518  LAST 1173   00,2764  52 155 1           DXCH   MPAC
1746   REF   8  LAST 1173   00,2765  24 136 0           INCR   DVSIGN

1747   REF 132  LAST 1171   00,2766  4 4770 1  /MPAC+    CS     ONE          INITIALIZE NEAR-ONE SWITCH.
1748   REF   4  LAST 1166   00,2767  54 140 0           TS     MAXDVSW

1749   REF 519  LAST 1173   00,2770  4 0154 0           CS     MPAC         CHECK POSSIBLE OVERFLOW.
1750   REF  15  LAST 1172   00,2771  6 0133 0           AD     BUF2         UNNORMALIZED INPUT DIVISOR.
1751   REF 302  LAST 1165   00,2772  10 000 0           CCS    A
1752   REF   1              00,2773  1 3003 0           TCF    DDVCALL      NOT NEAR-ONE
1753                        00,2774  1 2776 1           TCF    +2           +0 IS JUST POSSIBLE
1754   REF   8  LAST 1171   00,2775  1 2404 1           TCF    DVOVF        NO HOPE
1755   REF   5  LAST 1173   00,2776  54 140 0           TS     MAXDVSW      SIGNAL POSSIBLE NEAR-ONE CASE
1756   REF 520  LAST 1173   00,2777  4 0155 1           CS     MPAC +1      SEE IF DIVISION CAN BE DONE
1757   REF  16  LAST 1173   00,3000  6 0134 1           AD     BUF2 +1
1758                        00,3001  0 0006 1           EXTEND
1759   REF   9  LAST 1173   00,3002  6 2404 0           BZMF   DVOVF

1760   REF 521  LAST 1173   00,3003  52 155 1  DDVCALL   DXCH   MPAC         CALL PRE-DIVIDE NORMALIZATION.
1761   REF   6  LAST 1172   00,3004  50 137 1           INDEX  DVNORMCT
1762   REF   2  LAST 1165   00,3005  1 2564 0           TCF    MAXTEST
```

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```
1763                          00,3006   32506 0  SLOPELO  DEC    .8324

1764  REF 238  LAST 1173      00,3007   56 002 0 VECAGREE XCH    Q          SAVE Q IN A
1765  REF 522  LAST 1173      00,3010   52 155 1          DXCH   MPAC
1766  REF   2  LAST 1171      00,3011   0 7500 0          TC     ALSIGNAG   SIGNAGREE MPAC
1767  REF 523  LAST 1174      00,3012   52 155 1          DXCH   MPAC
1768  REF 524  LAST 1174      00,3013   52 160 1          DXCH   MPAC +3
1769  REF   3  LAST 1174      00,3014   0 7500 0          TC     ALSIGNAG   SIGN AGREE MPAC +3
1770  REF 525  LAST 1174      00,3015   52 160 1          DXCH   MPAC +3
1771  REF 526  LAST 1174      00,3016   52 162 0          DXCH   MPAC +5
1772  REF   4  LAST 1174      00,3017   0 7500 0          TC     ALSIGNAG   SIGNAGREE MPAC +5
1773  REF 527  LAST 1174      00,3020   52 162 0          DXCH   MPAC +5
1774  REF 303  LAST 1173      00,3021   0 0000 1          TC     A
```

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P1775 THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

```
1777  REF   2  LAST 1171  00,3022  0 3007 0  UNIT    TC      VECAGREE        FORCE SIGN AGREEMENT IN VECTOR
1778  REF   2  LAST 1144  00,3023  0 7466 1          TC      MPACVBUF        SAVE ARGUMENT IN VBUF
1779  REF 226  LAST 1169  00,3024  3 4772 1          CAF     ZERO            MUST SENSE OVERFLOW IN FOLLOWING DOT.
1780  REF   6  LAST 1162  00,3025  56 121 0          XCH     OVFIND
1781  REF   3  LAST   71  00,3026  54 141 1          TS      TEM1
1782  REF   1             00,3027  0 3316 0          TC      VSQSUB          DOT MPAC WITH ITSELF.
1783  REF   4  LAST 1175  00,3030  3 0141 0          CA      TEM1
1784  REF   7  LAST 1175  00,3031  56 121 0          XCH     OVFIND
1785                      00,3032  0 0006 1          EXTEND
1786                      00,3033  1 3035 0          BZF     +2
1787  REF  10  LAST 1173  00,3034  1 2404 1          TCF     DVOVF
1788                      00,3035  0 0006 1          EXTEND
1789  REF 528  LAST 1174  00,3036  3 0155 0          DCA     MPAC            LEAVE THE SQUARE OF THE LENGTH OF THE
1790  REF  24  LAST 1130  00,3037  50 120 1          INDEX   FIXLOC          ARGUMENT IN LVSQUARE.
1791  REF   1             00,3040  52 043 1          DXCH    LVSQUARE

1792  REF   1             00,3041  0 3342 1          TC      SQRTSUB         GO TAKE THE NORMALIZED SQUARE ROOT.

1793  REF 529  LAST 1175  00,3042  10 154 0          CCS     MPAC            CHECK FOR UNIT OVERFLOW.
1794                      00,3043  1 3050 0          TCF     +5              MPAC IS NOT LESS THAN .5 UNLESS
1795  REF 157  LAST 1166  00,3044  54 001 1          TS      L
1796  REF  25  LAST 1175  00,3045  50 120 1          INDEX   FIXLOC
1797  REF   1             00,3046  52 045 1          DXCH    LV
1798  REF  11  LAST 1175  00,3047  1 2404 1          TCF     DVOVF           INPUT TO SQRTSUB WAS 0.

1799  REF   1             00,3050  4 4321 1          CS      FOURTEEN        SEE IF THE INPUT WAS SO SMALL THE THE
1800  REF  45  LAST 1161  00,3051  6 0135 0          AD      MPTEMP          FIRST TWO REGISTERS OF THE SQUARE WERE 0
1801  REF 304  LAST 1174  00,3052  10 000 0          CCS     A
1802                      00,3053  4 0000 0          COM                     IF SO, SAVE THE NEGATIVE OF THE SHIFT
1803  REF   1             00,3054  1 3132 0          TCF     SMALL           COUNT -15D.

1804  REF   1             00,3055  1 3064 1          TCF     LARGE           (THIS IS USUALLY THE CASE.)

1805  REF   4  LAST 1091  00,3056  4 4776 1          CS      THIRTEEN        IF THE SHIFT COUNT WAS EXACTLY 14, SET
1806  REF  46  LAST 1175  00,3057  54 135 1          TS      MPTEMP          THE PRE-DIVIDE NORM COUNT TO -13D.

1807  REF 530  LAST 1175  00,3060  3 0154 1          CA      MPAC            SHIFT THE LENGTH RIGHT 14 BEFORE STORING
1808  REF 158  LAST 1175  00,3061  54 001 1  SMALL2  TS      L               (SMALL EXITS TO THIS POINT).
1809  REF 227  LAST 1175  00,3062  3 4772 1          CAF     ZERO
1810  REF   1             00,3063  1 3111 1          TCF     LARGE2          GO TO STORE LENGTH AND PROCEED.

1811  REF  47  LAST 1175  00,3064  10 135 1  LARGE   CCS     MPTEMP          MOST ALL CASES COME HERE.
1812  REF   1             00,3065  1 3073 1          TCF     LARGE3          SEE IF NO NORMALIZATION WAS REQUIRED BY

1813  REF   1             00,3066  4 2024 1          CS      SRDDV           SQRT, AND IF SO, SET UP FOR A SHIFT
1814  REF  48  LAST 1175  00,3067  54 135 1          TS      MPTEMP          RIGHT 1 BEFORE DIVIDING TO PRODUCE
1815                      00,3070  0 0006 1          EXTEND                  THE DESIRED HALF UNIT VECTOR.
1816  REF 531  LAST 1175  00,3071  3 0155 0          DCA     MPAC
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1817 REF 2 LAST 1175 00,3072 1 3111 1 TCF LARGE2

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1818                          00,3073  4 0000 0  LARGE3   COM                LEAVE NEGATIVE OF SHIFT COUNT-1 FOR
1819  REF  49  LAST 1175     00,3074  54 135 1            TS      MPTEMP     PREDIVIDE LEFT SHIFT.

1820                          00,3075  4 0000 0           COM                PICK UP REQUIRED SHIFTING BIT TO UNNORM-
1821  REF 305  LAST 1175     00,3076  50 000 1           INDEX   A          ALIZE THE SQRT RESULT.
1822  REF  54  LAST 1160     00,3077  3 4753 1           CAF     BIT14
1823  REF  95  LAST 1172     00,3100  54 130 1           TS      BUF
1824                          00,3101  0 0006 1           EXTEND
1825  REF 532  LAST 1175     00,3102  7 0155 1           MP      MPAC +1
1826  REF  96  LAST 1177     00,3103  56 130 0           XCH     BUF
1827                          00,3104  0 0006 1           EXTEND             (UNNORMALIZE THE SQRT FOR LV).
1828  REF 533  LAST 1177     00,3105  7 0154 0           MP      MPAC
1829  REF 159  LAST 1175     00,3106  56 001 0           XCH     L
1830  REF  97  LAST 1177     00,3107  6 0130 0           AD      BUF
1831  REF 160  LAST 1177     00,3110  56 001 0           XCH     L

1832  REF  26  LAST 1175     00,3111  50 120 1  LARGE2   INDEX   FIXLOC
1833  REF   2  LAST 1175     00,3112  52 045 1            DXCH    LV         LENGTH NOW STORED IN WORK AREA.

1834  REF 133  LAST 1173     00,3113  4 4770 1           CS      ONE
1835  REF   6  LAST 1173     00,3114  54 140 0           TS      MAXDVSW    NO MAXDV CASES IN UNIT.

1836  REF  43  LAST 1173     00,3115  52 123 0           DXCH    VBUF       PREPARE X COMPONENT FOR DIVIDE, SETTING
1837  REF 534  LAST 1177     00,3116  52 155 1           DXCH    MPAC       LENGTH OF VECTOR AS DIVISOR IN BUF.
1838  REF  98  LAST 1177     00,3117  52 131 0           DXCH    BUF
1839  REF   1                00,3120  0 3150 0           TC      UNITDV

1840  REF  44  LAST 1177     00,3121  52 125 0           DXCH    VBUF +2    DO Y AND Z IN USUAL FASHION SO WE CAN
1841  REF 535  LAST 1177     00,3122  52 155 1           DXCH    MPAC       EXIT THROUGH VROTATEX.
1842  REF 536  LAST 1177     00,3123  52 160 1           DXCH    MPAC +3
1843  REF   2  LAST 1177     00,3124  0 3150 0           TC      UNITDV

1844  REF  45  LAST 1177     00,3125  52 127 1           DXCH    VBUF +4
1845  REF 537  LAST 1177     00,3126  52 155 1           DXCH    MPAC
1846  REF 538  LAST 1177     00,3127  52 162 0           DXCH    MPAC +5
1847  REF   3  LAST 1177     00,3130  0 3150 0           TC      UNITDV
1848  REF   3  LAST 1172     00,3131  1 7354 0           TCF     VROTATEX   AND EXIT.
```

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P1849 IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST
R1851 14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.

```
1853   REF  50  LAST 1177   00,3132  54 135 1  SMALL   TS     MPTEMP      NEGATIVE OF PRE-DIVIDE SHIFT COUNT.

1854   REF 228  LAST 1175   00,3133  3 4772 1           CAF    ZERO        SHIFT EACH COMPONENT LEFT 14.
1855   REF  46  LAST 1177   00,3134  56 123 1           XCH    VBUF +1
1856   REF  47  LAST 1178   00,3135  56 122 0           XCH    VBUF
1857   REF  48  LAST 1178   00,3136  56 125 1           XCH    VBUF +3
1858   REF  49  LAST 1178   00,3137  56 124 0           XCH    VBUF +2
1859   REF  50  LAST 1178   00,3140  56 127 0           XCH    VBUF +5
1860   REF  51  LAST 1178   00,3141  56 126 1           XCH    VBUF +4

1861   REF  51  LAST 1178   00,3142  4 0135 1           CS     MPTEMP
1862   REF 306  LAST 1177   00,3143  50 000 1           INDEX  A
1863   REF  55  LAST 1177   00,3144  3 4753 1           CAF    BIT14
1864                        00,3145  0 0006 1           EXTEND
1865   REF 539  LAST 1177   00,3146  7 0154 0           MP     MPAC
1866   REF   1              00,3147  1 3061 1           TCF    SMALL2

1867   REF   4  LAST  776     4776          THIRTEEN =     OCT15
1868   REF   2  LAST  786     4321          FOURTEEN =     OCT16
1869   REF  14  LAST  382     4321          OCT16    =     R1D1
```

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P1870 THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

```
1871  REF 540  LAST 1178  00,3150  10 154 0  UNITDV  CCS   MPAC      FORCE MPAC POSITIVE IF POSSIBLE, SETTING
1872  REF   1              00,3151  1 3167 0         TCF   UMPAC+    DVSIGN ACCORDING TO THE SIGN OF MPAC
1873                       00,3152  1 3154 0         TCF   +2        SINCE THE DIVISOR IS ALWAYS POSITIVE
1874  REF   1              00,3153  1 3161 0         TCF   UMPAC-    HERE.

1875  REF 541  LAST 1179  00,3154  10 155 1         CCS   MPAC +1
1876  REF   2  LAST 1179  00,3155  1 3167 0         TCF   UMPAC+
1877  REF 239  LAST 1174  00,3156  0 0002 0         TC    Q         EXIT IMMEDIATELY ON ZERO.
1878  REF   2  LAST 1179  00,3157  1 3161 0         TCF   UMPAC-
1879  REF 240  LAST 1179  00,3160  0 0002 0         TC    Q

1880  REF 229  LAST 1178  00,3161  4 4772 0  UMPAC-  CS    ZERO      IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL
1881  REF   9  LAST 1173  00,3162  54 136 1         TS    DVSIGN    COMPLEMENT.
1882                       00,3163  0 0006 1         EXTEND
1883  REF 542  LAST 1179  00,3164  4 0155 1         DCS   MPAC      PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
1884  REF  52  LAST 1178  00,3165  50 135 0         INDEX MPTEMP
1885  REF   3  LAST 1173  00,3166  1 2563 1         TCF   MAXTEST -1

1886  REF  10  LAST 1179  00,3167  54 136 1  UMPAC+  TS    DVSIGN    SET DVSIGN FOR POSITIVE QUOTIENT.
1887  REF 543  LAST 1179  00,3170  52 155 1         DXCH  MPAC
1888  REF  53  LAST 1179  00,3171  50 135 0         INDEX MPTEMP
1889  REF   4  LAST 1179  00,3172  1 2563 1         TCF   MAXTEST -1
```

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P1890 MISCELLANEOUS UNARY OPERATIONS.

```
1891   REF   1              00,3173  0 3277 0  DSQ       TC      DSQSUB     SQUARE THE DP CONTENTS OF MPAC.
1892   REF  42  LAST 1165   00,3174  1 6030 0            TCF     DANZIG

1893   REF  22  LAST 1161   00,3175  10 163 1  ABVALABS  CCS     MODE       ABVAL OR ABS INSTRUCTION.
1894   REF   1              00,3176  1 3225 0            TCF     ABS        DO ABS ON SCALAR.
1895   REF   2  LAST 1180   00,3177  1 3225 0            TCF     ABS

1896   REF   2  LAST 1175   00,3200  0 3316 0  ABVAL     TC      VSQSUB     DOT MPAC WITH ITSELF.
1897   REF  23  LAST 1180   00,3201  22 163 0            LXCH    MODE       MODE IS NOW DP (L ZERO AFTER DAS).

1898                        00,3202  0 0006 1            EXTEND             STORE SQUARE OF LENGTH IN WORK AREA.
1899   REF 544  LAST 1179   00,3203  3 0155 0            DCA     MPAC
1900   REF  27  LAST 1177   00,3204  50 120 1            INDEX   FIXLOC
1901   REF   2  LAST 1175   00,3205  52 043 1            DXCH    LVSQUARE
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P1902   PROGRAM DESCRIPTION- SUBROUTINE SQRT
R1903   FUNCTIONAL DESCRIPTION-DOUBLE PRECISION SQUARE ROOT ROUTINE
R1904       THIS PROGRAM TAKES THE SQUARE ROOT OF THE 27 OR 28 MOST SIGNIFICANT BITS IN THE TRIPLE PRECISION SET OF
R1906       NUMBERS-MPAC,MPAC+1,AND MPAC+2.  THE ROOT IS RETURNED DOUBLE          PRECISION IN MPAC AND MPAC+1.
R1908   WARNING- THIS SUBROUTINE USES A TRIPLE PRECISION INPUT. THE PROGRAMMER  MUST ASSURE THE CONTENTS OF MPAC+2
R1910       ESPECIALLY IF THE CONTENTS OF MPAC IS SMALL OR ZERO.  FOR DETAILS SEE STG MEMO NO.949.
R1912   CALLING SEQUENCE- IN INTERPRETIVE MODE I.E., FOLLOWING TC  INTPRET,SQRT   NO ADDRESS IS ALLOWED
R1914   INPUT SCALING  THE BINARY POINT IS ASSUMED TO THE RIGHT OF BIT 15. THE  ANSWER IS RETURNED WITH THE SAME SCALING
R1916   SUBROUTINES- GENSCR,MPACSHR, SQRTSUB,ABORT
R1917   ABORT EXIT MODE- ABORTS ON NEGATIVE INPUT -1.2X10E-4 (77775  OCTAL)     OR LESS.
R1919       DISPLAYS ERROR CODE 1302
R1920                   TC   ABORT
R1921                   OCT  1302
R1922   DEBRIS -  LOCATIONS BUF,MPTEMP,ADDRWD ARE USED
 1923   REF   2  LAST 1175   00,3206  0 3342 1  SQRT      TC      SQRTSUB         TAKE THE SQUARE ROOT OF MPAC.
 1924   REF  54  LAST 1179   00,3207  10 135 1            CCS     MPTEMP          RETURNED NORMALIZED SQUARE ROOT. SEE IF
 1925                        00,3210  1 3212 1            TCF     +2              ANY UN-NORMALIZATION REQUIRED AND EXIT
 1926   REF  43  LAST 1180   00,3211  1 6030 0            TCF     DANZIG          IF NOT.

 1927   REF   3  LAST 1160   00,3212  6 3726 1            AD      NEG12           A RIGHT SHIFT OF MORE THAN 13 COULD BE
 1928                        00,3213  3 0006 1            EXTEND                  REQUIRED IF INPUT WAS ZERO IN MPAC,+1.
 1929   REF   1              00,3214  6 3220 1            BZMF    SQRTSHFT        GOES HERE IN MOST CASES.
 1930                        00,3215  22 007 0            ZL                      IF A LONG SHIFT IS REQUIRED, GO TO
 1931   REF  77  LAST 1161   00,3216  22 116 1            LXCH    ADDRWD          GENERAL RIGHT SHIFT ROUTINES.
 1932   REF   4  LAST 1160   00,3217  1 2303 1            TCF     GENSCR +4       ADDRWD WAS ZERO TO PREVENT ROUND.

 1933   REF  55  LAST 1181   00,3220  50 135 0  SQRTSHFT  INDEX   MPTEMP          SELECT SHIFTING BIT AND EXIT THROUGH
 1934   REF  41  LAST 1132   00,3221  3 4752 0            CAF     BIT15           SHIFT ROUTINES.
 1935   REF  56  LAST 1181   00,3222  54 135 1            TS      MPTEMP
 1936   REF 230  LAST 1179   00,3223  3 4772 1            CAF     ZERO            TO ZERO MPAC +2 IN THE PROCESS.
 1937   REF   2  LAST 1160   00,3224  1 2036 1            TCF     MPACSHR +3

 1938   REF   3  LAST 1157   00,3225  0 6672 1  ABS       TC      BRANCH          TEST SIGN OF MPAC AND COMPLEMENT IF
 1939   REF  44  LAST 1181   00,3226  1 6030 0            TCF     DANZIG
 1940   REF  45  LAST 1181   00,3227  1 6030 0            TCF     DANZIG
 1941   REF   4  LAST 1151   00,3230  1 7624 1            TCF     COMP
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1942   REF  17  LAST 1146   00,3231  4 4766 0  VDEF   CS     FOUR       VECTOR DEFINE - ESSENTIALLY TREATS
1943   REF  13  LAST 1149   00,3232  26 166 1          ADS    PUSHLOC    SCALAR IN MPAC AS X COMPONENT, PUSHES UP
1944                        00,3233  0 0006 1          EXTEND            FOR Y AND THEN AGAIN FOR Z.
1945   REF 307  LAST 1178   00,3234  5 0000 1          INDEX  A
1946                        00,3235  3 0003 1          DCA    2
1947   REF 545  LAST 1180   00,3236  52 160 1          DXCH   MPAC +3
1948                        00,3237  0 0006 1          EXTEND
1949   REF  14  LAST 1182   00,3240  5 0166 0          INDEX  PUSHLOC
1950                        00,3241  3 0001 0          DCA    0
1951   REF 546  LAST 1182   00,3242  52 162 0          DXCH   MPAC +5
1952   REF   2  LAST 1146   00,3243  1 6470 0          TCF    VMODE      MODE IS NON VECTOR.

1953   REF   3  LAST 1180   00,3244  0 3316 0  VSQ    TC     VSQSUB     DOT MPAC WITH ITSELF.
1954   REF   1              00,3245  1 7266 0          TCF    DMODE      MODE IS NOW DP.

1955                        00,3246  0 0006 1  PUSH   EXTEND            PUSH DOWN MPAC LEAVING IT LOADED.
1956   REF 547  LAST 1182   00,3247  3 0155 0          DCA    MPAC
1957   REF  15  LAST 1182   00,3250  50 166 0          INDEX  PUSHLOC    PUSH DOWN FIRST TWO REGISTERS IN EACH
1958                        00,3251  52 001 1          DXCH   0

1959   REF  24  LAST 1180   00,3252  50 163 0          INDEX  MODE       INCREMENT PUSHDOWN POINTER.
1960   REF   5  LAST 1127   00,3253  3 6213 1          CAF    NO.WDS
1961   REF  16  LAST 1182   00,3254  26 166 1          ADS    PUSHLOC

1962   REF  25  LAST 1182   00,3255  10 163 1          CCS    MODE
1963   REF   1              00,3256  1 3271 1          TCF    TPUSH      PUSH DOWN MPAC +2.
1964   REF  46  LAST 1181   00,3257  1 6030 0          TCF    DANZIG     DONE FOR DP.

1965                        00,3260  0 0006 1          EXTEND            ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
1966   REF 548  LAST 1182   00,3261  3 0160 0          DCA    MPAC +3
1967   REF  17  LAST 1182   00,3262  50 166 0          INDEX  PUSHLOC
1968                        00,3263  51'775 0          DXCH   0 -4
1969                        00,3264  0 0006 1          EXTEND
1970   REF 549  LAST 1182   00,3265  3 0162 1          DCA    MPAC +5
1971   REF  18  LAST 1182   00,3266  50 166 0          INDEX  PUSHLOC
1972                        00,3267  51'777 1          DXCH   0 -2
1973   REF  47  LAST 1182   00,3270  1 6030 0          TCF    DANZIG

1974   REF 550  LAST 1182   00,3271  3 0156 0  TPUSH  CA     MPAC +2
1975   REF   2  LAST 1126   00,3272  1 6523 1          TCF    ENDTPUSH +2

1976   REF  28  LAST 1180   00,3273  50 120 1  RVQ    INDEX  FIXLOC     RVQ - RETURN IVA QPRET.
1977   REF   6  LAST 1129   00,3274  3 0052 0          CA     QPRET
1978   REF  21  LAST 1141   00,3275  54 117 1          TS     POLISH
1979   REF   5  LAST 1130   00,3276  1 6621 0          TCF    GOTO +4    (ASSUME QPRET POINTS TO FIXED ONLY.)
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P1980 THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE
R1982 SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.

1983	REF 551	LAST 1182	00,3277	3 0155 0	DSQSUB	CA	MPAC +1	SQUARES THE SCALAR CONTENTS OF MPAC.
1984			00,3300	0 0006 1		EXTEND		
1985			00,3301	7 0000 0		SQUARE		
1986	REF 552	LAST 1183	00,3302	54 156 1		TS	MPAC +2	
1987	REF 231	LAST 1181	00,3303	3 4772 1		CAF	ZERO	FORM 2(CROSS TERM).
1988	REF 553	LAST 1183	00,3304	56 155 0		XCH	MPAC +1	
1989			00,3305	0 0006 1		EXTEND		
1990	REF 554	LAST 1183	00,3306	7 0154 0		MP	MPAC	
1991			00,3307	20 001 1		DDOUBL		AND MAYBE OVERFLOW.
1992	REF 555	LAST 1183	00,3310	20 156 1		DAS	MPAC +1	AND SET A TO NET OVERFLOW.
1993	REF 556	LAST 1183	00,3311	56 154 1		XCH	MPAC	
1994			00,3312	0 0006 1		EXTEND		
1995			00,3313	7 0000 0		SQUARE		
1996	REF 557	LAST 1183	00,3314	20 155 1		DAS	MPAC	
1997	REF 241	LAST 1179	00,3315	0 0002 0		TC	Q	
1998			00,3316	0 0006 1	VSQSUB	EXTEND		DOTS THE VECTOR IN MPAC WITH ITSELF.
1999	REF 8	LAST 1139	00,3317	22 137 1		QXCH	DOTRET	
2000	REF 2	LAST 1180	00,3320	0 3277 0		TC	DSQSUB	SQUARE THE X COMPONENT.
2001	REF 558	LAST 1183	00,3321	52 160 1		DXCH	MPAC +3	
2002	REF 559	LAST 1183	00,3322	52 155 1		DXCH	MPAC	
2003	REF 99	LAST 1177	00,3323	52 131 0		DXCH	BUF	SO WE CAN END IN DOTSUB.
2004	REF 560	LAST 1183	00,3324	3 0156 0		CA	MPAC +2	
2005	REF 100	LAST 1183	00,3325	54 132 0		TS	BUF +2	
2006	REF 3	LAST 1183	00,3326	0 3277 0		TC	DSQSUB	SQUARE Y COMPONENT.
2007	REF 561	LAST 1183	00,3327	52 156 1		DXCH	MPAC +1	
2008	REF 101	LAST 1183	00,3330	20 132 0		DAS	BUF +1	
2009	REF 562	LAST 1183	00,3331	6 0154 1		AD	MPAC	
2010	REF 102	LAST 1183	00,3332	6 0130 0		AD	BUF	
2011	REF 103	LAST 1183	00,3333	54 130 1		TS	BUF	
2012			00,3334	1 3336 0		TCF	+2	
2013	REF 8	LAST 1175	00,3335	54 121 1		TS	OVFIND	IF OVERFLOW.
2014	REF 563	LAST 1183	00,3336	52 162 0		DXCH	MPAC +5	
2015	REF 564	LAST 1183	00,3337	52 155 1		DXCH	MPAC	
2016	REF 4	LAST 1183	00,3340	0 3277 0		TC	DSQSUB	SQUARE Z COMPONENT.
2017	REF 1		00,3341	1 7154 1		TCF	ENDDOT	END AS IN DOTSUB.

P2018 DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY
R2020 IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO
R2022 .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.

2023	REF 232	LAST 1183	00,3342	3 4772 1	SQRTSUB	CAF	ZERO	START BY ZEROING RIGHT SHIFT COUNT.
2024	REF 57	LAST 1181	00,3343	54 135 1		TS	MPTEMP	
2025	REF 565	LAST 1183	00,3344	10 154 0		CCS	MPAC	CHECK FOR POSITIVE ARGUMENT, SHIFTING
2026	REF 1		00,3345	1 3403 1		TCF	SMPAC+	FIRST SIGNIFICANT MPAC REGISTER INTO
2027			00,3346	1 3350 0		TCF	+2	MPAC ITSELF.
2028	REF 1		00,3347	1 3372 0		TCF	SQRTNEG	SEE IF MAG OF ARGUMENT LESS THAN 1 (-4).
2029	REF 566	LAST 1184	00,3350	56 156 0		XCH	MPAC +2	MPAC IS ZERO - SHIFT LEFT 14.
2030	REF 567	LAST 1184	00,3351	56 155 0		XCH	MPAC +1	
2031	REF 568	LAST 1184	00,3352	54 154 0		TS	MPAC	
2032	REF 14	LAST 903	00,3353	3 4774 1		CAF	SEVEN	AUGMENT RIGHT SHIFT COUNTER.
2033	REF 58	LAST 1184	00,3354	54 135 1		TS	MPTEMP	
2034	REF 569	LAST 1184	00,3355	10 154 0		CCS	MPAC	SEE IF MPAC NOW PNZ.
2035	REF 2	LAST 1184	00,3356	1 3403 1		TCF	SMPAC+	
2036			00,3357	1 3361 1		TCF	+2	
2037	REF 1		00,3360	1 3375 1		TCF	ZEROANS	NEGATIVE BUT LESS THAN 1 (-4) IN MAG.
2038	REF 570	LAST 1184	00,3361	56 155 0		XCH	MPAC +1	ZERO - SHIFT LEFT 14 AGAIN.
2039	REF 571	LAST 1184	00,3362	54 154 0		TS	MPAC	
2040	REF 15	LAST 1184	00,3363	3 4774 1		CAF	SEVEN	AUGMENT RIGHT SHIFT COUNTER.
2041	REF 59	LAST 1184	00,3364	26 135 1		ADS	MPTEMP	
2042	REF 572	LAST 1184	00,3365	10 154 0		CCS	MPAC	
2043	REF 3	LAST 1184	00,3366	1 3403 1		TCF	SMPAC+	
2044	REF 242	LAST 1183	00,3367	0 0002 0		TC	Q	SQRT(0) = 0.
2045	REF 2	LAST 1184	00,3370	1 3375 1		TCF	ZEROANS	
2046	REF 1		00,3371	1 3450 1		TCF	FIXROOT	DO NOT LEAVE SQRTSUB WITH -0 IN MPAC.
2047	REF 308	LAST 1182	00,3372	10 000 0	SQRTNEG	CCS	A	ARGUMENT IS NEGATIVE, BUT SEE IF SIGN-
2048	REF 1		00,3373	1 3401 0		TCF	SQRTABRT	CORRECTED ARGUMENT IS LESS THAN 1 (-4)
2049	REF 573	LAST 1184	00,3374	10 155 1		CCS	MPAC +1	IN MAGNITUDE. IF SO, CALL ANSWER ZERO.
2050	REF 233	LAST 1184	00,3375	3 4772 1	ZEROANS	CAF	ZERO	FORCE ANSWER TO ZERO HERE.
2051	REF 2	LAST 1184	00,3376	1 3450 1		TCF	FIXROOT	
2052	REF 2	LAST 1184	00,3377	1 3401 0		TCF	SQRTABRT	
2053	REF 3	LAST 1184	00,3400	1 3450 1		TCF	FIXROOT	
2054	REF 5	LAST 925	00,3401	0 5726 1	SQRTABRT	TC	POODOO	
2055			00,3402	21302 0		OCT	21302	SQRT CALLED WITH NEGATIVE ARGUMENT
2056	REF 1		00,3403	6 2443 0	SMPAC+	AD	-1/2+2	SEE IF ARGUMENT GREATER THAN OR EQUAL TO
2057			00,3404	0 0006 1		EXTEND		.5.

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2058  REF   1                 00,3405  6 3453 0          BZMF   SRTEST        IF SO, SEE IF LESS THAN .25.

2059  REF 574  LAST 1184      00,3406  52 155 1          DXCH   MPAC          WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
2060  REF  22  LAST 1166      00,3407  22 021 1          LXCH   SR            SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
2061                           00,3410  0 0006 1          EXTEND
2062  REF  18  LAST 1166      00,3411  7 4753 0          MP     HALF
2063  REF 575  LAST 1185      00,3412  52 155 1          DXCH   MPAC
2064  REF  23  LAST 1185      00,3413  56 021 1          XCH    SR
2065  REF 576  LAST 1185      00,3414  26 155 1          ADS    MPAC +1       GUARANTEED NO OVERFLOW.

2066  REF   1                 00,3415  3 2314 0  ARGHI   CAF    SLOPEHI       ARGUMENT BETWEEN .25 AND .5. GET A
2067                           00,3416  0 0006 1          EXTEND               LINEAR APPROXIMATION FOR THIS RANGE.
2068  REF 577  LAST 1185      00,3417  7 0154 0          MP     MPAC
2069  REF   1                 00,3420  6 2565 0          AD     BIASHI        X0/2 = (MPAC/2)(SLOPEHI) + BIASHI/2.

2070  REF 104  LAST 1183      00,3421  54 130 1  +4      TS     BUF           X0/2 (ARGLO ENTERS HERE).
2071  REF 578  LAST 1185      00,3422  3 0154 1          CA     MPAC          SINGLE-PRECISION THROUGHOUT.
2073                           00,3423  0 0006 1          EXTEND
2074  REF  19  LAST 1185      00,3424  7 4753 0          MP     HALF          .5(MPAC/2)
2075                           00,3425  0 0006 1          EXTEND
2076  REF 105  LAST 1185      00,3426  10 130 1          DV     BUF           .5(MPAC/2)/(X0/2)
2077  REF 106  LAST 1185      00,3427  26 130 1          ADS    BUF           X1 = X0/2 + .5(MPAC/2)/(X0/2).

2078                           00,3430  0 0006 1          EXTEND
2079  REF  20  LAST 1185      00,3431  7 4753 0          MP     HALF          FORM UP X1/2.
2080  REF 579  LAST 1185      00,3432  52 155 1          DXCH   MPAC          SAVE AND BRING OUT ARGUMENT.
2081                           00,3433  0 0006 1          EXTEND               TAKE DP QUOTIENT WITH X1.
2082  REF 107  LAST 1185      00,3434  10 130 1          DV     BUF
2083  REF 108  LAST 1185      00,3435  54 131 0          TS     BUF +1        SAVE MAJOR PART OF QUOTIENT.
2084  REF 234  LAST 1184      00,3436  3 4772 1          CAF    ZERO          FORM MINOR PART OF QUOTIENT USING
2085  REF 161  LAST 1177      00,3437  56 001 0          XCH    L             (REMAINDER,0).
2086                           00,3440  0 0006 1          EXTEND
2087  REF 109  LAST 1185      00,3441  10 130 1          DV     BUF
2088  REF 162  LAST 1185      00,3442  54 001 1          TS     L             IN PREPARATION FOR DAS.
2089  REF 110  LAST 1185      00,3443  3 0131 1          CA     BUF +1
2090  REF 580  LAST 1185      00,3444  20 155 1          DAS    MPAC          X2 = X1/2 + (MPAC/2)X1

2091                           00,3445  0 0006 1          EXTEND               OVERFLOWS IF ARG. NEAR POSMAX.
2092  REF   1                 00,3446  1 3452 0          BZF    TCQBNK00
2093  REF  33  LAST 1170      00,3447  3 4750 1          CAF    POSMAX
2094  REF 581  LAST 1185      00,3450  54 154 0  FIXROOT TS     MPAC
2095  REF 582  LAST 1185      00,3451  54 155 1          TS     MPAC +1
2096  REF 243  LAST 1184      00,3452  0 0002 0  TCQBNK00 TC     Q             RETURN TO CALLER TO UNNORMALIZE, ETC.
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2097   REF   6  LAST 1020   00,3453  6 4754 0  SRTEST   AD      QUARTER    ARGUMENT WAS LESS THAN .5, SEE IF LESS
2098                        00,3454  0 0006 1           EXTEND               THAN .25.
2099   REF   1              00,3455  6 3477 0           BZMF    SQRTNORM   IF SO, BEGIN NORMALIZATION.

2100   REF 583  LAST 1185   00,3456  52 155 1           DXCH    MPAC       IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
2101   REF  24  LAST 1185   00,3457  22 021 1           LXCH    SR         START AT ARGLO.
2102                        00,3460  0 0006 1           EXTEND
2103   REF  21  LAST 1185   00,3461  7 4753 0           MP      HALF
2104   REF 584  LAST 1186   00,3462  52 155 1           DXCH    MPAC
2105   REF  25  LAST 1186   00,3463  56 021 1           XCH     SR
2106   REF 585  LAST 1186   00,3464  26 155 1           ADS     MPAC +1    NO OVERFLOW.

2107   REF   1              00,3465  3 3006 1  ARGLO    CAF     SLOPELO    (NORMALIZED) ARGUMENT BETWEEN .125 AND
2108                        00,3466  0 0006 1           EXTEND               .25
2109   REF 586  LAST 1186   00,3467  7 0154 0           MP      MPAC
2110   REF   1              00,3470  6 2270 0           AD      BIASLO
2111   REF   1              00,3471  1 3421 1           TCF     ARGHI +4   BEGIN SQUARE ROOT.

2112                        00,3472  0 0006 1  SQRTNM2   EXTEND             SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
2113   REF 587  LAST 1186   00,3473  3 0156 0           DCA     MPAC +1    COUNT (FOR TERMINAL UNNORMALIZATION).
2114   REF 588  LAST 1186   00,3474  20 156 1           DAS     MPAC +1
2115   REF 589  LAST 1186   00,3475  6 0154 1           AD      MPAC
2116   REF 590  LAST 1186   00,3476  26 154 0           ADS     MPAC       (NO OVERFLOW).

2117   REF  60  LAST 1184   00,3477  24 135 0  SQRTNORM  INCR    MPTEMP     FIRST TIME THROUGH, JUST SHIFT LEFT 1
2118                        00,3500  0 0006 1           EXTEND               (PUTS IN EFFECTIVE RIGHT SHIFT SINCE
2119   REF 591  LAST 1186   00,3501  3 0156 0           DCA     MPAC +1    WE WANT MPAC/2).
2120   REF 592  LAST 1186   00,3502  20 156 1           DAS     MPAC +1
2121   REF 593  LAST 1186   00,3503  6 0154 1           AD      MPAC
2122   REF 594  LAST 1186   00,3504  26 154 0           ADS     MPAC       (AGAIN NO OVERFLOW).
2123                        00,3505  6 0000 1           DOUBLE
2124   REF  22  LAST  385   00,3506  54 022 0           TS      CYL

2125   REF  23  LAST 1186   00,3507  10 022 0  NORMTEST CCS     CYL        SEE IF ARGUMENT NOW NORMALIZED AT
2126   REF  24  LAST 1186   00,3510  10 022 0           CCS     CYL        GREATER THAN .125.
2127   REF   1              00,3511  1 3472 1           TCF     SQRTNM2    NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
2128   REF   2  LAST 1186   00,3512  1 3415 0           TCF     ARGHI      YES - NOW BETWEEN .5 AND .25.
2129   REF   1              00,3513  1 3465 1           TCF     ARGLO      ARGUMENT NOW BETWEEN .25 AND .125.
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P2130 TRIGONOMETRIC FUNCTION PACKAGE.

R2131 THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2133 1. SIN COMPUTES (1/2)SINE(2 PI MPAC).
R2134 2. COS COMPUTES (1/2)COSINE(2 PI MPAC).

R2135 3. ASIN COMPUTES (1/2PI)ARCSINE(2 MPAC).
R2136 4. ACOS COMPUTES (1/2PI)ARCCOSINE(2 MPAC).

R2137 SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE, IE SIN(ASIN(X)) = X.

```
 2138  REF   4  LAST 1181   00,3514  0 6672 1  COSINE   TC      BRANCH     FINDS COSINE USING THE IDENTITY
 2139                       00,3515  1 3520 1           TCF     +3         COS(X) = SIN(PI/2 - ABS(X)).
 2140  REF   1               00,3516  1 3523 1           TCF     PRESINE
 2141  REF   2  LAST 1187   00,3517  1 3523 1           TCF     PRESINE

 2142                       00,3520  0 0006 1  +3       EXTEND
 2143  REF 595  LAST 1186   00,3521  4 0155 1           DCS     MPAC
 2144  REF 596  LAST 1187   00,3522  52 155 1           DXCH    MPAC

 2145  REF   7  LAST 1186   00,3523  3 4754 0  PRESINE  CAF     QUARTER    PI/2 SCALED.
 2146  REF 597  LAST 1187   00,3524  26 154 0           ADS     MPAC

 2147  REF 598  LAST 1187   00,3525  52 155 1  SINE     DXCH    MPAC       DOUBLE ARGUMENT.
 2148                       00,3526  20 001 1  +1       DDOUBL
 2149                       00,3527  54 000 0           OVSK               SEE IF OVERFLOW PRESENT.
 2150                       00,3530  1 3533 0           TCF     +3         IF NOT, ARGUMENT OK AS IS.

 2151                       00,3531  0 0006 1           EXTEND             IF SO, WE LOST (OR GAINED) PI, SO
 2152                       00,3532  4 0001 1           DCOM               COMPLEMENT MPAC USING THE IDENTITY
A2153                                                                      SIN(X-(+)PI) = SIN(-X).
 2154  REF 599  LAST 1187   00,3533  52 155 1  +3       DXCH    MPAC
 2155  REF 600  LAST 1187   00,3534  3 0154 1           CA      MPAC       SEE IF ARGUMENT GREATER THAN .5 IN
 2156                       00,3535  6 0000 1           DOUBLE             MAGNITUDE. IF SO, REDUCE IT TO LESS THAN
 2157  REF 163  LAST 1185   00,3536  54 001 1           TS      L          .5 (+-PI/2 SCALED) AS FOLLOWS:
 2158  REF   1               00,3537  1 3550 0           TCF     SN1

 2159  REF 309  LAST 1184   00,3540  50 000 1           INDEX   A          IF POSITIVE, FORM PI - X, IF NEGATIVE
 2160  REF   7  LAST 1082   00,3541  3 4752 0           CAF     NEG1/2 +1  USE -PI - X.
 2161                       00,3542  6 0000 1           DOUBLE
 2162                       00,3543  0 0006 1           EXTEND
 2163  REF 601  LAST 1187   00,3544  60 154 1           SU      MPAC       GUARANTEED NO OVERFLOW.
 2164  REF 602  LAST 1187   00,3545  54 154 0           TS      MPAC
 2165  REF 603  LAST 1187   00,3546  4 0155 1           CS      MPAC +1
 2166  REF 604  LAST 1187   00,3547  54 155 1           TS      MPAC +1
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2167                          00,3550  0 0006 1  SN1     EXTEND                  SET UP TO EVALUATE HASTINGS POLYNOMIAL
2168  REF 605  LAST 1187     00,3551  3 0155 0          DCA     MPAC
2169  REF  17  LAST 1173     00,3552  52 134 0          DXCH    BUF2
2170  REF   5  LAST 1183     00,3553  0 3277 0          TC      DSQSUB          SQUARE MPAC.

2171  REF   5  LAST  903     00,3554  0 7171 1          TC      POLY            EVALUATE FOURTH ORDER POLYNOMIAL.
2172                          00,3555   00003 1         DEC     3
2173                          00,3556   14441 0         2DEC    +.3926990796
2173                          00,3557   37325 1
2174                          00,3560   53250 0         2DEC    -.6459637111
2174                          00,3561   60764 1
2175                          00,3562   12146 1         2DEC    +.318758717
2175                          00,3563   21276 1
2176                          00,3564   75466 1         2DEC    -.074780249
2176                          00,3565   71471 0
2177                          00,3566   00236 0         2DEC    +.009694988
2177                          00,3567   32757 0

2178  REF   1                 00,3570  3 2467 0          CAF     LBUF2           MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
2179  REF  19  LAST 1149     00,3571  0 7055 0          TC      DMPSUB -1

2180                          00,3572  0 0006 1          EXTEND
2181  REF 606  LAST 1188     00,3573  3 0156 0          DCA     MPAC +1
2182  REF 607  LAST 1188     00,3574  20 156 1          DAS     MPAC +1
2183  REF 608  LAST 1188     00,3575  6 0154 1          AD      MPAC
2184  REF 609  LAST 1188     00,3576  26 154 0          ADS     MPAC            NEITHER SHIFT OVERFLOWS.
2185                          00,3577  0 0006 1          EXTEND
2186  REF 610  LAST 1188     00,3600  3 0156 0          DCA     MPAC +1
2187  REF 611  LAST 1188     00,3601  20 156 1          DAS     MPAC +1
2188  REF 612  LAST 1188     00,3602  6 0154 1          AD      MPAC
2189  REF 613  LAST 1188     00,3603  26 154 0          ADS     MPAC
2190  REF  48  LAST 1182     00,3604  1 6030 0          TCF     DANZIG
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P2191 ARCSIN/ARCCOS ROUTINE.

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2192  REF   1              00,3605  3 3626 0  ARCSIN  CAF   LASINEX   COMPUTE ARCSIN BY USING THE IDENTITY
2193                       00,3606  1 3610 1           TCF   +2        ARCSIN(X) = PI/2 - ARCCOS(X).

2194  REF   1              00,3607  3 3710 1  ARCCOS  CAF   LDANZIG   (EXITS IMMEDIATELY).
2195  REF   1              00,3610  54 136 1           TS    ESCAPE
2196  REF   5  LAST 1187  00,3611  0 6672 1           TC    BRANCH    TEST SIGN OF INPUT.
2197  REF   1              00,3612  1 3622 0           TCF   ACOSST    START IMMEDIATELY IF POSITIVE.
2198  REF   1              00,3613  1 3724 1           TCF   ACOSZERO  ARCCOS(0) = PI/2 = .25.
2199                       00,3614  0 0006 1           EXTEND          IF NEGATIVE, USE THE IDENTITY
2200  REF 614  LAST 1188   00,3615  4 0155 1           DCS   MPAC      ARCCOS(X) = PI - ARCCOS(-X), FORCING
2201  REF 615  LAST 1189   00,3616  52 155 1           DXCH  MPAC      ARGUMENT POSITIVE.
2202  REF   1              00,3617  3 3727 0           CAF   TCSUBTR   SET EXIT  TO DO ABOVE BEFORE
2203  REF   2  LAST 1189   00,3620  56 136 0           XCH   ESCAPE    ARCSIN/ARCCOS CONSIDERATIONS.
2204  REF   1              00,3621  54 137 0           TS    ESCAPE2

2205  REF  22  LAST 1186   00,3622  4 4753 0  ACOSST  CS    HALF      TEST MAGNITUDE OF INPUT.
2206  REF 616  LAST 1189   00,3623  6 0154 1           AD    MPAC
2207  REF 310  LAST 1187   00,3624  10 000 0           CCS   A
2208  REF   1              00,3625  1 3716 0           TCF   ACOSOVF   THIS IS PROBABLY AN OVERFLOW CASE.

2209  REF   1              00,3626  1 3704 0  LASINEX TCF   ASINEX

2210  REF   1              00,3627  1 3637 1           TCF   ACOSST2   NO OVERFLOW - PROCEED.

2211  REF 617  LAST 1189   00,3630  10 155 1           CCS   MPAC +1   IF MAJOR PART IS .5, CALL ANSWER 0
2212  REF 235  LAST 1185   00,3631  3 4772 1           CAF   ZERO     UNLESS MINOR PART NEGATIVE.
2213  REF   1              00,3632  1 3634 1           TCF   ACOS=0

2214  REF   2  LAST 1189   00,3633  1 3637 1           TCF   ACOSST2

2215  REF 618  LAST 1189   00,3634  54 155 1  ACOS=0  TS    MPAC +1
2216  REF 619  LAST 1189   00,3635  54 154 0    +1    TS    MPAC
2217  REF   3  LAST 1189   00,3636  0 0136 0           TC    ESCAPE

2218                       00,3637  0 0006 1  ACOSST2 EXTEND          NOW THAT ARGUMENT IS IN PROPER RANGE,
2219  REF 620  LAST 1189   00,3640  4 0155 1           DCS   MPAC      BEGIN COMPUTATION. USE HASTINGS
2220  REF  23  LAST 1189   00,3641  6 4753 1           AD    HALF      APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
2221  REF 621  LAST 1189   00,3642  52 155 1           DXCH  MPAC      IN A SCALED VERSION WHERE P(X) IS A
2222  REF  18  LAST 1188   00,3643  52 134 0           DXCH  BUF2      SEVENTH ORDER POLYNOMIAL.

2223  REF   3  LAST 1181   00,3644  0 3342 1           TC    SQRTSUB   RETURNS WITH NORMALIZED SQUARE ROOT.

2224  REF  61  LAST 1186   00,3645  10 135 1           CCS   MPTEMP    SEE IF UN-NORMALIZATION REQUIRED.
2225  REF   1              00,3646  1 3711 1           TCF   ACOSSHR   IF SO.
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2226  REF 622  LAST 1189   00,3647  52 155 1  ACOS3   DXCH   MPAC          SET UP FOR POLYNOMIAL EVALUATION.
2227  REF  19  LAST 1189   00,3650  52 134 0          DXCH   BUF2
2228  REF 623  LAST 1190   00,3651  52 155 1          DXCH   MPAC

2229  REF   6  LAST 1188   00,3652  0 7171 1          TC     POLY
2230                        00,3653   00006 1          DEC    6
2231                        00,3654   13240 0          2DEC   +.353553385     COEFFICIENTS ARE C 2(+I)/PISQRT(2) WHERE
2231                        00,3655   23630 0
2232                        00,3656   74721 0          2DEC*  -.0483017006 B+1*                 I
2232                        00,3657   47775 1
2233                        00,3660   02440 0          2DEC*  +.0200273085 B+2*    WHERE C STANDS FOR ORIGINAL COEFFS.
2233                        00,3661   20237 0
2234                        00,3662   75067 1          2DEC*  -.0112931863 B+3*
2234                        00,3663   70742 1
2235                        00,3664   03436 0          2DEC*  +.00695311612 B+4*
2235                        00,3665   26756 1
2236                        00,3666   74037 0          2DEC*  -.00384617957 B+5*
2236                        00,3667   57640 1
2237                        00,3670   03046 0          2DEC*  +.001501297736 B+6*
2237                        00,3671   07143 0
2238                        00,3672   76654 1          2DEC*  -.000284160334 B+7*
2238                        00,3673   42244 0

2239  REF   2  LAST 1188   00,3674  3 2467 0          CAF    LBUF2          DO FINAL MULTIPLY AND GO TO ANY
2240  REF  20  LAST 1188   00,3675  0 7055 0          TC     DMPSUB -1      EPILOGUE SEQUENCES.
2241  REF   4  LAST 1189   00,3676  0 0136 0          TC     ESCAPE

2242                        00,3677  0 0006 1  SUBTR   EXTEND               EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
2243  REF 624  LAST 1190   00,3700  4 0155 1          DCS    MPAC
2244  REF  24  LAST 1189   00,3701  6 4753 1          AD     HALF           FORMS PI - ARCCOS(-X) = ARCCOS(X).
2245  REF 625  LAST 1190   00,3702  52 155 1          DXCH   MPAC
2246  REF   2  LAST 1189   00,3703  0 0137 1          TC     ESCAPE2        GO TO POSSIBLE ARCSIN EPILOGUE.

2247                        00,3704  0 0006 1  ASINEX   EXTEND
2248  REF 626  LAST 1190   00,3705  4 0155 1          DCS    MPAC           ARCSIN EPILOGUE - GET ARCSIN(X)
2249  REF   8  LAST 1187   00,3706  6 4754 0          AD     QUARTER        = PI/2 - ARCCOS(X).
2250  REF 627  LAST 1190   00,3707  52 155 1          DXCH   MPAC
2251  REF  49  LAST 1188   00,3710  1 6030 0  LDANZIG  TCF    DANZIG
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2252   REF 311  LAST 1189   00,3711  50 000 1  ACOSSHR  INDEX  A          THE SHIFT RIGHT IS LESS THAN 14 SINCE
2253   REF  56  LAST 1178   00,3712  3 4753 1            CAF    BIT14      THE INPUT WAS NON-ZERO DP.
2254   REF  62  LAST 1189   00,3713  54 135 1            TS     MPTEMP
2255   REF   4  LAST 1155   00,3714  0 2073 1            TC     VSHRRND    DP SHIFT RIGHT AND ROUND.
2256   REF   1              00,3715  1 3647 0            TCF    ACOS3      PROCEED.

2257                        00,3716  0 0006 1  ACOSOVF  EXTEND             IF MAJOR PART WAS ONLY 1 MORE THAN .5,
2258   REF   2  LAST 1189   00,3717  1 3634 1            BZF    ACOS=0     CALL ANSWER ZERO.

2259   REF  31  LAST  832   00,3720  0 5671 1  ACOSABRT TC     ALARM      IF OVERFLOW, CALL ANSWER ZERO BUT
22591                       00,3721   01301 1            OCT    1301       SOUND AN ALARM.

2260   REF 236  LAST 1189   00,3722  3 4772 1            CAF    ZERO
22601  REF   3  LAST 1191   00,3723  1 3634 1            TCF    ACOS=0

2261   REF   9  LAST 1190   00,3724  3 4754 0  ACOSZERO CAF    QUARTER    ACOS(0) = PI/2.
2262   REF   4  LAST 1191   00,3725  1 3635 0            TCF    ACOS=0 +1  SET MPAC AND EXIT VIA ESCAPE.

2263                        00,3726   77763 0  NEG12    DEC    -12
2264   REF   1              00,3727  1 3677 0  TCSUBTR  TCF    SUBTR
```

P2265 THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2267 1. AXT ADDRESS TO INDEX TRUE.
R2268 1. AXC ADDRESS TO INDEX COMPLEMENTED.
R2269 3. LXA LOAD INDEX FROM ERASABLE.
R2270 4. LXC LOAD INDEX COMPLEMENTED FROM ERASABLE.
R2271 5. SXA STORE INDEX IN ERASABLE.
R2272 6. XCHX EXCHANGE INDEX REIGSTER WITH ERASABLE.

R2273 7. INCR INCREMENT INDEX REGISTER.
R2274 8. XAD ERASABLE ADD TO INDEX REGISTER.
R2275 9. XSU ERASABLE SUBTRACT FROM INDEX REGISTER.

R2276 10. TIX BRANCH ON INDEX REGISTER AND DECREMENT.

```
 2277   REF    1                01,2000                          SETLOC INTERB1
 22775                           01,2341                          BANK

 2278   REF    1                                                 COUNT* $$/INTER
 2279   REF    1                01,2341  0 2436 1  AXT          TC     TAGSUB          SELECT APPROPRIATE INDEX REGISTER.
 2280   REF   22  LAST 1182      01,2342  3 0117 0               CA     POLISH
 2281   REF    4  LAST 1112      01,2343  50 130 0  XSTORE       INDEX  INDEXLOC        CONTAINS C(FIXLOC) OR C(FIXLOC)+1.
 2282   REF   48  LAST 1122      01,2344  54 046 1               TS     X1
 2283   REF   50  LAST 1190      01,2345  1 6030 0               TCF    DANZIG

 2284   REF    2  LAST 1192      01,2346  0 2436 1  AXC          TC     TAGSUB
 2285   REF   23  LAST 1192      01,2347  4 0117 1               CS     POLISH
 2286   REF    1                01,2350  0 2343 1               TC     XSTORE

 2287   REF    1                01,2351  0 2424 1  LXA          TC     15ADRERS        LOAD INDEX REGISTER FROM ERASABLE.
 2288   REF   24  LAST 1192      01,2352  50 117 0               INDEX  POLISH
 2289                           01,2353  3 0000 1               CA     0
 2290   REF    2  LAST 1192      01,2354  1 2343 0               TCF    XSTORE

 2291   REF    2  LAST 1192      01,2355  0 2424 1  LXC          TC     15ADRERS        LOAD NDX REG FROM ERASABLE COMPLEMENTED.
 2292   REF   25  LAST 1192      01,2356  50 117 0               INDEX  POLISH
 2293                           01,2357  4 0000 0               CS     0
 2294   REF    3  LAST 1192      01,2360  1 2343 0               TCF    XSTORE

 2295   REF    3  LAST 1192      01,2361  0 2424 1  SXA          TC     15ADRERS        STORE INDEX REGISTER IN ERASABLE.
 2296   REF    5  LAST 1192      01,2362  50 130 0               INDEX  INDEXLOC
 2297   REF   49  LAST 1192      01,2363  3 0046 0               CA     X1
 2298   REF   26  LAST 1192      01,2364  50 117 0  MSTORE1      INDEX  POLISH
 2299                           01,2365  54 000 0               TS     0
 2300   REF   51  LAST 1192      01,2366  1 6030 0               TCF    DANZIG
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2301   REF   4  LAST 1192   01,2367  0 2424 1  XCHX     TC     15ADRERS     EXCHANGE INDEX REGISTER WITH ERASABLE.
2302   REF  27  LAST 1192   01,2370  50 117 0           INDEX  POLISH
2303                        01,2371  3 0000 1           CA     0
2304   REF   6  LAST 1192   01,2372  50 130 0           INDEX  INDEXLOC
2305   REF  50  LAST 1192   01,2373  56 046 0           XCH    X1
2306   REF   1              01,2374  1 2364 0           TCF    MSTORE1

2307   REF   5  LAST 1193   01,2375  0 2424 1  XAD      TC     15ADRERS     ADD ERASABLE TO INDEX REGISTER.
2308   REF  28  LAST 1193   01,2376  50 117 0           INDEX  POLISH
2309                        01,2377  3 0000 1           CA     0
2310   REF   7  LAST 1193   01,2400  50 130 0  XAD2     INDEX  INDEXLOC
2311   REF  51  LAST 1193   01,2401  26 046 1           ADS    X1           IGNORING OVERFLOWS.
2312   REF  52  LAST 1192   01,2402  1 6030 0           TCF    DANZIG

2313   REF   3  LAST 1192   01,2403  0 2436 1  INCR     TC     TAGSUB       INCREMENT INDEX REGISTER.
2314   REF  29  LAST 1193   01,2404  3 0117 0           CA     POLISH
2315   REF   1              01,2405  1 2400 0           TCF    XAD2

2316   REF   6  LAST 1193   01,2406  0 2424 1  XSU      TC     15ADRERS     SUBTRACT ERASABLE FROM INDEX REGISTER.
2317   REF  30  LAST 1193   01,2407  50 117 0           INDEX  POLISH
2318                        01,2410  4 0000 0           CS     0
2319   REF   2  LAST 1193   01,2411  1 2400 0           TCF    XAD2

2320   REF   4  LAST 1193   01,2412  0 2436 1  TIX      TC     TAGSUB       BRANCH AND DECREMENT ON INDEX.
2321   REF   8  LAST 1193   01,2413  50 130 0           INDEX  INDEXLOC
2322   REF  34  LAST  926   01,2414  4 0050 0           CS     S1
2323   REF   9  LAST 1193   01,2415  50 130 0           INDEX  INDEXLOC
2324   REF  52  LAST 1193   01,2416  6 0046 0           AD     X1
2325                        01,2417  0 0006 1           EXTEND                NO OPERATION IF DECREMENTED INDEX IS
2326   REF  53  LAST 1193   01,2420  6 6030 1           BZMF   DANZIG        NEGATIVE OR ZERO.

2327   REF  10  LAST 1193   01,2421  50 130 0  DOTIXBR   INDEX  INDEXLOC
2328   REF  53  LAST 1193   01,2422  56 046 0           XCH    X1           IGNORING OVERFLOWS.

2329   REF   6  LAST 1182   01,2423  1 6615 1           TCF    GOTO         DO THE BRANCH USING THE CADR IN POLISH.
```

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```
P2330           SUBROUTINE TO CONVERT AN ERASABLE ADDRESS (11 BITS) TO AN EBANK SETTING AND SUBADDRESS.

 2332   REF  31  LAST 1193   01,2424  4 0117 1  15ADRERS CS    POLISH
 2333   REF   3  LAST 1122   01,2425  6 5006 1            AD    DEC45
 2334   REF 312  LAST 1191   01,2426  10 000 0            CCS   A          DOES THE ADDRESS POINT TO THE WORK AREA?
 2335   REF  29  LAST 1182   01,2427  3 0120 1            CA    FIXLOC     YES.  ADD FIXLOC.  EBANK OK AS IS.
 2336                        01,2430  1 2435 0            TCF   +5

 2337   REF   7  LAST 1122   01,2431  3 5024 1            CA    OCT1400    NO.  SET EBANK & MAKE UP SUBADDRESS.
 2338   REF  32  LAST 1194   01,2432  56 117 0            XCH   POLISH
 2339   REF  34  LAST 1130   01,2433  54 003 0            TS    EBANK
 2340   REF  12  LAST 1130   01,2434  7 4350 1            MASK  LOW8
 2341   REF  33  LAST 1194   01,2435  26 117 1  +5        ADS   POLISH     FALL INTO TAGSUB, AND RETURN VIA Q.

R2342           SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY, THE ADDRESS -38D.)

 2344   REF  30  LAST 1194   01,2436  3 0120 1  TAGSUB   CA    FIXLOC
 2345   REF  11  LAST 1193   01,2437  54 130 1            TS    INDEXLOC

 2346   REF  30  LAST 1161   01,2440  10 020 1            CCS   CYR        BIT 15 SPECIFIES INDEX.
 2347   REF  12  LAST 1194   01,2441  24 130 0            INCR  INDEXLOC   0 MEANS USE X2.
 2348   REF 244  LAST 1185   01,2442  0 0002 0            TC    Q
 2349   REF 245  LAST 1194   01,2443  0 0002 0            TC    Q          1 FOR X1.
```

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P2350 MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES. INCLUDED HERE ARE:

R2352 1. ITA STORE QPRET (RETURN ADDRESS) IN ERASABLE.
R2354 2. CALL CALL A SUBROUTINE, LEAVING RETURN IN QPRET.
R2356 3. RTB RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.
R2358 4. BHIZ BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).
R2360 5. BOV BRANCH ON OVERFLOW.
R2361 6. GOTO SIMPLE SEQUENCE CHANGE.

```
2362   REF  31  LAST 1194   01,2444  10 020 1  RTB/BHIZ CCS    CYR
2363   REF  34  LAST 1194   01,2445  3 0117 0  RTB      CA     POLISH
2364   REF   2  LAST  424   01,2446  0 4641 0           TC     SWCALL   -1     SO A "TC Q" FROM ROUTINE LEADS TO DANZIG

2365   REF 628  LAST 1190   01,2447  10 154 0  BHIZ     CCS    MPAC
2366   REF  54  LAST 1193   01,2450  1 6030 0           TCF    DANZIG
2367   REF   7  LAST 1193   01,2451  1 6615 1           TCF    GOTO
2368   REF  55  LAST 1195   01,2452  1 6030 0           TCF    DANZIG
2369   REF   8  LAST 1195   01,2453  1 6615 1           TCF    GOTO

2370   REF   9  LAST 1183   01,2454  10 121 1  BOV(B)   CCS    OVFIND           BRANCH ON OVERFLOW TO BASIC OR INTERP.
2371                        01,2455  1 2457 1           TCF    +2
2372   REF  56  LAST 1195   01,2456  1 6030 0           TCF    DANZIG
2373   REF  10  LAST 1195   01,2457  54 121 1           TS     OVFIND
2374   REF  32  LAST 1195   01,2460  10 020 1           CCS    CYR
2375   REF   1              01,2461  1 2445 1           TCF    RTB              IF BASIC.
2376                        01,2462   00360 1  B5TOB8   OCT    360
2377   REF   9  LAST 1195   01,2463  1 6615 1           TCF    GOTO
```

L INTERPRETER USER'S PAGE NO. 89 E3 S3

```
2378   REF  33  LAST 1195   01,2464  10 020 1  BZE/GOTO CCS   CYR          SEE WHICH OP-CODE IS DESIRED.
2379   REF   6  LAST 1189   01,2465  0 6672 1            TC    BRANCH       DO BZE.
2380   REF  57  LAST 1195   01,2466  1 6030 0            TCF   DANZIG
2381   REF  10  LAST 1195   01,2467  1 6615 1            TCF   GOTO         DO GOTO.
2382   REF  58  LAST 1196   01,2470  1 6030 0            TCF   DANZIG

2383   REF  34  LAST 1196   01,2471  10 020 1  BPL/BMN  CCS   CYR
2384   REF   1              01,2472  1 2500 1            TCF   BPL
2385                        01,2473   12000 1  5B10     DEC   5 B+10       SHIFTS OP CODE IN SWITCH INSTRUCTION ADR

2386   REF   7  LAST 1196   01,2474  0 6672 1            TC    BRANCH       DO BMN.
2387   REF  59  LAST 1196   01,2475  1 6030 0            TCF   DANZIG
2388   REF  60  LAST 1196   01,2476  1 6030 0            TCF   DANZIG
2389   REF  11  LAST 1196   01,2477  1 6615 1            TCF   GOTO         ONLY IF NNZ.

2390   REF   8  LAST 1196   01,2500  0 6672 1  BPL       TC    BRANCH
2391   REF  12  LAST 1196   01,2501  1 6615 1            TCF   GOTO         IF POSITIVE OR ZERO.
2392   REF  13  LAST 1196   01,2502  1 6615 1            TCF   GOTO
2393   REF  61  LAST 1196   01,2503  1 6030 0            TCF   DANZIG

2394   REF  35  LAST 1196   01,2504  10 020 1  CALL/ITA CCS   CYR
2395   REF   1              01,2505  1 6607 1            TCF   CALL

2396                        01,2506  12 507 0            NOOP                CANNOT GET HERE
2397   REF   7  LAST 1193   01,2507  0 2424 1            TC    15ADRERS     STORE QPRET. (TAGSUB AFTER 15ADRERS IS
2398   REF  31  LAST 1194   01,2510  50 120 1            INDEX FIXLOC       SLOW IN THIS CASE, BUT SAVES STORAGE.)
2399   REF   7  LAST 1182   01,2511  3 0052 0            CA    QPRET
2400   REF   2  LAST 1193   01,2512  1 2364 0            TCF   MSTORE1
```

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P2401 THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES:

R2403	00	BONSET	SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2404	01	SETGO	SET A SWITCH AND DO A GOTO.
R2405	02	BOFSET	SET A SWITCH AND DO A GOTO IF IT WAS OFF
R2406	03	SET	SET A SWITCH.
R2407	04	BONINV	INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2408	05	INVGO	INVERT A SWITCH AND DO A GOTO.
R2409	06	BOFINV	INVERT A SWITCH AND BRANCH IF IT WAS OFF
R2410	07	INVERT	INVERT A SWITCH.
R2411	10	BONCLR	CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2412	11	CLRGO	CLEAR A SWITCH AND DO A GOTO.
R2413	12	BOFCLR	CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2414	13	CLEAR	CLEAR A SWITCH.
R2415	14	BON	BRANCH IF A SWITCH WAS ON.
R2416	16	BOFF	BRANCH IF A SWITCH WAS OFF.

R2417 THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS:

R2419 BITS 1-4 SWITCH BIT NUMBER (1-15).
R2420 BITS 5-8 SWITCH OPERATION NUMBER.
R2421 BITS 9- SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2422 THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO
R2424 ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.

```
2426  REF   5  LAST 1004  01,2513  3 4777 1  SWITCHES CAF    LOW4      LEAVE THE SWITCH BIT IN  SWBIT  .
2427  REF  35  LAST 1195  01,2514  7 0117 1           MASK   POLISH
2428  REF 313  LAST 1194  01,2515  50 000 1          INDEX  A
2429  REF  42  LAST 1181  01,2516  3 4752 0          CAF    BIT15     (NUMBER FROM LEFT TO RIGHT.)
2430  REF   1            01,2517  54 131 0          TS     SWBIT

2431  REF  36  LAST 1098  01,2520  3 4762 0          CAF    BIT7      LEAVE THE SWITCH NUMBER IN SWWORD.
2432                      01,2521  0 0006 1          EXTEND
2433  REF  36  LAST 1197  01,2522  7 0117 1          MP     POLISH
2434  REF   1            01,2523  54 130 1          TS     SWWORD

2435                      01,2524  0 0004 0          INHINT            DURING SWITCH CHANGE SO RUPT CAN USE TOO
2436  REF 314  LAST 1197  01,2525  50 000 1          INDEX  A          LEAVE THE SWITCH WORD ITSELF IN L.
2437  REF  25  LAST  852  01,2526  3 0074 1          CA     STATE
2438  REF 246  LAST 1194  01,2527  54 002 1          TS     Q         Q WILL BE USED AS A CHANNEL.
```

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```
2439  REF  26  LAST 1034  01,2530  3 4756 1          CAF     BIT11
2440                      01,2531  0 0006 1          EXTEND                  DISPATCH SWITCH BIT OPERATION AS IN BITS
2441  REF  37  LAST 1197  01,2532  7 0117 1          MP      POLISH          7-8 OF POLISH.
2442  REF   1             01,2533  7 3024 0          MASK    B3TOB4          GETS 4X2-BIT CODE.
2443  REF 315  LAST 1197  01,2534  50 000 1          INDEX   A
2444                      01,2535  1 2536 1          TCF     +1

2445  REF   2  LAST 1197  01,2536  3 0131 1  +1      CA      SWBIT           00 - SET SWITCH IN QUESTION.
2446                      01,2537  0 0006 1          EXTEND
2447  REF   1             01,2540  04 002 1          ROR     QCHAN
2448  REF   1             01,2541  1 2550 1          TCF     SWSTORE

2449  REF   3  LAST 1198  01,2542  3 0131 1  +5      CA      SWBIT           01 - INVERT SWITCH.
2450                      01,2543  0 0006 1          EXTEND
2451  REF   2  LAST 1198  01,2544  06 002 0          RXOR    QCHAN
2452  REF   2  LAST 1198  01,2545  1 2550 1          TCF     SWSTORE

2453  REF   4  LAST 1198  01,2546  4 0131 0  +9D     CS      SWBIT           10 - CLEAR.
2454  REF 247  LAST 1197  01,2547  7 0002 1          MASK    Q
2455  REF   2  LAST 1197  01,2550  50 130 0  SWSTORE  INDEX   SWWORD
2456  REF  26  LAST 1197  01,2551  54 074 0          TS      STATE           NEW SWITCH WORD.
```

L INTERPRETER USER'S PAGE NO. 92 E3 S3

```
2457                          01,2552  0 0003 1  +13D   RELINT                    11 - NOOP.
2458  REF  37  LAST 1102     01,2553  3 4754 0         CAF     BIT13
2459                          01,2554  0 0006 1         EXTEND                   DISPATCH SEQUCE CHANGING OR BRANCHING
2460  REF  38  LAST 1198     01,2555  7 0117 1         MP      POLISH           CODE.
2461  REF   2  LAST 1198     01,2556  7 3024 0         MASK    B3TO84
2462  REF 316  LAST 1198     01,2557  50 000 1         INDEX   A
2463                          01,2560  1 2561 0         TCF     +1               ORIGINALLY STORED IN BITS 5-6.

2464  REF 248  LAST 1198     01,2561  4 0002 1  +1      CS      Q                00 - BRANCH IF ON.
2465  REF   5  LAST 1198     01,2562  7 0131 0  TEST    MASK    SWBIT
2466  REF 317  LAST 1199     01,2563  10 000 0         CCS     A
2467  REF   1                01,2564  1 2574 1         TCF     SWSKIP

2468  REF   1                01,2565  1 6664 1  +5      TCF     SWBRANCH         01 - GO TO.

2469  REF   2  LAST 1199     01,2566  1 2574 1         TCF     SWSKIP           HERE ONLY ON BIT 15.

2470                          01,2567  12 570 0         NOOP                     CANNOT GET HERE
2471                          01,2570  12 571 1         NOOP,                    CANNOT GET HERE
2472  REF 249  LAST 1199     01,2571  3 0002 0  +9D      CA      Q                10 - BRANCH IF OFF.
2473  REF   1                01,2572  1 2562 0         TCF     TEST

2474                          01,2573  12 574 1  +11D     NOOP                     CANNOT GET HERE
2475  REF  26  LAST 1131     01,2574  24 164 1  SWSKIP   INCR    LOC
2477  REF  62  LAST 1196     01,2575  1 6030 0  +13D     TCF     DANZIG           11 - NOOP.

2478  REF   1                01,3024          B3TOB4    EQUALS  COREINC
2479  REF   1                01,2513          SW/       EQUALS  SWITCHES
```

L FIXED-FIXED CONSTANT POOL USER'S PAGE NO. 1 E0 S3

```
 00005  REF   4  LAST 1104      4000                    SETLOC FFTAG1
 0001                           4747                    BANK

 00015  REF   1                                         COUNT* $$/FCONS
R00016   THE FOLLOWING TABLE OF 18 VALUES IS INDEXED. DO NOT INSERT OR REMOVE ANY QUANTITIES.

 0002                           4747   37777 1  DPOSMAX  OCT    37777          MUST PRECEDE POSMAX
 0003                           4750   37777 1  POSMAX   OCT    37777

 0004   REF   8  LAST 1187      4751            LIMITS   =      NEG1/2

 0007                           4751   57777 1  NEG1/2   OCT    -20000         USED BY SIN ROUTINE (MUST BE TWO
A0008                                                                          LOCATIONS IN FRONT OF BIT14)
R0009             BIT TABLE

 0010                           4752   40000 0  BIT15    OCT    40000
 0011                           4753   20000 0  BIT14    OCT    20000
 0012                           4754   10000 0  BIT13    OCT    10000
 0013                           4755   04000 0  BIT12    OCT    04000
 0014                           4756   02000 0  BIT11    OCT    02000
 0015                           4757   01000 0  BIT10    OCT    01000
 0016                           4760   00400 0  BIT9     OCT    00400
 0017                           4761   00200 0  BIT8     OCT    00200
 0018                           4762   00100 0  BIT7     OCT    00100
 0019                           4763   00040 0  BIT6     OCT    00040
 0020                           4764   00020 0  BIT5     OCT    00020
 0021                           4765   00010 0  BIT4     OCT    00010
 0022                           4766   00004 0  BIT3     OCT    00004
 0023                           4767   00002 0  BIT2     OCT    00002
 0024                           4770   00001 0  BIT1     OCT    00001

R0025   DO NOT DESTROY THIS COMBINATION, SINCE IT IS USED IN DOUBLE PRECISION INSTRUCTIONS.
 0027                           4771   77777 0  NEG0     OCT    -0             MUST PRECEDE ZERO
 0028                           4772   00000 1  ZERO     OCT    0              MUST FOLLOW NEG0
A0029                                          BIT1     OCT    00001
A0030                                          NO.WDS   OCT    2              INTERPRETER
A0031                                          OCTAL3   OCT    3              INTERPRETER
A0032                                          R3D1     OCT    4              PINBALL
 0033                           4773   00005 1  FIVE     OCT    5
A0034                                          REVCNT   OCT    6              INTERPRETER
 0035                           4774   00007 0  SEVEN    OCT    7
A0036                                          BIT4     OCT    00010
A0037                                          R2D1     OCT    11             PINBALL
 00375  REF   6  LAST  382      4322            OCT11    =      R2D1           P20S
A0038                                          BINCON   DEC    10             PINBALL              (OCTAL 12)
 0039                           4775   00013 0  ELEVEN   DEC    11
A0040                                          OCT14    OCT    14             ALARM AND ABORT (FILLER)
 00401                          4776   00015 0  OCT15    OCT    15
A0041                                          R1D1     OCT    16             PINBALL
```

L FIXED-FIXED CONSTANT POOL USER'S PAGE NO. 2 EO S3

```
 0043                          4777   00017 1  LOW4     OCT    17
A0044                                         BIT5     OCT    00020
A0045                                         ND1      OCT    21          PINBALL
 0045                          5000   00022 1  OCT22    OCT    22
A0046                                         VD1      OCT    23          PINBALL
A0047                                         OCT24    OCT    24          SERVICE ROUTINES
A0048                                         MD1      OCT    25          PINBALL
A0048                                         VBSP2LD  DEC    22          PINBALL    (OCT26)
A0048                                         DEC23    DEC    23          AUTO MAN.  (OCT27)
 0048                          5001   00030 1  BITS4&5  OCT    30
A0049                                         OCT31    OCT    31          SERVICE ROUTINES
 0050                          5002   00032 0  CALLCODE OCT    00032
 0050  REF    8 LAST  579      4342            OCT37    =      LOW5
A0051                                         LOW5     OCT    37          PINBALL
 0052                          5003   00041 1  33DEC    DEC    33
A0053                                         34DEC    DEC    34          PINBALL              (OCTAL 42)
A0056                                         BIT6     OCT    00040
 0057                          5004   00050 1  OCT50    OCT    50
 0057                          5005   00054 0  LTHVACA  DEC    44
 0058                          5006   00055 1  DEC45    DEC    45
 0058                          5007   00056 1  MINDB    DEC    46          OCT 56
 0059                          5010   00060 1  SUPER011 OCT    60          BITS FOR SUPERBNK SETTING 011.
 0060                          5011   00062 0  .5SEC    DEC    50
 0060                          5012   00075 0  OCT75    OCT    75
A0061                                         BIT7     OCT    00100

 0062  REF   37 LAST 1197      4762            SUPER100 =      BIT7        BITS FOR SUPERBNK SETTING 100
A0063                                                                     (LAST 4K OF ROPE)
 0063                          5013   00110 1  BITS7+4  OCT    110
 0064                          5014   00120 1  SUPER101 OCT    120         BITS FOR SUPERBNK SETTING 101
A0065                                         OCT121   OCT    121         SERVICE ROUTINES
A0066                                                                     (FIRST 8K OF ACM)
 0067                          5015   00140 1  SUPER110 OCT    140         BITS FOR SUPERBNK SETTING 110.
A0068                                                                     (LAST 8K OF ACM)
 0069                          5016   00144 0  1SEC     DEC    100
A0070                                         LOW7     OCT    177         INTERPRETER
A0071                                         BIT8     OCT    00200
A0072                                         OT215    OCT    215         ALARM AND ABORT
A0073                                         8,5      OCT    00220       P20-P25 SUNDANCE
 0074                          5017   00310 0  2SECS    DEC    200
A0075                                         LOW8     OCT    377         PINBALL
A0076                                         BIT9     OCT    00400
 0080                          5020   00620 0  4SECS    DEC    400
 0080                          5021   00777 0  LOW9     OCT    777
A0081                                         BIT10    OCT    01000
A0082                                         5.5DEGS  DEC    .03056      P20-P25 SUNDANCE   (OCTAL 00765)
A0083                                         OCT1103  OCT    1103        ALARM AND ABORT
 0084                          5022   01124 1  C5/2     DEC    .0363551                        (OCTAL 01124)
 0085                          5023   01211 1  V05N09   VN     0509        (SAME AS OCTAL 1211)
 0086                          5024   01400 1  OCT1400  OCT    01400
```

L FIXED-FIXED CONSTANT POOL USER'S PAGE NO. 3 EB S3

```
 C08649 REF   6 LAST  803      5025           7.9SEC   EQUALS V06N22
 C0865                        5025   01426 0 V06N22   VN     0622
 C08651                       5026   01441 1 V06N33   VN     0633
 C08652                       5027   01442 1 V06N34   VN     0634
 C08653                       5030   01461 0 V06N49   VN     0649
 C08654                       5031   01422 1 V06N18   VN     0618
 C08655                       5032   01451 0 V06N41   VN     0641
 C08656                       5033   01474 1 V06N60   VN     0660
 C08657                       5034   01475 0 V06N61   VN     0661
 C0866                        5035   01530 0 V06N88   VN     0688
 C08661                       5036   01531 1 V06N89   VN     0689
 C08662                       5037   01532 1 V06N90   VN     0690
 C08665                       5040   01535 0 V06N93   VN     0693
A0087                                       MID5     OCT    1740     PINBALL
 C088                         5041   01777 1 LOW10    OCT    1777
A0089                                       BIT11    OCT    02000
A0090                                       2K+3     OCT    2003     PINBALL
 C091                         5042   02177 1 LOW7+2K  OCT    2177
 C092                         5043   02400 1 EBANK5   OCT    02400
 C0925                        5044   02600 0 OCT2600  OCT    2600
 C093                         5045   03000 1 PRIO3    OCT    03000
 C094                         5046   03400 0 EBANK7   OCT    03400
A0095                                       LOW11    OCT    3777     PINBALL
A0096                                       BIT12    OCT    04000
A0097                                       RELTAB   OCT    04025    T4RUPT
 C098                         5047   05000 1 PRIO5    OCT    05000
 C099                         5050   06000 1 PRIO6    OCT    06000
 C100                         5051   07000 0 PRIO7    OCT    07000

A0102                                       BIT13    OCT    10000
A0103                                                OCT    10003    T4RUPT     RELTAB +1D
A0104                                       13,7,2   OCT    10102    P20-P25 SUNDANCE
A0106                                       PRIO12   OCT    12000    BANKCALL
 C107                         5052   13000 0 PRIO13   OCT    13000
 C108                         5053   14000 1 PRIO14   OCT    14000
A0109                                                OCT    14031    T4RUPT     RELTAB +2D
 C110                         5054   15000 0 PRIO15   OCT    15000
 C111                         5055   16000 0 PRIO16   OCT    16000
A0112                                       85DEGS   DEC    .45556   P20-P25 SUNDANCE   (OCTAL 16450)
 C114                         5056   17770 1 OCT17770 OCT    17770
A0115                                       BIT14    OCT    20000
A0116                                                OCT    20033    T4RUPT     RELTAB +3D
 C117                         5057   21000 1 PRIO21   OCT    21000
 C1174  REF   2 LAST 1065     6000                    SETLOC FFTAG6
 C1175                        7644                    BANK

 C1176  REF   1                                       COUNT* $$/FCONS
 C118                         7644   22000 1 PRIO22   OCT    22000    SERVICE ROUTINES
 C120                         7645   24000 1 PRIO24   OCT    24000
A0121                                       5/3+1    OCT    24001    SINGLE PRECISION SUBROUTINES
```

L FIXED-FIXED CONSTANT POOL USER'S PAGE NO. 4 EO S3

A0122					OCT	24017	T4RUPT	RELTAB +4D
01221		7646	24100 0	14,12,7	OCT	24100		
0123		7647	25000 0	PRIO25	OCT	25000		
0124		7650	26000 0	PRIO26	OCT	26000		
0125		7651	27000 1	PRIO27	OCT	27000		
A0126				CHRPRIO	OCT	30000	PINBALL	
A0127					OCT	30036	T4RUPT	RELTAB +5D
0128		7652	31000 0	PRIO31	OCT	31000		
0129		7653	31103 1	C1/2	DEC	.7853134		(OCTAL 31103)
0130		7654	32000 0	PRIO32	OCT	32000		
0131		7655	33000 1	PRIO33	OCT	33000		
0132		7656	34000 0	PRIO34	OCT	34000		
A0133					OCT	34034	T4RUPT	RELTAB +6D
0134		7657	35000 1	PRIO35	OCT	35000		
0136		7660	37000 0	PRIO37	OCT	37000		
A0138				MID7	OCT	37600	PINBALL	
0139		7661	37766 1	OCT37766	OCT	37766		
0140		7662	37774 1	OCT37774	OCT	37774		
0141		7663	37776 0	OCT37776	OCT	37776		
A01411				DPOSMAX	OCT	37777		
A0142				BIT15	OCT	40000		
A0143				OCT40001	OCT	40001	INTERPRETER	(CS 1 INSTRUCTION)
01435		7664	40010 1	OT40010	OCT	40010		
0144		7665	40014 0	DLOADCOD	OCT	40014		
0145		7666	40015 1	DLOAD*	OCT	40015		
A0146					OCT	40023	T4RUPT	RELTAB +7D
01465		7667	40040 1	BIT15+6	OCT	40040		
01466		7670	40200 1	OCT40200	OCT	40200		
A0147					OCT	44035	T4RUPT	RELTAB +8D
01475		7671	47777 0	NEG30000	OCT	47777		
A0148					OCT	50037	T4RUPT	RELTAB +9D
A0149					OCT	54000	T4RUPT	RELTAB +10D
01495	REF 9 LAST 1200	4751		-BIT14	EQUALS	NEG1/2		
A0150				RELTAB11	OCT	6000	T4RUPT	
0151		7672	65552 0	C3/2	DEC	-.3216147		(OCTAL 65552)
0152		7673	70000 0	13,14,15	OCT	70000		
0153		7674	73777 1	-1/8	OCT	73777		
0154		7675	74000 1	HIGH4	OCT	74000		
0155		7676	74056 1	-ENDERAS	DEC	-2001		(OCTAL 74056)
A0156				HI5	OCT	76000	PINBALL	
0157		7677	77700 0	HIGH9	OCT	77700		
A0158				-ENDVAC	DEC	-45	INTERPRETER	(OCTAL 77722)
A01585				DECNEG23	DEC	-23	AUTO MAN.	(OCT77750)
A0159				-OCT10	OCT	-10		(OCT 77767)
A0161				NEG4	DEC	-4		(OCTAL 77773)
0162		7700	77774 0	NEG3	DEC	-3		
0163		7701	77775 1	NEG2	OCT	77775		
0164		7702	77776 1	NEGONE	DEC	-1		

L FIXED-FIXED CONSTANT POOL USER'S PAGE NO. 5 E0 S3

P0165 DEFINED BY EQUALS

R0166 IT WOULD BE TO THE USERS ADVANTAGE TO OCCASIONALLY CHECK ANY OF THESE SYMBOLS IN ORDER TO PREVENT ANY
R0168 ACCIDENTAL DEFINITION CHANGES.

0169	REF	5	LAST 346	7702	MINUS1	=	NEG1	
0170	REF	25	LAST 1164	7702	NEG1	=	NEGONE	
0171	REF	61	LAST 1110	4770	ONE	=	BIT1	
0172	REF	37	LAST 1009	4767	TWO	=	BIT2	
0173	REF	1		6214	THREE	=	OCTAL3	
0174	REF	43	LAST 1134	6214	LOW2	=	THREE	
0175	REF	41	LAST 1013	4766	FOUR	=	BIT3	
0176	REF	3	LAST 1114	6211	SIX	=	REVCNT	
0177	REF	16	LAST 1184	4774	LOW3	=	SEVEN	
0178	REF	35	LAST 1055	4765	EIGHT	=	BIT4	
0179	REF	7	LAST 1200	4322	NINE	=	R2D1	
0180	REF	4	LAST 392	4355	TEN	=	BINCON	
0181	REF	10	LAST 1058	4775	NOUTCON	=	ELEVEN	
0182	REF	8	LAST 949	4351	OCT23	=	VD1	
01825	REF	3	LAST 385	4353	OCT25	=	MD1	
0183	REF	27	LAST 1160	4757	PRIO1	=	BIT10	
0184	REF	8	LAST 1194	5024	EBANK3	=	OCT1400	
0185	REF	27	LAST 1198	4756	PRIO2	=	BIT11	
0186	REF	1		5014	OCT120	=	SUPER101	
0187	REF	1		5015	OCT140	=	SUPER110	
0188	REF	28	LAST 1204	4756	2K	=	BIT11	
0189	REF	29	LAST 1204	4756	EBANK4	=	BIT11	
0190	REF	26	LAST 971	4755	PRIO4	=	BIT12	
0191	REF	2	LAST 507	5045	EBANK6	=	PRIO3	
0192	REF	38	LAST 1199	4754	QUARTER	=	BIT13	
0193	REF	39	LAST 1204	4754	PRIO10	=	BIT13	
01935	REF	1		7617	OCT10001	=	CCSL	
0194	REF	25	LAST 1190	4753	POS1/2	=	HALF	
0195	REF	57	LAST 1191	4753	PRIO20	=	BIT14	
0196	REF	58	LAST 1204	4753	HALF	=	BIT14	
0197	REF	2	LAST 365	4346	PRIO30	=	CHRPRIO	
0198	REF	10	LAST 1132	4346	BIT13-14	=	PRIO30	INTERPRETER USES IN PROCESSING STORECODE
01985	REF	3	LAST 1117	6440	OCT30002	=	TLOAD +1	
0199	REF	3	LAST 1013	7656	E12T14	=	PRIO34	
0200	REF	43	LAST 1197	4752	NEGMAX	=	BIT15	
0201	REF	44	LAST 1204	4752	VLOADCOD	=	BIT15	
0202	REF	1		6056	VLOAD*	=	OCT40001	
0203	REF	3	LAST 366	4076	OCT60000	=	RELTAB11	
0204	REF	5	LAST 344	4344	BANKMASK	=	HI5	

L INTERPRETIVE CONSTANTS USER'S PAGE NO. 1 E0 S3

```
0001   REF   1                26,2000                          SETLOC  INTPRET1
0002                          26,3325                          BANK

0003   REF   1                                                 COUNT*  $$/ICONS
0004                          26,3325   10000 0  DP1/4TH      2DEC    .25
0004                          26,3326   00000 1
0005                          26,3327   00000 1  UNITZ        2DEC    0
0005                          26,3330   00000 1
0006                          26,3331   00000 1  UNITY        2DEC    0
0006                          26,3332   00000 1
0007                          26,3333   20000 0  UNITX        2DEC    .5
0007                          26,3334   00000 1
0008                          26,3335   00000 1  ZEROVECS     2DEC    0
0008                          26,3336   00000 1
0009                          26,3337   00000 1               2DEC    0
0009                          26,3340   00000 1
0010                          26,3341   00000 1               2DEC    0
0010                          26,3342   00000 1
0011   REF   6  LAST  938     26,3333                DPHALF    =       UNITX
0012                          26,3343   37777 1  DPPOSMAX     OCT     37777
0013                          26,3344   37777 1               OCT     37777
```

L INTERPRETIVE CONSTANTS USER'S PAGE NO. 2 E. S3

P0014 INTERPRETIVE CONSTANTS IN THE OTHER HALF-MEMORY

```
0015   REF   1          04,2000                    SETLOC  INTPRET2
0016                    04,3753                    BANK

0017   REF   1                                     COUNT*  $$/ICONS
0018                    04,3753   00000 1  ZUNIT   2DEC    0
0018                    04,3754   00000 1
0019                    04,3755   00000 1  YUNIT   2DEC    0
0019                    04,3756   00000 1
0020                    04,3757   20000 0  XUNIT   2DEC    .5
0020                    04,3760   00000 1
0021                    04,3761   00000 1  ZEROVEC 2DEC    0
0021                    04,3762   00000 1
0022                    04,3763   00000 1          2DEC    0
0022                    04,3764   00000 1
0023                    04,3765   00000 1          2DEC    0
0023                    04,3766   00000 1
0024                    04,3767   77777 0          OCT     77777          -0,-6,-12 MUST REMAIN IN THIS ORDER
0025                    04,3770   77771 0  DEC-6   DEC     -6
0026                    04,3771   77763 0  DEC-12  DEC     -12
0027                    04,3772   37777 1  LODPMAX 2OCT    3777737777     THESE TWO CONSTANTS MUST REMAIN
0027                    04,3773   37777 1
0028                    04,3774   37777 1  LODPMAX1 2OCT   3777737777     ADJACENT AND THE SAME FOR INTEGRATION
0028                    04,3775   37777 1
0029   REF  15  LAST  775  04,3761                ZERODP  =       ZEROVEC
0030   REF   5  LAST  724  04,3757                HALFDP  =       XUNIT
```

L SINGLE PRECISION SUBROUTINES USER'S PAGE NO. 1 ED 53

```
 00005  REF   5  LAST 1200      4000                    SETLOC FFTAG1
 0001                           5060                    BANK

R0002   SINGLE PRECISION SINE AND COSINE

 00025  REF   1                                         COUNT* $$/INTER
 0003   REF  26  LAST 1204      5060  6 4753 1  SPCOS    AD     HALF        ARGUMENTS SCALED AT PI
 0004   REF   1                 5061  54 742 1  SPSIN    TS     TEMK
 0005   REF   1                 5062  1 5064 1           TCF    SPT
 0006   REF   2  LAST 1207      5063  4 0742 1           CS     TEMK
 0007                           5064  6 0000 1  SPT      DOUBLE
 0008   REF   3  LAST 1207      5065  54 742 1           TS     TEMK
 0009   REF   1                 5066  1 5077 0           TCF    POLLEY
 0010   REF   4  LAST 1207      5067  56 742 0           XCH    TEMK
 0011   REF   5  LAST 1207      5070  50 742 0           INDEX  TEMK
 0012   REF   6  LAST 1134      5071  6 4751 0           AD     LIMITS
 0013                           5072  4 0000 0           COM
 0014   REF   6  LAST 1207      5073  6 0742 0           AD     TEMK
 0015   REF   7  LAST 1207      5074  54 742 1           TS     TEMK
 0016   REF   2  LAST 1207      5075  1 5077 0           TCF    POLLEY
 0017   REF   1                 5076  1 5115 0           TCF    ARG90
 0018                           5077  0 0006 1  POLLEY   EXTEND
 0019   REF   8  LAST 1207      5100  7 0742 1           MP     TEMK
 0020   REF   1                 5101  54 743 0           TS     SQ
 0021                           5102  0 0006 1           EXTEND
 0022   REF   1                 5103  7 5022 0           MP     C5/2
 0023   REF   1                 5104  6 7672 0           AD     C3/2
 0024                           5105  0 0006 1           EXTEND
 0025   REF   2  LAST 1207      5106  7 0743 0           MP     SQ
 0026   REF   1                 5107  6 7653 0           AD     C1/2
 0027                           5110  0 0006 1           EXTEND
 0028   REF   9  LAST 1207      5111  7 0742 1           MP     TEMK
 0029                           5112  20 001 1           DDOUBL
 0030   REF  10  LAST 1207      5113  54 742 1           TS     TEMK
 0031   REF 250  LAST 1199      5114  0 0002 0           TC     Q
 0032   REF 318  LAST 1199      5115  50 000 1  ARG90    INDEX  A
 0033   REF   7  LAST 1207      5116  4 4751 1           CS     LIMITS
 0034   REF 251  LAST 1207      5117  0 0002 0           TC     Q                  RESULT SCALED AT 1
R0040           SPROOT WAS DELETED IN REV 51 OF MASTER. ASS. CONT. HAS CARDS.
```

L EXECUTIVE USER'S PAGE NO. 1 E S3

```
00005  REF   1                  4000                        SETLOC EXECF2
0001                            5120                        BANK

R0002                TO ENTER A JOB REQUEST REQUIRING NO VAC AREA:

00025  REF   1                                              COUNT* $$/EXEC
00026  REF  11  LAST 1204       5120  3 4346 1  NOVAC30     CAF    PRIO30
00029                           5121  0 0004 0  NOVAC       INHINT
0003   REF   1                  5122  6 5213 1             AD     FAKEPRET      LOC(MPAC +6) - LOC(QPRET)
00031  REF   3  LAST  224       5123  54 063 0             TS     NEWPRIO       PRIORITY OF NEW JOB + NOVAC C(FIXLOC)

0004                            5124  0 0006 1             EXTEND
0005   REF 252  LAST 1207       5125  5 0002 0             INDEX  Q             Q WILL BE UNDISTURBED THROUGHOUT.
0006                            5126  3 0001 0             DCA    0             2CADR OF JOB ENTERED.
0007   REF   2  LAST  224       5127  52 066 0             DXCH   NEWLOC
0008   REF   1                  5130  3 4756 1             CAF    EXECBANK
0009   REF  24  LAST 1150       5131  56 004 0             XCH    FBANK
0010   REF   1                  5132  54 061 1             TS     EXECTEM1
0011   REF   1                  5133  1 2620 0             TCF    NOVAC2        ENTER EXECUTIVE BANK.

R0012                TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

00139  REF   4  LAST  829       5134  3 4753 1  FINVAC20    CAF    PRIO20
0014                            5135  0 0004 0  FINDVAC     INHINT
00145  REF   4  LAST 1208       5136  54 063 0             TS     NEWPRIO
0015                            5137  0 0006 1             EXTEND
0016   REF 253  LAST 1208       5140  5 0002 0             INDEX  Q
0017                            5141  3 0001 0             DCA    0
0018   REF   3  LAST 1208       5142  52 066 0  SPVACIN    DXCH   NEWLOC
0019   REF   2  LAST 1208       5143  3 4756 1             CAF    EXECBANK
0020   REF  25  LAST 1208       5144  56 004 0             XCH    FBANK
0021   REF   1                  5145  1 2576 0             TCF    FINDVAC2      OFF TO EXECUTIVE SWITCHED-BANK.

R0211                TO ENTER A FINDVAC WITH THE PRIORITY IN NEWPRIO TO THE 2CADR ARRIVING IN A AND L:

R002125              USERS OF SPVAC MUST INHINT BEFORE STORING IN NEWPRIO.

00213  REF 254  LAST 1208       5146  56 002 0  SPVAC      XCH    Q
00214  REF   9  LAST 1048       5147  6 7701 0             AD     NEG2
00215  REF 255  LAST 1208       5150  56 002 0             XCH    Q
00216  REF   1                  5151  1 5142 1             TCF    SPVACIN

R0022                TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED:

0024   REF 256  LAST 1208       5152  22 002 0  CHANG1     LXCH   Q
0025   REF   3  LAST 1208       5153  3 4756 1             CAF    EXECBANK
0026   REF  18  LAST 1131       5154  56 006 1             XCH    BBANK
0027   REF   1                  5155  1 2677 1             TCF    CHANJOB

R0030                TO SUSPEND AN INTERPRETIVE JOB:
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```
 0031   REF  27  LAST 1199      5156  4 0164 0  CHANG2   CS     LOC          NEGATIVE LOC SHOWS JOB = INTERPRETIVE.
R00315          ITRACE (4) REFERS TO "CHANG2".
 0032   REF 164  LAST 1187      5157  54 001 1            TS     L
 0033   REF   4  LAST 1208      5160  3 4756 1   +2       CAF    EXECBANK
 0035   REF  19  LAST 1208      5161  54 006 0            TS     BBANK
 0034   REF   2  LAST 1208      5162  1 2676 0            TCF    CHANJOB -1
```

```
P0035           TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.):

 0037  REF  28  LAST 1209   5163  54 164 0  JOBSLEEP TS      LOC
 0038  REF   5  LAST 1209   5164  3 4756 1           CAF     EXECBANK
 0039  REF  26  LAST 1208   5165  54 004 1           TS      FBANK
 0040  REF   1              5166  1 2767 1           TCF     JOBSLP1

R0041           TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION:

 0042                       5167  0 0004 0  JOBWAKE  INHINT
 00421 REF   4  LAST 1208   5170  54 065 0           TS      NEWLOC
 0043  REF  55  LAST 1147   5171  4 4767 1           CS      TWO       EXIT IS VIA FINDVAC/NOVAC PROCEDURES.
 0044  REF 257  LAST 1208   5172  26 002 1           ADS     Q
 0045  REF   6  LAST 1210   5173  3 4756 1           CAF     EXECBANK
 0046  REF  27  LAST 1210   5174  56 004 0           XCH     FBANK
 0047  REF   1              5175  1 3014 0           TCF     JOBWAKE2

R0048           TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION:

 0049                       5176  0 0004 0  PRIOCHNG INHINT   NEW PRIORITY ARRIVES IN A. RETURNS TO
 0050  REF   5  LAST 1208   5177  54 063 0           TS      NEWPRIO   CALLER AS SOON AS NEW JOB PRIORITY IS
 0051  REF   7  LAST 1210   5200  3 4756 1           CAF     EXECBANK  HIGHEST. PREPARE FOR POSSIBLE BASIC-
 0052  REF  20  LAST 1209   5201  56 006 1           XCH     BBANK     STYLE CHANGE-JOB.
 0053  REF   9  LAST 1131   5202  54 165 1           TS      BANKSET
 0054  REF 258  LAST 1210   5203  3 0002 0           CA      Q
 0055  REF   1              5204  1 3063 0           TCF     PRIOCH2

R0058           TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS:

 0059  REF   8  LAST 1210   5205  3 4756 1  ENDOFJOB CAF     EXECBANK
 0060  REF  28  LAST 1210   5206  54 004 1           TS      FBANK
 0061  REF   1              5207  1 3074 0           TCF     ENDJOB1

 0062  REF   2  LAST 1208   5210  3 0061 0  ENDFIND  CA      EXECTEM1  RETURN TO CALLER AFTER JOB ENTRY
 0063  REF  29  LAST 1210   5211  54 004 1           TS      FBANK     COMPLETE.
 0064  REF   4  LAST  781   5212  1 6710 0           TCF     Q+2
 0066  REF  30  LAST 1204   4756              EXECBANK EQUALS  BIT11    THIS IS TRUE IF FINDVAC2 STAYS IN BANK01

 00665 REF 629  LAST 1195   5213   00110 1  FAKEPRET ADRES   MPAC -36D  LOC(MPAC +6) - LOC(QPRET)
```

P0067 LOCATE AN AVAILABLE VAC AREA.

```
 00675  REF    1                01,2000                        SETLOC  EXEC81
 0068                            01,2576                        BANK

 00685 *REF    1                                               COUNT*  $$/EXEC
A00686                                        ********  IF THE EXECUTIVE IS
A00687                                                  MOVED   OUT OF BANK 1
A00688                                                  DONT    FORGET TO CHANGE
A00689                                                  THE     VALUE OF
A006891                                                 ******  EXECBANK ****
 0069   REF    3  LAST 1210     01,2576  54 061 1  FINDVAC2 TS      EXECTEM1        (SAVE CALLER'S BANK FIRST.)
 0070   REF    3  LAST  205     01,2577  10 400 1           CCS     VAC1USE
 0071   REF    1                01,2600  1 2613 0           TCF     VACFOUND
 0072   REF    2  LAST  204     01,2601  10 454 0           CCS     VAC2USE
 0073   REF    2  LAST 1211     01,2602  1 2613 0           TCF     VACFOUND
 0074   REF    2  LAST  204     01,2603  10 530 0           CCS     VAC3USE
 0075   REF    3  LAST 1211     01,2604  1 2613 0           TCF     VACFOUND
 0076   REF    2  LAST  204     01,2605  10 604 1           CCS     VAC4USE
 0077   REF    4  LAST 1211     01,2606  1 2613 0           TCF     VACFOUND
 0078   REF    2  LAST  204     01,2607  10 660 0           CCS     VAC5USE
 0079   REF    5  LAST 1211     01,2610  1 2613 0           TCF     VACFOUND
 0080   REF    2  LAST  242     01,2611  0 7706 1           TC      BAILOUT
 0081                           01,2612   31201 0           OCT     31201           NO VAC AREAS

 0082   REF   56  LAST 1210     01,2613  6 4767 0  VACFOUND AD      TWO             RESERVE THIS VAC AREA BY STORING A ZERO
 0083                           01,2614  22 007 0           ZL                      IN ITS VAC USE REGISTER AND STORE THE
 0084   REF  319  LAST 1207     01,2615  50 000 1           INDEX   A               ADDRESS OF THE FIRST WORD OF IT IN THE
 0085                           01,2616  21'777 0           LXCH    0 -1            LOW NINE BITS OF THE PRIORITY WORD.
 0086   REF    6  LAST 1210     01,2617  26 063 0           ADS     NEWPRIO

 0087   REF  237  LAST 1191     01,2620  3 4772 1  NOVAC2   CAF     ZERO            NOVAC ENTERS HERE. FIND A CORE SET.
 0088   REF    3  LAST  426     01,2621  54 064 1           TS      LOCCTR
 0089   REF    1                01,2622  3 2627 0           CAF     NO.CORES        SEVEN SETS OF ELEVEN REGISTERS EACH.
 0090   REF    1                01,2623  54 062 1  NOVAC3   TS      EXECTEM2
 0091   REF    4  LAST 1211     01,2624  50 064 0           INDEX   LOCCTR
 0092   REF    9  LAST  223     01,2625  10 167 0           CCS     PRIORITY        EACH PRIORITY REGISTER CONTAINS -0 IF
 0093   REF    1                01,2626  1 2667 0           TCF     NEXTCORE        THE CORRESPONDING CORE SET IS AVAILABLE.
 0094                           01,2627   00006 1  NO.CORES DEC     6
 0095   REF    2  LAST 1211     01,2630  1 2667 0           TCF     NEXTCORE        AN ACTIVE JOB HAS A POSITIVE PRIORITY
A0096                                                                              BUT A DORMANT JOB'S PRIORITY IS NEGATIVE
```

```
0097  REF   7  LAST 1211  01,2631  3 0063 1  CORFOUND CA     NEWPRIO    SET THE PRIORITY OF THIS JOB IN THE CORE
0098  REF   5  LAST 1211  01,2632  50 064 0            INDEX  LOCCTR     SET'S PRIORITY REGISTER AND SET THE
0099  REF  10  LAST 1211  01,2633  54 167 0            TS     PRIORITY   JOB'S PUSH-DOWN POINTER AT THE BEGINNING
0100  REF   4  LAST  358  01,2634  7 5021 0            MASK   LOW9       OF THE WORK AREA AND OVERFLOW INDICATOR
0101  REF   6  LAST 1212  01,2635  50 064 0            INDEX  LOCCTR
0102  REF  19  LAST 1182  01,2636  54 166 1            TS     PUSHLOC    OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

0103  REF   7  LAST 1212  01,2637  10 064 1            CCS    LOCCTR     IF CORE SET ZERO IS BEING LOADED, SET UP
0104  REF   1            01,2640  1 2654 0            TCF    SETLOC     OVFIND AND FIXLOC IMMEDIATELY .
0105  REF  11  LAST 1195  01,2641  54 121 1            TS     OVFIND
0106  REF  20  LAST 1212  01,2642  3 0166 0            CA     PUSHLOC
0107  REF  32  LAST 1196  01,2643  54 120 0            TS     FIXLOC

0108  REF   7  LAST 1109  01,2644  10 067 1  SPECTEST CCS    NEWJOB     SEE IF ANY ACTIVE JOBS WAITING (RARE).
0109  REF   2  LAST 1212  01,2645  1 2654 0            TCF    SETLOC     MUST BE AWAKENED BUT UNCHANGED JOB.
0110                       01,2646  12 647 1            NOOP              CANNOT GET HERE
0111                       01,2647  12 650 1            NOOP              CANNOT GET HERE
0112  REF   8  LAST 1212  01,2650  54 067 1            TS     NEWJOB     +0 SHOWS ACTIVE JOB ALREADY SET.
0113  REF   5  LAST 1210  01,2651  52 066 0            DXCH   NEWLOC
0114  REF  29  LAST 1210  01,2652  52 165 1            DXCH   LOC
0115  REF   1            01,2653  1 5210 0            TCF    ENDFIND

0116  REF   6  LAST 1212  01,2654  52 066 0  SETLOC   DXCH   NEWLOC     SET UP THE LOCATION REGISTERS FOR THIS
0117  REF   8  LAST 1212  01,2655  50 064 0            INDEX  LOCCTR
0118  REF  30  LAST 1212  01,2656  52 165 1            DXCH   LOC
0119  REF   9  LAST 1212  01,2657  50 067 0            INDEX  NEWJOB     THIS INDEX INSTRUCTION INSURES THAT THE
0120  REF  11  LAST 1212  01,2660  4 0167 0            CS     PRIORITY   HIGHEST ACTIVE PRIORITY WILL BE COMPARED
0121  REF   8  LAST 1212  01,2661  6 0063 1            AD     NEWPRIO    WITH THE NEW PRIORITY TO SEE IF NEWJOB
0122                       01,2662  0 0006 1            EXTEND            SHOULD BE SET TO SIGNAL A SWITCH.
0123  REF   2  LAST 1212  01,2663  6 5210 1            BZMF   ENDFIND
0124  REF   9  LAST 1212  01,2664  3 0064 0            CA     LOCCTR     LOCCTR IS LEFT SET AT THIS CORE SET IF
0125  REF  10  LAST 1212  01,2665  54 067 1            TS     NEWJOB     THE CALLER WANTS TO LOAD ANY MPAC
0126  REF   3  LAST 1212  01,2666  1 5210 0            TCF    ENDFIND    REGISTERS, ETC.

0127  REF   2  LAST 1199  01,2667  3 3024 1  NEXTCORE CAF    COREINC
0128  REF  10  LAST 1212  01,2670  26 064 1            ADS    LOCCTR
0129  REF   2  LAST 1211  01,2671  10 062 1            CCS    EXECTEM2
0130  REF   1            01,2672  1 2623 0            TCF    NOVAC3
0131  REF   3  LAST 1211  01,2673  0 7706 1            TC     BAILOUT    NO CORE SETS.
0132                       01,2674   31202 0           OCT    31202
```

P0133 THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

```
01345  REF  31  LAST 1212   01,2675  22 164 1   -2        LXCH   LOC
0135   REF  10  LAST 1210   01,2676  30 165 0   -1        CAE    BANKSET      BANKSET, NOT BBANK, HAS RIGHT CONTENTS.
0136                        01,2677  0 0004 0   CHANJOB   INHINT
01362                       01,2700  0 0006 1             EXTEND
01364  REF  12  LAST 1105   01,2701  04 007 1             RQR    SUPERBNK     PICK UP CURRENT SBANK FOR BBCON
01366  REF 165  LAST 1209   01,2702  56 001 0             XCH    L            LOC IN A AND BBCON IN L.
01368  REF  11  LAST 1212   01,2703  50 067 0   +4        INDEX  NEWJOB       SWAP LOC AND BANKSET.
0137   REF  32  LAST 1213   01,2704  52 165 1             DXCH   LOC
0138   REF  33  LAST 1213   01,2705  52 165 1             DXCH   LOC

01382  REF  11  LAST 1213   01,2706  30 165 0             CAE    BANKSET
01384                       01,2707  0 0006 1             EXTEND
01388  REF  13  LAST 1213   01,2710  01 007 1             WRITE  SUPERBNK     SET SBANK FOR NEW JOB.
0139   REF 630  LAST 1210   01,2711  52 155 1             DXCH   MPAC         SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
0140   REF  12  LAST 1213   01,2712  50 067 0             INDEX  NEWJOB
0141   REF 631  LAST 1213   01,2713  52 155 1             DXCH   MPAC
0142   REF 632  LAST 1213   01,2714  52 155 1             DXCH   MPAC
0143   REF 633  LAST 1213   01,2715  52 157 0             DXCH   MPAC +2
0144   REF  13  LAST 1213   01,2716  50 067 0             INDEX  NEWJOB
0145   REF 634  LAST 1213   01,2717  52 157 0             DXCH   MPAC +2
0146   REF 635  LAST 1213   01,2720  52 157 0             DXCH   MPAC +2
0147   REF 636  LAST 1213   01,2721  52 161 0             DXCH   MPAC +4
0148   REF  14  LAST 1213   01,2722  50 067 0             INDEX  NEWJOB
0149   REF 637  LAST 1213   01,2723  52 161 0             DXCH   MPAC +4
0150   REF 638  LAST 1213   01,2724  52 161 0             DXCH   MPAC +4
0151   REF 639  LAST 1213   01,2725  52 163 1             DXCH   MPAC +6
0152   REF  15  LAST 1213   01,2726  50 067 0             INDEX  NEWJOB
0153   REF 640  LAST 1213   01,2727  52 163 1             DXCH   MPAC +6
0154   REF 641  LAST 1213   01,2730  52 163 1             DXCH   MPAC +6

0155   REF 238  LAST 1211   01,2731  3 4772 1             CAF    ZERO
0156   REF  12  LAST 1212   01,2732  56 121 0             XCH    OVFIND       MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
0157                        01,2733  0 0006 1             EXTEND
0158                        01,2734  1 2737 1             BZF    +3
0159   REF  21  LAST 1212   01,2735  4 0166 1             CS     PUSHLOC
0160   REF  22  LAST 1213   01,2736  54 166 1             TS     PUSHLOC

0161   REF  23  LAST 1213   01,2737  52 167 0             DXCH   PUSHLOC
0162   REF  16  LAST 1213   01,2740  50 067 0             INDEX  NEWJOB
0163   REF  24  LAST 1213   01,2741  52 167 0             DXCH   PUSHLOC
0164   REF  25  LAST 1213   01,2742  52 167 0             DXCH   PUSHLOC      SWAPS PUSHLOC AND PRIORITY.
0165   REF   5  LAST 1212   01,2743  3 5021 1             CAF    LOW9         SET FIXLOC TO BASE OF VAC AREA.
0166   REF  12  LAST 1212   01,2744  7 0167 0             MASK   PRIORITY
0167   REF  33  LAST 1212   01,2745  54 120 0             TS     FIXLOC

0168   REF  26  LAST 1213   01,2746  10 166 1             CCS    PUSHLOC      SET OVERFLOW INDICATOR ACCORDING TO
0169   REF 239  LAST 1213   01,2747  3 4772 1             CAF    ZERO
0170   REF   1              01,2750  1 2755 0             TCF    ENDPRCHG -1
```

L EXECUTIVE USER'S PAGE NO. 7 E0 S3

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0171  REF  27  LAST 1213   01,2751  4 0166 1          CS      PUSHLOC
0172  REF  28  LAST 1214   01,2752  54 166 1          TS      PUSHLOC
0173  REF 134  LAST 1177   01,2753  3 4770 0          CAF     ONE
0174  REF  13  LAST 1213   01,2754  56 121 0          XCH     CVFIND
0175  REF  17  LAST 1213   01,2755  54 067 1    -1    TS      NEWJOB
0176                       01,2756  0 0003 1  ENDPRCHG RELINT
0177  REF  34  LAST 1213   01,2757  52 165 1          DXCH    LOC             BASIC JOBS HAVE POSITIVE ADDRESSES, SO
0178                       01,2760  0 0006 1          EXTEND                  DISPATCH WITH A DTCB.
0179                       01,2761  6 2763 1          BZMF    +2              IF INTERPRETIVE, SET UP EBANK, ETC.
0180                       01,2762  52 006 0          DTCB
```

```
C0181                          01,2763  4 0000 0          COM                    EPILOGUE TO JOB CHANGE FOR INTERPRETIVE
C0182  REF 135  LAST 1214      01,2764  6 4770 0          AD      ONE
C0183  REF  35  LAST 1214      01,2765  54 164 0          TS      LOC            RESUME.
C0186  REF   1                 01,2766  1 6017 0          TCF     INTRSM

RC187                  COMPLETE JOBSLEEP PREPARATIONS.

C0188                          01,2767  0 0004 0  JOBSLP1  INHINT
C0189  REF  13  LAST 1213      01,2770  4 0167 0          CS      PRIORITY       NNZ PRIORITY SHOWS JOB ASLEEP.
C0190  REF  14  LAST 1215      01,2771  54 167 0          TS      PRIORITY
C0191  REF   8  LAST 1149      01,2772  3 6043 0          CAF     LOW7
C0192  REF  21  LAST 1210      01,2773  7 0006 0          MASK    BBANK
C1921                          01,2774  0 0006 1          EXTEND
C1922  REF  14  LAST 1213      01,2775  04 007 1          ROR     SUPERBNK       SAVE OLD SUPERBANK VALUE.
C0193  REF  12  LAST 1213      01,2776  54 165 1          TS      BANKSET
C0194  REF 240  LAST 1213      01,2777  4 4772 0          CS      ZERO
C0195  REF 111  LAST 1185      01,3000  54 131 0  JOBSLP2  TS      BUF +1         HOLDS - HIGHEST PRIORITY.
C0196  REF   1                 01,3001  1 3111 1          TCF     EJSCAN         SCAN FOR HIGHEST PRIORITY ALA ENDOFJOB.

C1961                          01,3002  0 0004 0  NUCHANG2 INHINT                 QUICK... DONT LET NEWJOB CHANGE TO +0 .
C19611 REF  18  LAST 1214      01,3003  10 067 1          CCS     NEWJOB
C19612                         01,3004  1 3007 1          TCF     +3             NEWJOB STILL PNZ
C19613                         01,3005  0 0003 1          RELINT                 NEWJOB HAS CHANGED TO +0. WAKE UP JOB
C19614 REF   1                 01,3006  1 3201 0          TCF     ADVAN +2       VIA NUDIRECT. (VERY RARE CASE.)

C1962  REF  57  LAST 1211      01,3007  3 4767 0          CAF     TWO
C1963                          01,3010  0 0006 1          EXTEND
C1964  REF  24  LAST  834      01,3011  05 011 1          WOR     DSALMOUT       TURN ON ACTIVITY LIGHT
C1965  REF  36  LAST 1215      01,3012  52 165 1          DXCH    LOC            AND SAVE ADDRESS INFO FOR BENEFIT OF
C1966  REF   3  LAST 1209      01,3013  1 2703 0          TCF     CHANJOB + 4     POSSIBLE SLEEPING JOB.
```

```
P0197           TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE FCADR IN THE
R0199  LOC REGISTER OF ANY SUCH JOB MATCHES THAT SUPPLIED BY THE CALLER, THAT JOB IS AWAKENED. IF NO JOB IS FOUND,
R0201  LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

0202  REF   4  LAST 1211  01,3014  54 061 1  JOBWAKE2 TS     EXECTEM1
0203  REF 241  LAST 1215  01,3015   3 4772 1           CAF    ZERO          BEGIN CORE SET SCAN.
0204  REF  11  LAST 1212  01,3016  54 064 1           TS     LOCCTR
0205  REF   2  LAST 1211  01,3017   3 2627 0           CAF    NO.CORES
0206  REF   3  LAST 1212  01,3020  54 062 1  JOBWAKE4 TS     EXECTEM2
0207  REF  12  LAST 1216  01,3021  50 064 0           INDEX  LOCCTR
0208  REF  15  LAST 1215  01,3022  10 167 0           CCS    PRIORITY
0209  REF   1              01,3023   1 3026 1           TCF    JOBWAKE3      ACTIVE JOB - CHECK NEXT CORE SET.
0210                       01,3024    00014 1  COREINC  DEC    12            12 REGISTERS PER CORE SET.
0211  REF   1              01,3025   1 3035 0           TCF    WAKETEST      SLEEPING JOB - SEE IF CADR MATCHES.

0212  REF   3  LAST 1212  01,3026   3 3024 1  JOBWAKE3 CAF    COREINC
0213  REF  13  LAST 1216  01,3027  26 064 1           ADS    LOCCTR
0214  REF   4  LAST 1216  01,3030  10 062 1           CCS    EXECTEM2
0215  REF   1              01,3031   1 3020 1           TCF    JOBWAKE4
0216  REF 136  LAST 1215  01,3032   4 4770 1           CS     ONE           EXIT IF SLEEPING JOB NOT FOUND.
0217  REF  14  LAST 1216  01,3033  54 064 1           TS     LOCCTR
0218  REF   4  LAST 1212  01,3034   1 5210 0           TCF    ENDFIND

0219  REF   7  LAST 1212  01,3035   4 0065 0  WAKETEST CS     NEWLOC
0220  REF  15  LAST 1216  01,3036  50 064 0           INDEX  LOCCTR
0221  REF  37  LAST 1215  01,3037   6 0164 1           AD     LOC
0222                       01,3040   0 0006 1           EXTEND
0223                       01,3041   1 3043 1           BZF    +2            IF MATCH.
0224  REF   2  LAST 1216  01,3042   1 3026 1           TCF    JOBWAKE3      EXAMINE NEXT CORE SET IF NO MATCH.

0225  REF  16  LAST 1216  01,3043  50 064 0           INDEX  LOCCTR        RE-COMPLEMENT PRIORITY TO SHOW JOB AWAKE
0226  REF  16  LAST 1216  01,3044   4 0167 0           CS     PRIORITY
0227  REF   9  LAST 1212  01,3045  54 063 0           TS     NEWPRIO
0228  REF  17  LAST 1216  01,3046  50 064 0           INDEX  LOCCTR
0229  REF  17  LAST 1216  01,3047  54 167 0           TS     PRIORITY

0230  REF   1              01,3050   4 4344 1           CS     FBANKMSK      MAKE UP THE 2CADR OF THE WAKE ADDRESS
0231  REF   8  LAST 1216  01,3051   7 0065 0           MASK   NEWLOC        USING THE CADR IN NEWLOC AND THE EBANK
0232  REF   3  LAST 1129  01,3052   6 4756 1           AD     2K            HALF OF BBANK SAVED IN BANKSET.
0233  REF   9  LAST 1216  01,3053  56 065 1           XCH    NEWLOC
0234  REF   2  LAST 1216  01,3054   7 4344 1           MASK   FBANKMSK
0235  REF  18  LAST 1216  01,3055  50 064 0           INDEX  LOCCTR
0236  REF  13  LAST 1215  01,3056   6 0165 0           AD     BANKSET
0237  REF  10  LAST 1216  01,3057  54 066 0           TS     NEWLOC +1

0238  REF  19  LAST 1216  01,3060  10 064 1           CCS    LOCCTR        SPECIAL TREATMENT IF THIS JOB WAS
0239  REF   3  LAST 1212  01,3061   1 2654 0           TCF    SETLOC        ALREADY IN THE RUN (0) POSITION.
0240  REF   1              01,3062   1 2644 1           TCF    SPECTEST
```

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P0241           PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

0243   REF  38  LAST 1216   01,3063  54 164 0  PRIOCH2  TS     LOC
0244   REF 242  LAST 1216   01,3064  3 4772 1           CAF    ZERO          SET FLAG TO TELL ENDJOB SCANNER IF THIS
0245   REF 112  LAST 1215   01,3065  54 130 1           TS     BUF           JOB IS STILL HIGHEST PRIORITY.
0246   REF   6  LAST 1213   01,3066  3 5021 1           CAF    LOW9
0247   REF  18  LAST 1216   01,3067  7 0167 0           MASK   PRIORITY
0248   REF  10  LAST 1216   01,3070  6 0063 1           AD     NEWPRIO
0249   REF  19  LAST 1217   01,3071  54 167 0           TS     PRIORITY
0250                        01,3072  4 0000 0           COM
0251   REF   1              01,3073  1 3000 0           TCF    JOBSLP2       AND TO EJSCAN.
```

P0252 RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

```
0254                                01,3074  0 0004 0  ENDJOB1  INHINT
0255   REF 243  LAST 1217          01,3075  4 4772 0            CS      ZERO
0256   REF 113  LAST 1217          01,3076  54 131 0            TS      BUF +1
0257   REF  20  LAST 1217          01,3077  56 167 1            XCH     PRIORITY
0258   REF   7  LAST 1217          01,3100  7 5021 0            MASK    LOW9
02581  REF 166  LAST 1213          01,3101  54 001 1            TS      L

02582  REF   2  LAST 1208          01,3102  4 5213 0            CS      FAKEPRET
025821 REF 167  LAST 1218          01,3103  6 0001 0            AD      L

02583                               01,3104  0 0006 1            EXTEND
02584  REF   2  LAST 1215          01,3105  6 3111 0            BZMF    EJSCAN          NOVAC ENDOFJOB

0259   REF 168  LAST 1218          01,3106  10 001 1            CCS     L
0260   REF 320  LAST 1211          01,3107  50 000 1            INDEX   A
0261                                01,3110  54 000 0            TS      0

0262   REF  21  LAST 1218          01,3111  10 203 1  EJSCAN    CCS     PRIORITY +120
0263   REF   1                     01,3112  0 3156 0            TC      EJ1
02635  REF   4  LAST  273            1361                      EBANK=  SELFRET
0264   REF   3  LAST  273          01,3113   66102 1  SELFBANK  BBCON   SELFCHK          CANNOT GET HERE
0265                                01,3114  1 3115 0            TCF     +1

0266   REF  22  LAST 1218          01,3115  10 217 1            CCS     PRIORITY +24D   EXAMINE EACH PRIORITY REGISTER TO FIND
0267   REF   2  LAST 1218          01,3116  0 3156 0            TC      EJ1             THE JOB OF HIGHEST ACTIVE PRIORITY.
0268                                01,3117   40201 0  OCT40201  OCT     40201           CANNOT GET HERE
0269                                01,3120  1 3121 1            TCF     +1

0270   REF  23  LAST 1218          01,3121  10 233 1            CCS     PRIORITY +36D
0271   REF   3  LAST 1218          01,3122  0 3156 0            TC      EJ1
0272   REF  24  LAST 1218          01,3123   67610 1  -CCSPR    -CCS    PRIORITY
0273                                01,3124  1 3125 0            TCF     +1

0274   REF  25  LAST 1218          01,3125  10 247 1            CCS     PRIORITY +48D
0275   REF   4  LAST 1218          01,3126  0 3156 0            TC      EJ1
0276   REF   1                     01,3127   03724 0  PHS2CADR  GENADR  PHSPART2        CANNOT GET HERE
0277                                01,3130  1 3131 0            TCF     +1

0278   REF  26  LAST 1218          01,3131  10 263 1            CCS     PRIORITY +60D
0279   REF   5  LAST 1218          01,3132  0 3156 0            TC      EJ1
0280   REF   1                     01,3133   03502 0  PRT2CADR  GENADR  GETPART2        CANNOT GET HERE
0281                                01,3134  1 3135 1            TCF     +1

0282   REF  27  LAST 1218          01,3135  10 277 1            CCS     PRIORITY +72D
0283   REF   6  LAST 1218          01,3136  0 3156 0            TC      EJ1
0284   REF   4  LAST  699          01,3137   05332 0  LGCLCADR  GENADR  LONGCALL        CANNOT GET HERE
0285                                01,3140  1 3141 1            TCF     +1
```

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P0286           EVALUATE THE RESULTS OF THE SCAN.

 0287   REF 114  LAST 1218   01,3141  10 131 0          CCS    BUF +1          SEE IF THERE ARE ANY ACTIVE JOBS WAITING
R02875  * WAITLIST TASK GETCADR *
 0288   REF   1              01,3142  53'301 0  GETCADR  DXCH   LONGCADR       CANNOT GET HERE
 0289   REF   4  LAST  640   01,3143  0 5214 0          TC     SUPDXCHZ
 0290                        01,3144  1 3146 0          TCF    +2
 0291   REF   2  LAST  196   01,3145  1 3171 1          TCF    DUMMYJOB
 0292   REF 115  LAST 1219   01,3146  10 130 1          CCS    BUF             BUF IS ZERO IF THIS IS A PRIOCHNG AND
 0293                        01,3147  1 3151 0          TCF    +2              CHANGED PRIORITY IS STILL HIGHEST.
 0294   REF   2  LAST 1213   01,3150  1 2755 0          TCF    ENDPRCHG -1

 0295   REF 321  LAST 1218   01,3151  50 000 1          INDEX  A               OTHERWISE, SET NEWJOB TO THE RELATIVE
 0296                        01,3152  2'7777 0          CAF    0 -1            ADDRESS OF THE NEW JOB'S CORE SET.
 0297   REF   1              01,3153  6 3123 1          AD     -CCSPR
 0298   REF  19  LAST 1215   01,3154  54 067 1          TS     NEWJOB
 0299   REF   4  LAST 1215   01,3155  1 2675 0          TCF    CHANJOB -2

 0300   REF 116  LAST 1219   01,3156  54 132 0  EJ1     TS     BUF +2
 0301   REF 117  LAST 1219   01,3157  6 0131 1          AD     BUF +1          - OLD HIGH PRIORITY.
 0302   REF 322  LAST 1219   01,3160  10 000 0          CCS    A
 0303   REF 118  LAST 1219   01,3161  4 0132 0          CS     BUF +2
 0304   REF   1              01,3162  1 3165 1          TCF    EJ2             NEW HIGH PRIORITY.
 0305                        01,3163  13 164 0          NOOP
 0306   REF   5  LAST 1210   01,3164  1 6710 0          TCF    Q+2

 0308   REF 119  LAST 1219   01,3165  54 131 0  EJ2     TS     BUF +1
 0309   REF 259  LAST 1210   01,3166  3 0002 0          CA     Q
 0310   REF 120  LAST 1219   01,3167  54 130 1          TS     BUF             FOR LOCATING CCS PRIORITY + X INSTR.
 0311   REF   6  LAST 1219   01,3170  1 6710 0          TCF    Q+2
```

P0314 IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF,
R0316 BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

```
 0318   REF   5  LAST 1218      1361                          EBANK= SELFRET          SELF-CHECK STORAGE IN EBANK.

 0319   REF 244  LAST 1218  01,3171  4 4772 0  DUMMYJOB  CS     ZERO
 0320   REF  20  LAST 1219  01,3172  54 067 1             TS     NEWJOB
 0321               ---     01,3173  0 0003 1  +2        RELINT
 0322   REF  58  LAST 1215  01,3174  4 4767 1             CS     TWO              TURN OFF THE ACTIVITY LIGHT.
 0323               ---     01,3175  0 0006 1             EXTEND
 0324   REF  25  LAST 1215  01,3176  03 011 1             WAND   DSALMOUT
 0328   REF  21  LAST 1220  01,3177  10 067 1  ADVAN     CCS    NEWJOB           IS A NEWJOB ACTIVE ?
 0329   REF   1             01,3200  1 3002 1             TCF    NUCHANG2         YES... ONE REQUIRING A CHANGE JOB.
 0330   REF  59  LAST 1220  01,3201  3 4767 0  +2        CAF    TWO              NEW JOB ALREADY IN POSITION FOR
 0331   REF   1             01,3202  1 3207 0             TCF    NUDIRECT         EXECUTION.

03317   REF   6  LAST 1220  01,3203  3 1361 1             CA     SELFRET
03318   REF 169  LAST 1218  01,3204  54 001 1             TS     L                PUT RETURN ADDRESS IN L.
 0332   REF   1             01,3205  3 3113 1             CAF    SELFBANK
 0333   REF   5  LAST 1219  01,3206  1 5215 0             TCF    SUPDXCHZ + 1      AND DISPATCH JOB.

 0335               ---     01,3207  0 0006 1  NUDIRECT  EXTEND                   TURN THE GREEN LIGHT BACK ON.
 0336   REF  26  LAST 1220  01,3210  05 011 1             WOR    DSALMOUT
 0337   REF  39  LAST 1217  01,3211  52 165 1             DXCH   LOC              JOBS STARTED IN THIS FASHION MUST BE
03372   REF   6  LAST 1220  01,3212  1 5214 1             TCF    SUPDXCHZ

 0337   REF   2  LAST 1208      4000                      SETLOC EXECF2
 0340               ---         5214                      BANK ??

 0341   REF   2 LAST 1208 TO 1211:    60    60*          COUNT* $$/EXEC
R033791 SUPDXCHZ - ROUTINE TO TRANSFER TO SUPERBANK.
R033792 CALLING SEQUENCE
A033793                                                   TCF    SUPDXCHZ         WITH 2CADR OF DESIRED LOCATION IN A + L.

 0342   REF 170  LAST 1220      5214  56 001 0  SUPDXCHZ XCH    L                BASIC.
 0343               ---         5215  0 0006 1  +1        EXTEND
 0344   REF  15  LAST 1215      5216  01 007 1             WRITE  SUPERBNK
 0345   REF  22  LAST 1215      5217  54 006 0             TS     BBANK
 0346   REF 171  LAST 1220      5220  0 0001 0             TC     L

 0347                           5221   77677 1  NEG100    OCT    77677
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R0001   PROGRAM DESCRIPTION                                          DATE - 10 OCTOBER 1966
R0003   MOD NO - 2                                                   LOG SECTION - WAITLIST
R0005   MOD BY - MILLER   (DTMAX INCREASED TO 162.5 SEC)            ASSEMBLY SUNBURST REV 5
R00072  MOD 3 BY KERNAN  (INHINT INSERTED AT WAITLIST)  2/28/68 SKIPPER REV 4

R00073  MOD 48Y KERNAN (TWIDDLE IN 54)  3/28/68 SKIPPER REV 13.
R00079

R0008   FUNCTIONAL DESCRIPTION-
R0009           PART OF A SECTION OF PROGRAMS,-WAITLIST, TASKOVER, T3RUPT, USED  TO CALL A PROGRAM, (CALLED A TASK),
R0011      WHICH IS TO BEGIN IN C(A) CENTISECONDS.  WAITLIST UPDATES TIME3, LST1 AND LST2. THE MEANING OF THESE LISTS
R0013      FOLLOW.

R0014                   C(TIME3)  = 16384 -(T1-T) CENTISECONDS, (T=PRESENT TIME, T1-TIME FOR TASK1)
R0016

R0017                              C(LST1)     = -(T2-T1)+1
R0018                              C(LST1 +1)  = -(T3-T2)+1
R0019                              C(LST1 +2)  = -(T4-T3)+1
R0020                                          .
R0021                                          .
R0022                              C(LST1 +6)  = -(T8-T7)+1
R0023                              C(LST1 +7)  = -(T9-T8)+1

R0024                              C(LST2)     = 2CADR OF TASK1
R0025                              C(LST2 +2)  = 2CADR OF TASK2
R0026                                          .
R0027                                          .
R0028                              C(LST2 +14) = 2CADR OF TASK8
R0029                              C(LST2 +16) = 2CADR OF TASK9

R0030   WARNINGS-
R0031   --------
R0032                1) 1 <= C(A) <= 162500 (1 CENTISECOND TO 162.5 SEC)
R0033                2) 9 TASKS MAXIMUM
R0034                3) TASKS CALLED UNDER INTERRUPT INHIBITED
R0035                4) TASKS END BY TC TASKOVER

R0036   CALLING SEQUENCE-

R0037                L-1     CA      DELTAT    (TIME IN CENTISECONDS TO TASK START)
R0039                L       TC      WAITLIST
R0040                L+1     2CADR   DESIRED TASK
R0041                L+2     (MINOR OF 2CADR)
R0042                L+3     RELINT            (RETURNS HERE)

R00421  TWIDDLE-
R00422  -------
R00423               TWIDDLE IS FOR USE WHEN THE TASK BEING SET UP IS IN THE SAME EBANK AND FBANK AS THE USER.   IN
R00425               SUCH CASES, IT IMPROVES UPON WAITLIST BY ELIMINATING THE NEED FOR THE BBCON HALF OF THE 2CADR,
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R0427                SAVING A WORD.  TWIDDLE IS LIKE WAITLIST IN EVERY RESPECT EXCEPT CALLING SEQUENCE, TO WIT-

R0043                L-1     CA      DELTAT
R0431                L       TC      TWIDDLE
R0432                L+1     ADRES   DESIRED TASK
R0433                L+2     RELINT                  (RETURNS HERE)

R0439  NORMAL EXIT MODES-

R0044                AT L+3 OF CALLING SEQUENCE

R0045  ALARM OR ABORT EXIT MODES-

R0046                TC      ABORT
R0047                OCT     1203    (WAITLIST OVERFLOW - TOO MANY TASKS)

R0048  ERASABLE INITIALIZATION REQUIRED-

R0049                ACCOMPLISHED BY FRESH START,--LST2,...,  LST2 +16 =ENDTASK
R0050                                          LST1,...,  LST1 +7  =NEG1/2

R0051  OUTPUT--

R0052                LST1 AND LST2 UPDATED WITH NEW TASK AND ASSOCIATED TIME.
R0053  DEBRIS-

R0054                CENTRALS- A,Q,L
R0055                OTHER   - WAITEXIT, WAITADR, WAITTEMP, WAITBANK
R0056  DETAILED ANALYSIS OF TIMING-

R0057           CONTROL WILL NOT BE RETURNED TO THE SPECIFIED ADDRESS (2CADR)   IN EXACTLY DELTA T CENTISECONDS.
R0059       THE APPROXIMATE TIME MAY BE CALCULATED AS FOLLOWS

R0060                LET TO = THE TIME OF THE TC WAITLIST
R0061                LET TS = TO +147U + COUNTER INCREMENTS (SET UP TIME)
R0062                LET X  = TS -(100TS)/100  (VARIANCE FROM COUNTERS)
R0063                LET Y  = LENGTH OF TIME OF INHIBIT INTERRUPT AFTER T3RUPT
R0064                LET Z  = LENGTH OF TIME TO PROCESS TASKS WHICH ARE DUE THIS T3RUPT BUT DISPATCHED EARLIER.
R0066       (Z=0, USUALLY)
R0067                LET DELTD = THE ACTUAL TIME TAKEN TO GIVE CONTROL TO 2CADR
R0068              THEN   DELTD = TS+DELTA T -X +Y +Z +1.05MS* +COUNTERS*
R0069       *-THE TIME TAKEN BY WAITLIST ITSELF AND THE COUNTER TICKING DURING THIS WAITLIST TIME.
R0071

R0072           IN SHORT, THE ACTUAL TIME TO RETURN CONTROL TO A 2CADR IS AUGMENTED BY THE TIME TO SET UP THE TASK:S
R0074       INTERRUPT, ALL COUNTERS TICKING, THE T3RUPT PROCESSING TIME, THE WAITLIST PROCESSING TIME AND THE POSSIBILITY
R0076       OF OTHER TASKS INHIBITING THE INTERRUPT.


 0077  REF   1                 4000                    SETLOC WAITF2
```

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```
00775                          5222                          BANK

0078   REF  13  LAST  203  E3,1400                          EBANK= LST1          TASK  LISTS IN SWITCHED E BANK.

0079   REF   1                                               COUNT* $$/WAIT
00791  REF 137  LAST 1216     5222  3 4770 0  TWIDBIT1 CAF   ONE
00795                         5223  0 0004 0  TWIDDLE  INHINT
0080   REF 172  LAST 1220     5224  54 001 1            TS    L              SAVE DELAY TIME IN L
0081   REF  34  LAST 1185     5225  3 4750 1            CA    POSMAX
0082   REF 260  LAST 1219     5226  26 002 1            ADS   Q              CREATING OVERFLOW AND Q-1 IN Q
0083   REF  23  LAST 1220     5227  3 0006 1            CA    BBANK
00832                         5230  0 0006 1            EXTEND
00834  REF  16  LAST 1220     5231  04 007 1            ROR   SUPERBNK
0084   REF 173  LAST 1223     5232  56 001 0            XCH   L

00849                         5233  0 0004 0  WAITLIST INHINT
00849S                        5234  0 0006 1            EXTEND
00849G REF   1                5235  6 5247 0            BZMF  WATLSTO-
0085   REF 261  LAST 1223     5236  56 002 0            XCH   Q              SAVE DELTA T IN Q AND RETURN IN
0086   REF   1                5237  54 061 1            TS    WAITEXIT       WAITEXIT.
0087                          5240  0 0006 1            EXTEND
0088   REF   2  LAST 1223     5241  5 0061 0            INDEX WAITEXIT       IF TWIDDLING, THE TS SKIPS TO HERE
0089                          5242  3 0001 0            DCA   0                PICK UP 2CADR OF TASK.
0090   REF   1                5243  54 063 0  -1       TS    WAITADR        BBCON WILL REMAIN IN L
0091   REF   2  LAST  140     5244  3 5254 1  DLY2     CAF   WAIT8B         ENTRY FROM FIXDELAY AND VARDELAY.
0092   REF  24  LAST 1223     5245  56 006 1            XCH   BBANK
0093   REF   1                5246  1 3213 0            TCF   WAIT2

00935  REF   6  LAST 1184     5247  0 5726 1  WATLSTO- TC    POODOO
00936                         5250   21204 1            OCT   21204

R0094                  RETURN TO CALLER AFTER TASK INSERTION:

0095   REF   3  LAST 1223     5251  52 062 1  LVWTLIST DXCH  WAITEXIT
0096   REF  60  LAST 1220     5252  6 4767 0            AD    TWO
0097                          5253  52 006 0            DTCB

0099   REF  14  LAST 1223  E3,1400                       EBANK= LST1
0100   REF   2  LAST 1223     5254    02063 0  WAITBB   BBCON  WAIT2

R0101                  RETURN TO CALLER +2 AFTER WAITING DT SPECIFIED AT CALLER +1.

0102   REF 262  LAST 1223     5255  50 002 0  FIXDELAY INDEX  Q              BOTH ROUTINES MUST BE CALLED UNDER
0103                          5256  3 0000 1            CAF   .              WAITLIST CONTROL AND TERMINATE THE TASK
0104   REF 263  LAST 1223     5257  24 002 0            INCR  Q              IN WHICH THEY WERE CALLED.

R0105                  RETURN TO CALLER +1 AFTER WAITING THE DT AS ARRIVING IN A.

0106                          5260  0 0006 1  VARDELAY EXTEND
01064  REF   2  LAST 1223     5261  6 5247 0            BZMF  WATLSTO-
```

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```
01066  REF 264  LAST 1223      5262  56 002 0              XCH     Q
0107   REF   2  LAST 1223      5263  54 063 0              TS      WAITADR
0108   REF  25  LAST 1223      5264  3 0006 1              CA      BBANK           BBANK IS SAVED DURING DELAY.
0109                           5265  0 0006 1              EXTEND
0110   REF  17  LAST 1223      5266  04 007 1              ROR     SUPERBNK        ADD SBANK TO BBCON.
0111   REF 174  LAST 1223      5267  54 001 1              TS      L
0112   REF   1                 5270  3 5273 1              CAF     DELAYEX
0113   REF   4  LAST 1223      5271  54 061 1              TS      WAITEXIT        GO TO TASKOVER AFTER TASK ENTRY.
0114   REF   1                 5272  1 5244 1              TCF     DLY2

0115   REF  54  LAST 1089      5273  1 5312 0  DELAYEX     TCF     TASKOVER -2     RETURNS TO TASKOVER
```

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```
R0116   ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADRES ALONE.

 0118   REF  15  LAST 1223   E3,1400                          EBANK=  LST1
 0119   REF   1                5274   72501 0  ENDTASK -2CADR  SVCT3
 0119   REF   1                5275   73714 1

 0120   REF  25  LAST 1067     5276  3 0076 0  SVCT3    CA      FLAGWRD2
 0121   REF   3  LAST  827     5277  7 4752 1           MASK    DRFTBIT
 0122                          5300  0 0006 1           EXTEND
 0123   REF  55  LAST 1224     5301  1 5314 0           BZF     TASKOVER
 01231  REF   2  LAST  204     5302  11'335 1           CCS     IMUCADR         DON'T DO NBDONLY IF SOMEONE ELSE IS IN
 01232  REF   1                5303  1 7703 0           TCF     SVCT3X
 01233                          5304  1 5307 1           TCF     +3
 01234  REF   2  LAST 1225     5305  1 7703 0           TCF     SVCT3X
 01235  REF   3  LAST 1225     5306  1 7703 0           TCF     SVCT3X
 0124   REF   1                5307  3 7657 1     +3    CAF     PRIO35          COMPENSATE FOR NBD COEFFICIENTS ONLY.
 0125   REF  21  LAST 1013     5310  0 5121 0  NOVACADR TC      NOVAC           ENABLE EVERY 81.93 SECONDS (=GENADR)
 0126   REF   6  LAST  826   E3,1460                          EBANK=  NBDX
 0127   REF   1                5311   03561 0             2CADR   NBDONLY
 0127   REF   1                5312   14063 1
 01275  REF  56  LAST 1225     5313  0 5314 1  TSKOVCDR TC      TASKOVER        (=GENADR)
 01276  REF   3  LAST 1202     6000                       SETLOC  FFTAG6
 01277                          7703                       BANK

 01278  REF   1                                           COUNT*  $$/WAIT
 0128   REF  10  LAST  831     7703  0 5255 0  SVCT3X   TC      FIXDELAY        DELAY MAX OF 2 TIMES FOR IMU ZERO
 01282                          7704   00764 1  DEC500   DEC     500             MUST COME AFTER SVCT3X
 01285  REF   2  LAST 1225     7705  0 5276 1           TC      SVCT3           CHECK DRIFT FLAG AGAIN
```

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```
P0129                BEGIN TASK INSERTION.

 0130   REF   2  LAST 1211   01,2000                    SETLOC EXECB1
 01305                       01,3213                    BANK

 0131   REF   1                                         COUNT* $$/WAIT
 0132   REF   1              01,3213  54 062 1  WAIT2   TS     WAITBANK        BBANK OF CALLING PROGRAM.
 0133   REF   2  LAST  202   01,3214  4 0026 1          CS     TIME3
 0134   REF  30  LAST 1158   01,3215  6 4761 0          AD     BIT8            BIT 8 = OCT 200
 0135   REF 323  LAST 1219   01,3216  10 000 0          CCS    A               TEST 200 - C(TIME3).  IF POSITIVE,
A0136                       IT MEANS THAT TIME3 OVERFLOW HAS OCCURRED PRIOR TO CS  TIME3 AND THAT
A0137                       C(TIME3) = T - T1, INSTEAD OF 1.0 - (T1 - T).  THE FOLLOWING FOUR
A0138                       ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.

 0139   REF   2  LAST 1204   01,3217  6 6056 1          AD     OCT40001        OVERFLOW HAS OCCURRED.  SET C(A) =
 0140   REF 324  LAST 1226   01,3220  4 0000 0          CS     A               T - T1 + 1.0 - 201

R0141   NORMAL CASE (C(A) NNZ) YIELDS SAME C(A):  -( -(1.0-(T1-T)) + 200) - 1

 0142   REF   1              01,3221  6 3117 0          AD     OCT40201
 0143   REF 265  LAST 1224   01,3222  6 0002 0          AD     Q               RESULT = TD - T1 + 1.

 0144   REF 325  LAST 1226   01,3223  10 000 0          CCS    A               TEST TD - T1 + 1

 0145   REF  16  LAST 1225   01,3224  6 1400 1          AD     LST1            IF TD - T1 POS, GO TO WTLST5 WITH
 0146   REF   1              01,3225  1 3267 0          TCF    WTLST5          C(A) = (TD - T1) + C(LST1) = TD-T2+1

 0147                        01,3226  13 227 1          NOOP
 0148   REF 266  LAST 1226   01,3227  4 0002 1          CS     Q

R0149   NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -1,
R0150   SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1 .  (G/E
R0151   SYMBOL MEANS GREATER THAN OR EQUAL TO).  THUS THERE NEED BE NO CON-
R0152   CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.

 0153   REF   8  LAST 1087   01,3230  6 4753 1          AD     POS1/2          WHEN TD IS NEXT, FORM QUANTITY
 0154   REF   9  LAST 1226   01,3231  6 4753 1          AD     POS1/2            1.0 - DELTA T = 1.0 - (TD - T)
 0155   REF   3  LAST 1226   01,3232  56 026 0          XCH    TIME3
 0156   REF  12  LAST 1148   01,3233  6 4752 0          AD     NEGMAX
 0157   REF 267  LAST 1226   01,3234  6 0002 0          AD     Q               1.0 - DELTAT T NOW COMPLETE.
 0158                        01,3235  0 0006 1          EXTEND                 ZERO INDEX Q.
 0159                        01,3236  22 007 0          QXCH   7               (ZQ)
```

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```
0160   REF  17  LAST 1226   01,3237  57'400 1  WTLST4  XCH    LST1
0161   REF  18  LAST 1227   01,3240  57'401 0          XCH    LST1 +1
0162   REF  19  LAST 1227   01,3241  57'402 0          XCH    LST1 +2
0163   REF  20  LAST 1227   01,3242  57'403 1          XCH    LST1 +3
0164   REF  21  LAST 1227   01,3243  57'404 0          XCH    LST1 +4
0165   REF  22  LAST 1227   01,3244  57'405 1          XCH    LST1 +5
0166   REF  23  LAST 1227   01,3245  57'406 1          XCH    LST1 +6
0167   REF  24  LAST 1227   01,3246  57'407 0          XCH    LST1 +7

0168   REF   3  LAST 1224   01,3247  3 0063 1          CA     WAITADR     (MINOR PART OF TASK CADR HAS BEEN IN L.)
0169   REF 268  LAST 1226   01,3250  50 002 0          INDEX  Q
0170                        01,3251  1 3252 0          TCF    +1

0171   REF  19  LAST  203   01,3252  53'411 0          DXCH   LST2
0172   REF  20  LAST 1227   01,3253  53'413 1          DXCH   LST2 +2
0173   REF  21  LAST 1227   01,3254  53'415 1          DXCH   LST2 +4
0174   REF  22  LAST 1227   01,3255  53'417 0          DXCH   LST2 +6
0175   REF  23  LAST 1227   01,3256  53'421 0          DXCH   LST2 +8D
0176   REF  24  LAST 1227   01,3257  53'423 1          DXCH   LST2 +10D    AT END, CHECK THAT C(LST2+10) IS STD
0177   REF  25  LAST 1227   01,3260  53'425 1          DXCH   LST2 +12D
0178   REF  26  LAST 1227   01,3261  53'427 0          DXCH   LST2 +14D
0179   REF  27  LAST 1227   01,3262  53'431 1          DXCH   LST2 +16D
0180   REF   3  LAST  203   01,3263  6 5274 0          AD     ENDTASK      END ITEM, AS CHECK FOR EXCEEDING
AG181                                                                     THE LENGTH OF THE LIST.
0182                        01,3264  0 0006 1          EXTEND               DUMMY TASK ADRES SHOULD BE IN FIXED-
0183   REF   1              01,3265  1 5251 0          BZF    LVWTLIST      FIXED SO ITS ADRES ALONE DISTINGUISHES
0184   REF   1              01,3266  1 3342 0          TCF    WTABORT       IT.
```

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```
0185  REF 326  LAST 1226  01,3267  10 000 0  WTLST5  CCS   A          TEST  TD - T2 + 1
0186  REF  25  LAST 1227  01,3270  6 1401 0          AD    LST1 +1
0187                      01,3271  1 3275 0          TCF   +4
0188  REF 138  LAST 1223  01,3272  6 4770 0          AD    ONE
0189  REF   1             01,3273  0 3347 1          TC    WTLST2
0190                      01,3274   00001 0          OCT   1

0191  REF 327  LAST 1228  01,3275  10 000 0  +4      CCS   A          TEST  TD - T3 + 1
0192  REF  26  LAST 1228  01,3276  6 1402 0          AD    LST1 +2
0193                      01,3277  1 3303 0          TCF   +4
0194  REF 139  LAST 1228  01,3300  6 4770 0          AD    ONE
0195  REF   2  LAST 1228  01,3301  0 3347 1          TC    WTLST2
0196                      01,3302   00002 0          OCT   2

0197  REF 328  LAST 1228  01,3303  10 000 0  +4      CCS   A          TEST  TD - T4 + 1
0198  REF  27  LAST 1228  01,3304  6 1403 1          AD    LST1 +3
0199                      01,3305  1 3311 0          TCF   +4
0200  REF 140  LAST 1228  01,3306  6 4770 0          AD    ONE
0201  REF   3  LAST 1228  01,3307  0 3347 1          TC    WTLST2
0202                      01,3310   00003 1          OCT   3

0203  REF 329  LAST 1228  01,3311  10 000 0  +4      CCS   A          TEST  TD - T5 + 1
0204  REF  28  LAST 1228  01,3312  6 1404 0          AD    LST1 +4
0205                      01,3313  1 3317 0          TCF   +4
0206  REF 141  LAST 1228  01,3314  6 4770 0          AD    ONE
0207  REF   4  LAST 1228  01,3315  0 3347 1          TC    WTLST2
0208                      01,3316   00004 0          OCT   4

0209  REF 330  LAST 1228  01,3317  10 000 0  +4      CCS   A          TEST  TD - T6 + 1
0210  REF  29  LAST 1228  01,3320  6 1405 1          AD    LST1 +5
0211                      01,3321  1 3325 1          TCF   +4
0212  REF 142  LAST 1228  01,3322  6 4770 0          AD    ONE
0213  REF   5  LAST 1228  01,3323  0 3347 1          TC    WTLST2
0214                      01,3324   00005 1          OCT   5

0215  REF 331  LAST 1228  01,3325  10 000 0  +4      CCS   A          TEST TD - T7 + 1
0216  REF  30  LAST 1228  01,3326  6 1406 1          AD    LST1 +6
0217                      01,3327  1 3333 0          TCF   +4
0218  REF 143  LAST 1228  01,3330  6 4770 0          AD    ONE
0219  REF   6  LAST 1228  01,3331  0 3347 1          TC    WTLST2
0220                      01,3332   00006 1          OCT   6
```

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```
0221   REF 332  LAST 1228   01,3333  10 000 0   +4        CCS     A
0222   REF  31  LAST 1228   01,3334  6 1407 0             AD      LST1 +7
0223                        01,3335  1 3341 0             TCF     +4
0224   REF 144  LAST 1228   01,3336  6 4770 0             AD      ONE
0225   REF   7  LAST 1228   01,3337  0 3347 1             TC      WTLST2
0226                        01,3340   00007 0             OCT     7

0227   REF 333  LAST 1229   01,3341  10 000 0   +4        CCS     A
0228   REF   4  LAST 1212   01,3342  0 7706 1   WTABORT   TC      BAILOUT     NO ROOM IN THE INN.
0229                        01,3343   31203 1             OCT     31203

0230   REF 145  LAST 1229   01,3344  6 4770 0             AD      ONE
0231   REF   8  LAST 1229   01,3345  0 3347 1             TC      WTLST2
0232                        01,3346   00010 0             OCT     10
```

```
RC234   THE ENTRY TO WTLST2 JUST PRECEDING OCT  N  IS FOR T  LE TD LE T   -1.
RC235                                               N          N+1

RC236   (LE MEANS LESS THAN OR EQUAL TO).  AT ENTRY, C(A) = -(TD - T   + 1)
RC237                                                          N+1

RC238   THE LST1 ENTRY -(T   - T +1) IS TO BE REPLACED BY -(TD - T + 1), AND
RC239                   N+1   N                              N

RC240   THE ENTRY -(T   - TD + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.
RC241               N+1

 0242   REF   1              01,3347  54 064 1  WTLST2  TS      WAITTEMP          C(A) = -(TD - T   + 1)
 0243   REF 269  LAST 1227   01,3350  50 002 0           INDEX   Q
 0244                        01,3351  3 0000 1           CAF     0
 0245   REF 270  LAST 1230   01,3352  54 002 1           TS      Q                 INDEX VALUE INTO Q.

 0246   REF 146  LAST 1229   01,3353  3 4770 0           CAF     ONE
 0247   REF   2  LAST 1230   01,3354  6 0064 0           AD      WAITTEMP
 0248   REF 271  LAST 1230   01,3355  50 002 0           INDEX   Q                 C(A) = -(TD - T ) + 1.
 0249   REF  32  LAST 1229   01,3356  27'377 1           ADS     LST1 -1                                N

 0250   REF   3  LAST 1230   01,3357  4 0064 1           CS      WAITTEMP
 0251   REF 272  LAST 1230   01,3360  50 002 0           INDEX   Q
 0252   REF   1              01,3361  1 3237 0           TCF     WTLST4

RC253   C(TIME3) = 1.0 - (T1 - T)

RC254   C(LST1   ) = - (T2 - T1) + 1
RC255   C(LST1+1) = - (T3 - T2) + 1
RC256   C(LST1+2) = - (T4 - T3) + 1
RC257   C(LST1+3) = - (T5 - T4) + 1
RC258   C(LST1+4) = - (T6 - T5) + 1

RC259   C(LST2   ) = 2CADR  TASK1
RC260   C(LST2+2 ) = 2CADR  TASK2
RC261   C(LST2+4 ) = 2CADR  TASK3
RC262   C(LST2+6 ) = 2CADR  TASK4
RC263   C(LST2+8 ) = 2CADR  TASK5
RC264   C(LST2+10) = 2CADR  TASK6
```

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```
P0265           ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

 0266                                01,3362  0 0006 1  T3RUPT    EXTEND
 0267  REF  18  LAST 1224           01,3363  04 007 1            ROR     SUPERBNK        READ CURRENT SUPERBANK VALUE AND
 0268  REF  22  LAST 1096           01,3364  54 016 1            TS      BANKRUPT        SAVE WITH E AND F BANK VALUES.
 0269                                01,3365  0 0006 1            EXTEND
 0270  REF  18  LAST 1096           01,3366  22 012 1            QXCH    QRUPT

 0271  REF  10  LAST 1203           01,3367  3 4751 0  T3RUPT2   CAF     NEG1/2          DISPATCH WAITLIST TASK.
 0272  REF  33  LAST 1230           01,3370  57'407 0            XCH     LST1 +7
 0273  REF  34  LAST 1231           01,3371  57'406 1            XCH     LST1 +6
 0274  REF  35  LAST 1231           01,3372  57'405 1            XCH     LST1 +5
 0275  REF  36  LAST 1231           01,3373  57'404 0            XCH     LST1 +4         1. MOVE UP LST1 CONTENTS, ENTERING
 0276  REF  37  LAST 1231           01,3374  57'403 1            XCH     LST1 +3             A VALUE OF 1/2 +1 AT THE BOTTOM
 0277  REF  38  LAST 1231           01,3375  57'402 0            XCH     LST1 +2             FOR T6-T5, CORRESPONDING TO THE
 0278  REF  39  LAST 1231           01,3376  57'401 0            XCH     LST1 +1             INTERVAL 81.91 SEC FOR ENDTASK.
 0279  REF  40  LAST 1231           01,3377  57'400 1            XCH     LST1
 0280  REF  35  LAST 1223           01,3400  6 4750 1            AD      POSMAX          2. SET T3 = 1.0 - T2 -T USING LIST 1.
 0281  REF   4  LAST 1226           01,3401  26 026 1            ADS     TIME3           SO T3 WONT TICK DURING UPDATE.
 0282  REF   2  LAST   81           01,3402  55'137 1            TS      RUPTAGN
 0283  REF 245  LAST 1220           01,3403  4 4772 0            CS      ZERO
 0284  REF   3  LAST 1231           01,3404  55'137 1            TS      RUPTAGN         SETS RUPTAGN TO +1 ON OVERFLOW.

 0285                                01,3405  0 0006 1            EXTEND                  DISPATCH TASK.
 0286  REF   4  LAST 1227           01,3406  4 5275 0            DCS     ENDTASK
 0287  REF  28  LAST 1227           01,3407  53'431 1            DXCH    LST2 +16D
 0288  REF  29  LAST 1231           01,3410  53'427 0            DXCH    LST2 +14D
 0289  REF  30  LAST 1231           01,3411  53'425 1            DXCH    LST2 +12D
 0290  REF  31  LAST 1231           01,3412  53'423 1            DXCH    LST2 +10D
 0291  REF  32  LAST 1231           01,3413  53'421 0            DXCH    LST2 +8D
 0292  REF  33  LAST 1231           01,3414  53'417 0            DXCH    LST2 +6
 0293  REF  34  LAST 1231           01,3415  53'415 1            DXCH    LST2 +4
 0294  REF  35  LAST 1231           01,3416  53'413 1            DXCH    LST2 +2
 0295  REF  36  LAST 1231           01,3417  53'411 0            DXCH    LST2

 0296  REF 175  LAST 1224           01,3420  56 001 0            XCH     L
 0297                                01,3421  0 0006 1            EXTEND
 0298  REF  19  LAST 1231           01,3422  01 007 1            WRITE   SUPERBNK        SET SUPERBANK FROM BBCON OF 2CADR
 0299  REF 176  LAST 1231           01,3423  56 001 0            XCH     L               RESTORE TO L FOR DXCH Z.
 0300                                01,3424  52 006 0            DTCB
```

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```
P0301           RETURN, AFTER EXECUTION OF T3 OVERFLOW TASK:

 0302   REF   2 LAST 1222      4000                    SETLOC  WAITFZ
 03025                        5314                    BANK

 0303   REF   2 LAST 1223 TO 1225:    58    58*       COUNT*  $$/WAIT
 0304   REF   4  LAST 1231     5314  11'137 1  TASKOVER CCS     RUPTAGN         IF +1 RETURN TO T3RUPT, IF -0 RESUME.
 0305   REF   3  LAST 1223     5315  3 5254 1           CAF     WAIT8B
 0306   REF  26  LAST 1224     5316  54 006 0           TS      BBANK
 0307   REF   1                5317  1 3367 1           TCF     T3RUPT2         DISPATCH NEXT TASK IF IT WAS DUE.

 0308   REF  23  LAST 1231     5320  3 0016 0  SUPERRSM CA      BANKRUPT
 0309                         5321  0 0006 1           EXTEND
 0310   REF  20  LAST 1231     5322  01 007 1           WRITE   SUPERBNK        RESTORE SUPERBANK BEFORE RESUME IS DONE

 0311                         5323  0 0006 1  RESUME   EXTEND
 0312   REF  19  LAST 1231     5324  22 012 1           QXCH    QRUPT
 0313   REF  24  LAST 1232     5325  3 0016 0  NOQRSM   CA      BANKRUPT
 0314   REF  27  LAST 1232     5326  56 006 1    +1     XCH     BBANK
 0315   REF  10  LAST  139     5327  52 011 0  NOQBRSM  DXCH    ARUPT
 03155                        5330  0 0003 1           RELINT
 0316                         5331  5 0017 1           RESUME
```

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```
P0317   LONGCALL

R0318   PROGRAM DESCRIPTION                                  DATE- 17 MARCH 1967
R0319   PROGRAM WRITTEN BY W.H. VANDEVER                     LOG SECTION WAITLIST
R0320   MOD BY- R. MELANSON TO ADD DOCUMENTATION             ASSEMBLY SUNDISK REV. 100

R0321   FUNCTIONAL DESCRIPTION-
R0322   LONGCALL IS CALLED WITH THE DELTA TIME ARRIVING IN A,L SCALED AS TIME2,TIME1 WITH THE 2CADR OF THE TASK
R0324   IMMEDIATELY FOLLOWING THE TC LONGCALL.  FOR EXAMPLE, IT MIGHT BE DONE AS FOLLOWS WHERE TIMELOC IS THE NAME OF
R0326   A DP REGISTER CONTAINING A DELTA TIME AND WHERE TASKTODO IS THE NAME OF THE LOCATION AT WHICH LONGCALL IS TO
R0328   START

R0329   CALLING SEQUENCE-
A0330                                       EXTEND
A0331                                       DCA     TIMELOC
A0332                                       TC      LONGCALL
A0333                                       2CADR   TASKTODO

R0334   NORMAL EXIT MODE-
R0335      1). TC    WAITLIST
R0336      2). DTCB  (TO L+3 OF CALLING ROUTINE 1ST PASS THRU LONGCYCL)
R0337      3). DTCB  (TO TASKOVER ON SUBSEQUENT PASSES THRU LONGCYCL)

R0338   ALARM OR ABORT EXIT MODE-
R0339      NONE

R0340   OUTPUT-
R0341      LONGTIME AND LONGTIME+1 = DELTA TIME
R0342      LONGEXIT AND LONGEXIT+1 = RETURN 2CADR
R0343      LONGCADR AND LONGCADR+1 = TASK 2CADR
R0344      A = SINGLE PRECISION TIME FOR WAITLIST

R0345   ERASABLE INITIALIZATION-
R0346      A = MOST SIGNIFICANT PART OF DELTA TIME
R0347      L = LEAST SIGNIFICANT PART OF DELTA TIME
R0348      Q = ADDRESS OF 2CADR TASK VALUE

R0349   DEBRIS-
R0350      A,Q,L
R0351      LONGCADR AND LONGCADR+1
R0352      LONGEXIT AND LONGEXIT+1
R0353      LONGTIME AND LONGTIME+1

R0354   *** THE FOLLOWING IS TO BE IN FIXED-FIXED AND UNSWITCHED ERRASIBLE ***

 03545  REF   3  LAST 1232      4000                    SETLOC WAITF2
 0355                           5332                    BANK

 03555  REF   3 LAST 1232 TO 1233:    14    72*        COUNT* $$/WAIT
 0356   REF  41  LAST 1231   E3,1400                    EBANK= LST1
```

L WAITLIST USER'S PAGE NO. 14 E? S3

```
0357   REF   1                    5332  53'305 1  LONGCALL DXCH   LONGTIME        OBTAIN THE DELTA TIME

0358                              5333  0 0006 1            EXTEND                  OBTAIN THE 2CADR
0359   REF 273  LAST 1230         5334  5 0002 0            NDX     Q
0360                              5335  3 0001 0            DCA     0
0361   REF   2  LAST 1219         5336  53'301 0            DXCH    LONGCADR

0362                              5337  0 0006 1            EXTEND                  NOW GO TO THE APPROPRIATE SWITCHED BANK
0363   REF   1                    5340  3 5343 0            DCA     LGCL2CDR        FOR THE REST OF LONGCALL
0364                              5341  52 006 0            DTCB

0365   REF  42  LAST 1233  E3,1400                          EBANK=  LST1
0366   REF   1                    5342   03425 1  LGCL2CDR 2CADR   LNGCALL2
0366   REF   1                    5343   02063 0

R0367  *** THE FOLLOWING MAY BE IN A SWITCHED BANK, INCLUDING ITS ERASABLE ***

0368   REF   3  LAST 1226  01,2000                          SETLOC  EXECB1
03685                       01,3425                          BANK

0369   REF   2 LAST 1226 TO 1232:   138   138*              COUNT*  $$/WAIT
0370   REF   1                    01,3425  23'435 1  LNGCALL2 LXCH   LONGEXIT +1   SAVE THE CORRECT BB FOR RETURN
0371   REF  61  LAST 1223         01,3426  3 4767 0            CA      TWO             OBTAIN THE RETURN ADDRESS
0372   REF 274  LAST 1234         01,3427  26 002 1            ADS     Q
0373   REF   2  LAST 1234         01,3430  55'434 1            TS      LONGEXIT

03731  REF   2  LAST 1234         01,3431  11'304 0  LGCLNGTM CCS    LONGTIME        TEST FOR NEG. TIME
03732  REF   1                    01,3432  1 3440 0            TCF     LONGCYCL        HI-ORDER POS...OK
03733                             01,3433  1 3435 1            TCF     +2                      ZERO..TEST LO-ORDER
03734  REF   3  LAST 1223         01,3434  1 5247 1            TCF     WATLST0-                NEG...POODOO
03735  REF   3  LAST 1234         01,3435  3 1305 0            CA      LONGTIME +1             ZERO..TEST LO-ORDER
03736                             01,3436  0 0006 1            EXTEND
03737  REF   4  LAST 1234         01,3437  6 5247 0            BZMF    WATLST0-        LO-ORDER ZERO/NEG...POODOO

R0374                 *** WAITLIST TASK LONGCYCL ***
0375                              01,3440  0 0006 1  LONGCYCL EXTEND                 CAN WE SUCCESFULLY TAKE ABOUT 1.25
0376   REF   1                    01,3441  4 3452 0            DCS     DPBIT14         MINUTES OFF OF LONGTIME
0377   REF   4  LAST 1234         01,3442  21'305 1            DAS     LONGTIME

0378   REF   5  LAST 1234         01,3443  11'305 1            CCS     LONGTIME +1     THE REASONIBG BEHIND THIS PART IS
0379   REF   1                    01,3444  1 3462 0            TCF     MUCHTIME        INVOLVED, TAKING INTO ACCOUNT THAT THE
A0380                                                                                   WORDS MAY NOT BE SIGNED CORRECTED (DP
A0381                                                                                   BASIC INSTRUCTIONS
A0382                                                                                   DO NOT SIGN CORRECT) AND THAT WE SUBTRAC
A0383                                                                                   TED BIT14 (1 OVER HALF THE POS. VALUE
A0384                                                                                   REPRESENTIBLE IN SINGLE WORD)
0385                              01,3445  13 446 0            NOOP            CAN:T GET HERE    **********
0386                              01,3446  1 3447 1            TCF     +1
0387   REF   6  LAST 1234         01,3447  11'304 0            CCS     LONGTIME
0388   REF   2  LAST 1234         01,3450  1 3462 0            TCF     MUCHTIME
```

L WAITLIST USER'S PAGE NO. 15 E3 S3

```
 0389                          01,3451   00000 1  DPBIT14  OCT     00000
 0390                          01,3452   20000 0           OCT     20000

A0391                                                                    LONGCALL
 0392  REF  59  LAST 1204      01,3453  3 4753 1  LASTTIME CA      BIT14  GET BACK THE CORRECT DELTA TFOR WAITLIST
 0393  REF   7  LAST 1234      01,3454  27'305 1           ADS     LONGTIME +1
 0395  REF  23  LAST 1088      01,3455  0 5223 1           TC      TWIDDLE
 0396  REF   1                 01,3456   03142 0           ADRES   GETCADR  THE ENTRY TO OUR LONGCADR
 0399  REF   2  LAST  385      01,3457  3 5313 0  LONGRTRN CA      TSKOVCDR SET IT UP SO THAT ONLY THE FIRST EXIT IS
 0400  REF   3  LAST 1234      01,3460  53'435 0           DXCH    LONGEXIT TO THE CALLER OF LONGCALL
 0401                          01,3461  52 006 0           DTCB             THE REST ARE TO TASKOVER

 0402  REF  60  LAST 1235      01,3462  3 4753 1  MUCHTIME CA      BIT14  WE HAVE OVER OUR ABOUT 1.25 MINUTES
 0404  REF  27  LAST 1077      01,3463  0 5233 0  WTLTCADR TC      WAITLIST SET UP ANOTHER CYCLE THRU HERE (=GENADR)
 0405  REF  43  LAST 1234      E3,1400           EBANK=   LST1
 0406  REF   2  LAST 1234      01,3464   03440 1          2CADR   LONGCYCL
 0406                          01,3465   02063 0

 0408  REF   1                 01,3466  1 3457 0           TCF     LONGRTRN NOW EXIT PROPERLY
```

```
L       LATITUDE LONGITUDE SUBROUTINES                                  USER'S PAGE NO.  1      EO S3

R0001   SUBROUTINE TO CONVERT RAD VECTOR AT GIVEN TIME TO LAT,LONG AND ALT

R0002   CALLING SEQUENCE

R0003     L-1    CALL
R0004     L              LAT-LONG
R0005   SUBROUTINES USED

R0006    R-TO-RP,ARCTAN,SETGAMMA,SETRE
R0007   ERASABLE INIT. REQ.

R0008     AXO,-AYO,AZO,TEPHEM (SET AT LAUNCH TIME)
R0009   ALPHAV = POSITION VECTOR METERS B-29
R0010     MPAC-- TIME  (CSECS B-28)
R0011    ERADFLAG =1, TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0012    LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0013   OUTPUT

R0014     LATITUDE IN LAT   (REVS. B-0)
R0015     LONGITUDE IN LONG   (REVS. B-0)
R0016   ALTITUDE IN ALT METERS B-29
 0018   REF   1              13,2000                    SETLOC LATLONG
 0019                        13,2453                    BANK
 0020   REF   1                                         COUNT* $$/LT-LG
 0021   REF  18  LAST  911   E4,1551                    EBANK= ALPHAV
 0022                        13,2453   40220 0  LAT-LONG STQ    SETPD
 0023   REF   2  LAST  542   13,2454   02241 1                  INCORPEX
 0024                        13,2455   00001 0                  D
 0025                        13,2456   24007 0          STOVL   6D              SAVE TIME IN 6-7D FOR R-TO-RP
 0026   REF  19  LAST 1236   13,2457   02152 0                  ALPHAV
 0027                        13,2460   51406 1          PUSH    ABVAL          0-5D= R FOR R-TO-RP
 0028   REF   2  LAST   93   13,2461   16301 1          STODL   ALPHAM         ABS. VALUE OF R FOR ALT FORMULA BELOW
 0029   REF  16  LAST 1206   13,2462   11762 1                  ZEROVEC        SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0030                        13,2463   71414 0          BOFF    COS            USE COS(0) TO GET NON-ZERO IN MPAC
 0031   REF  20  LAST  911   13,2464   01743 0                  LUNAFLAG       0=EARTH,1=MOON
 0032   REF   1              13,2465   26466 1                  CALLRTRP
 0033                        13,2466   77624 1  CALLRTRP CALL
 0034   REF   3  LAST  617   13,2467   55370 0                  R-TO-RP        RP VECTOR CONVERTED FROM R B-29
 0035                        13,2470   77656 1          UNIT                   UNIT RP B-1
 0036   REF  20  LAST 1236   13,2471   36152 1          STCALL  ALPHAV         U2= 1/2 SINL FOR SETRE SUBR BELOW
 0037   REF   1              13,2472   35766 0                  SETGAMMA        SET GAMMA=B2/A2 FOR EARTH,=1 FOR MOON
 0038                        13,2473   77624 1          CALL                    SCALED B-1
 0039   REF   3  LAST  762   13,2474   26654 1                  SETRE          CALC RE METERS B-29
 0040                        13,2475   63545 0          DLOAD   DSQ
 0041   REF  21  LAST 1236   13,2476   02152 0                  ALPHAV
 0042                        13,2477   63525 0          PDDL    DSQ
 0043   REF  22  LAST 1236   13,2500   02154 0                  ALPHAV +2
 0044                        13,2501   75415 0          DAD     SQRT
 0045                        13,2502   76405 1          DMP     SL1R
```

L LATITUDE LONGITUDE SUBROUTINES USER'S PAGE NO. 2 E4 S3

```
0046  REF   1                  13,2503  00011 1          GAMRP
0047  REF   7  LAST  892       13,2504  14021 1  STODL   COSTH      COS(LAT) B-1
0048  REF  23  LAST 1236       13,2505  02156 1          ALPHAV +4
0049  REF   7  LAST  892       13,2506  34023 1  STCALL  SINTH      SIN(LAT) B-1
0050  REF   1                  13,2507  26614 0          ARCTAN
0051  REF  12  LAST  911       13,2510  14747 0  STODL   LAT        LAT B0
0052  REF  24  LAST 1237       13,2511  02152 0          ALPHAV
0053  REF   8  LAST 1237       13,2512  14021 1  STODL   COSTH      COS(LONG) B-1
0054  REF  25  LAST 1237       13,2513  02154 0          ALPHAV +2
0055  REF   8  LAST 1237       13,2514  34023 1  STCALL  SINTH      SIN(LONG) B-1
0056  REF   2  LAST 1237       13,2515  26614 0          ARCTAN
0057  REF  10  LAST  911       13,2516  14751 1  STODL   LONG       LONG. REVS B-0 IN RANGE -1/2 TO 1/2
0058  REF   3  LAST 1236       13,2517  02301 1          ALPHAM
0059                            13,2520  77625 0  DSU                ALT= R-RE METERS B-29
0060  REF   9  LAST  814       13,2521  02240 0          ERADM
0061  REF   8  LAST  762       13,2522  34753 1  STCALL  ALT        EXIT WITH ALT METERS B-29
0062  REF   3  LAST 1236       13,2523  02241 1          INCORPEX
```

L LATITUDE LONGITUDE SUBROUTINES USER'S PAGE NO. 3 E4 S3

```
R0063   SUBROUTINE TO CONVERT LAT,LONG,ALT AT GIVEN TIME TO RADIUS VECTOR
R0064   CALLING SEQUENCE

R0065     L-1    CALL
R0066     L              LALOTORV
R0067   SUBROUTINES USED

R0068    SETGAMMA,SETRE,RP-TO-R
R0069   ERASABLE INIT. REQ.

R0070     AXO,AYO,AZO,TEPHEM  SET AT LAUNCH TIME
R0071     LAT-- LATITUDE  (REVS B0)
R0072     LONG-- LONGITUDE  (REVS B0)
R0073   ALT--ALTITUDE (METERS) B-29
R0074     MPAC-- TIME  (CSECS B-28)
R0075     ERADFLAG =1 TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0076    LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0077   OUTPUT

R0078   R-VECTOR IN ALPHAV (METERS B-29)
 0079                        13,2524   40220 0  LALOTORV STQ     SETPD           LAT,LONG,ALT TO R VECTOR
 0080   REF   4  LAST 1237   13,2525   02241 1                   INCORPEX
 0081                        13,2526   00001 0                   0D
 0082                        13,2527   34007 1            STCALL 6D              6-7D= TIME FOR RP-TO-R
 0083   REF   2  LAST 1236   13,2530   35766 0                   SETGAMMA        GAMMA=B2/A2 FOR EARTH,1 FOR MOON 8-1
 0084                        13,2531   73545 1            DLOAD  SIN                     COS(LONG)COS(LAT) IN MPAC
 0085   REF  13  LAST 1237   13,2532   00747 0                   LAT          UNIT RP= SIN(LONG)COS(LAT)     2-3D
 0086                        13,2533   65275 1            DMPR   PDDL            PD 2    GAMMA*SIN(LAT)         0-1D
 0087   REF   2  LAST 1237   13,2534   00011 1                   GAMRP
 0088   REF  14  LAST 1238   13,2535   00747 0                   LAT                  0-1D= GAMMA*SIN(LAT) B-2
 0089                        13,2536   65346 0            COS    PDDL            PD 4    2-3D=COS(LAT) B-1 TEMPORARILY
 0090   REF  11  LAST 1237   13,2537   00751 1                   LONG
 0091                        13,2540   57356 0            SIN    DMPR            PD 2
 0092                        13,2541   71525 0            PDDL   COS             PD 4   2-3D=SIN(LONG)COS(LAT) B-2
 0093   REF  15  LAST 1238   13,2542   00747 0                   LAT
 0094                        13,2543   71525 0            PDDL   COS             PD 6    4-5D=COS(LAT) B-1 TEMPORARILY
 0095   REF  12  LAST 1238   13,2544   00751 1                   LONG
 0096                        13,2545   55475 1            DMPR   VDEF            PD 4   MPAC= COS(LONG)COS(LAT) B-2
 0097                        13,2546   41456 0            UNIT   PUSH            0-5D= UNIT RP FOR RP-TO-R SUBR.
 0098   REF  26  LAST 1237   13,2547   36152 1            STCALL ALPHAV          ALPHAV +4= SINL FOR SETRE SUBR.
 0099   REF   4  LAST 1236   13,2550   26654 1                   SETRE           RE METERS B-29
 0100                        13,2551   43145 0            DLOAD  BOFF            SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0101   REF  17  LAST 1236   13,2552   11762 1                   ZEROVEC
 0102   REF  21  LAST 1236   13,2553   01743 0                   LUNAFLAG
 0103   REF   1              13,2554   26556 0                   CALLRPRT
 0104                        13,2555   77746 1            COS                    USE COS(0) TO GET NON-ZERO IN MPAC
 0105                        13,2556   77624 1  CALLRPRT  CALL
 0106   REF   6  LAST  783   13,2557   55345 0                   RP-TO-R         EXIT WITH UNIT R VECTOR IN MPAC
 0107   REF  27  LAST 1238   13,2560   16152 0            STODL  ALPHAV
 0108   REF  10  LAST 1237   13,2561   02240 0                   ERADM
```

L LATITUDE LONGITUDE SUBROUTINES USER'S PAGE NO. 4 E4 S3

```
 0109                          13,2562   74215 1          DAD     VXSC            (RE + ALT)(UNIT R) METERS B-30
 0110   REF   9  LAST 1237     13,2563   00753 0                  ALT
 0111   REF  28  LAST 1238     13,2564   02152 0                  ALPHAV
 0112                          13,2565   77772 0          VSL1                    R METERS B-29
 0113   REF  29  LAST 1239     13,2566   36152 1          STCALL  ALPHAV          EXIT WITH R IN METERS B-29
 0114   REF   5  LAST 1238     13,2567   02241 1                  INCORPEX
R0115   SUBROUTINE TO COMPUTE EARTH RADIUS

R0116   INPUT

R0117     1/2 SIN LAT IN ALPHAV +4

R0118   OUTPUT

R0119     EARTH RADIUS IN ERADM AND MPAC  (METERS B-29)

 0120                          13,2570   63545 0  GETERAD  DLOAD   DSQ
 0121   REF  30  LAST 1239     13,2571   02156 1                   ALPHAV +4      SIN**2(L)
 0122                          13,2572   44352 0          SL1     BDSU
 0123   REF   1                13,2573   11760 0                  DP1/2          COS**2(L)
 0124                          13,2574   44275 1          DMPR    BDSU
 0125   REF   1                13,2575   26611 0                  EE
 0126   REF   2  LAST 1239     13,2576   11760 0                  DP1/2
 0127                          13,2577   75465 1          BDDV    SQRT
 0128   REF   1                13,2600   26605 0                  B2XSC
 0129                          13,2601   77622 1          SR4R
 0130   REF  11  LAST 1238     13,2602   02240 0          STORE   ERADM
 0131                          13,2603   77616 0          RVQ

R1311   THE FOLLOWING CONSTANTS WERE COMPUTED WITH A=6378166,B=6356784 METERS
R1312   B2XSC= B**2 SCALED B-51
R1313   B2/A2= B**2/A**2 SCALED B-1
R1314   EE=(1-B**2/A**2) SCALED B-0

 0132                          13,2604   00446 1  B2XSC    2DEC    .0179450689     B**2 SCALED B-51
 0132                          13,2605   00305 1
 0133   REF   6  LAST 1206     04,3757             DP1/2    =       XUNIT
 0134                          13,2606   17711 0  B2/A2    2DEC    .9933064884 B-1 GAMMA= B**2/A**2 B-1
 0134                          13,2607   05254 1
 0135                          13,2610   00155 0  EE       2DEC    6.6935116 E-3   (1-B**2/A**2) B-0
 0135                          13,2611   25250 1
 0136                          13,2612   00302 0  ERAD     2DEC    6373338 B-29    PAD RADIUS
 0136                          13,2613   17755 0
```

L LATITUDE LONGITUDE SUBROUTINES USER'S PAGE NO. 5 E4 S3

P0137 ARCTAN SUBROUTINE

R0138 CALLING SEQUENCE

R0139 SIN THETA IN SINTH B-1
R0140 COS THETA IN COSTH B-1
R0141 CALL ARCTAN

R0142 OUTPUT
R0143 ARCTAN THETA IN MPAC AND THETA B-0 IN RANGE -1/2 TO +1/2

```
0144                        13,2614  77600 1  ARCTAN   BOV
0145  REF   1              13,2615  26616 1           CLROVFLW
0146                        13,2616  63545 0  CLROVFLW DLOAD   DSQ
0147  REF   9  LAST 1237   13,2617  00023 0           SINTH
0148                        13,2620  63525 0           PDDL    DSQ
0149  REF   9  LAST 1237   13,2621  00021 1           COSTH
0150                        13,2622  77615 0           DAD
0151                        13,2623  75454 0           BZE     SQRT
0152  REF   1              13,2624  26642 0           ARCTANXX        ATAN=C/C  SET THETA=0
0153                        13,2625  40065 0           BDDV    BOV
0154  REF  10  LAST 1240   13,2626  00023 0           SINTH
0155  REF   1              13,2627  26647 0           ATAN=90
0156                        13,2630  67542 0           SR1     ASIN
0157  REF   4  LAST  769   13,2631  00025 0           STORE   THETA
0158                        13,2632  50125 1           PDDL    BMN
0159  REF  10  LAST 1240   13,2633  00021 1           COSTH
0160  REF   1              13,2634  26636 0           NEGCOS
0161                        13,2635  43545 1           DLOAD   RVQ
0162                        13,2636  57545 1  NEGCOS   DLOAD   DCOMP
0163                        13,2637  43244 1           BPL     DAD
0164  REF   1              13,2640  26644 0           NEGOUT
0165  REF   3  LAST 1239   13,2641  11760 0           DP1/2
0166  REF   5  LAST 1240   13,2642  00025 0  ARCTANXX STORE   THETA
0167                        13,2643  77616 0           RVQ

0168                        13,2644  52025 1  NEGOUT   DSU     GOTO
0169  REF   4  LAST 1240   13,2645  11760 0           DP1/2
0170  REF   2  LAST 1240   13,2646  26642 0           ARCTANXX
0171                        13,2647  75345 1  ATAN=90  DLOAD   SIGN
0172  REF   1              13,2650  33412 0           LCDP1/4
0173  REF  11  LAST 1240   13,2651  00023 0           SINTH
0174  REF   6  LAST 1240   13,2652  00025 0           STORE   THETA
0175                        13,2653  77616 0           RVQ

0176  REF   2  LAST  751   04,3761           2DZERO   =       DPZERO
```

L LATITUDE LONGITUDE SUBROUTINES USER'S PAGE NO. 6 E4 S3

```
PC177   ..... SETGAMMA SUBROUTINE .....
RC178   SUBROUTINE TO SET GAMMA FOR THE LAT-LONG AND LALOTORV SUBROUTINES

RC179    GAMMA = B**2/A**2 FOR EARTH (B-1)
RC180    GAMMA = 1 FOR MOON (B-1)

RC181   CALLING SEQUENCE
RC182    L       CALL
RC183    L+1             SETGAMMA

RC184   INPUT
RC185    LUNAFLAG=0 FOR EARTH,=1 FOR MOON

RC186   OUTPUT
RC187    GAMMA IN GAMRP  (B-1)

 01875  REF   1                16,2000                      SETLOC  LATLONG1
 01876                         16,3766                      BANK
 01877  REF   1                                            COUNT*  $$/LT-LG

 0188                          16,3766   43145 0  SETGAMMA  DLOAD   BOFF          BRANCH FOR EARTH
 0189   REF   1                16,3767   26607 1                    B27/A2        EARTH GAMMA
 0190   REF  22  LAST 1238     16,3770   01743 0                    LUNAFLAG
 0191   REF   1                16,3771   35774 0                    SETGMEX
 0192                          16,3772   77735 0                    SLOAD
 0193   REF   1                16,3773   11760 0                              1B1   MOON GAMMA
 0194   REF   3  LAST 1238     16,3774   00011 1  SETGMEX   STORE   GAMRP
 0195                          16,3775   77616 0                    RVQ
 0196                             0010             GAMRP     =       8D
 01961  REF   2  LAST 1236     13,2000                      SETLOC  LATLONG
 01962                         13,2654                      BANK
```

L LATITUDE LONGITUDE SUBROUTINES USER'S PAGE NO. 7 E4 S3

```
P0197   .....SETRE SUBROUTINE .....
R0198   SUBROUTINE TO SET RE (EARTH OR MOON RADIUS)

R0199   RE= RM FOR MOON
R0200    RE= RREF FOR FIXED EARTH RADIUS OR COMPUTED RF FOR FISCHER ELLIPSOID

R0201   CALLING SEQUENCE
R0202    L       CALL
R0203    L+1             SETRE

R0204   SUBROUTINES USED
R0205    GETERAD

R0206   INPUT
R0207    ERADFLAG=0 FOR FIXED RE, 1 FOR COMPUTED RE
R0208    ALPHAV +4= 1/2 SINL IF GETERAD IS CALLED
R0209    LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0210   OUTPUT
R0211    ERADM= 504RM FOR MOON (METERS B-29)
R0212    ERADM= ERAD OR COMPUTED RF FOR EARTH (METERS B-29)

 0213                        13,2654   71220 1  SETRE    STQ     DLOAD
 0214   REF   1              13,2655   00051 0                   SETREX
 0215   REF   1              13,2656   26701 0                   504RM
 0216                        13,2657   71214 0          BON      DLOAD            BRANCH FOR MOON
 0217   REF   23  LAST 1241  13,2660   01703 1                   LUNAFLAG
 0218   REF   1              13,2661   26671 0                   TSTRLSRM
 0219   REF   1              13,2662   26613 1                   ERAD
 0220                        13,2663   45014 0          BOFF     CALL             ERADFLAG=0 FOR FIXED RE,1 FOR COMPUTED
 0221   REF   12  LAST  911  13,2664   00742 0                   ERADFLAG
 0222   REF   1              13,2665   26667 1                   SETRXX
 0223   REF   4   LAST  901  13,2666   26570 1                   GETERAD
 0224   REF   12  LAST 1239  13,2667   36240 1  SETRXX   STCALL  ERADM            EXIT WITH RE OR RM METERS B-29
 0225   REF   2   LAST 1242  13,2670   00051 0                   SETREX
 0226                        13,2671   77214 0  TSTRLSRM BON     VLOAD            ERADFLAG=0,SET R0=RLS
 0227   REF   13  LAST 1242  13,2672   00702 1                   ERADFLAG                  =1     R0=RM
 0228   REF   2   LAST 1242  13,2673   26667 1                   SETRXX
 0229   REF   9   LAST  745  13,2674   02026 1                   RLS
 0230                        13,2675   64446 0          ABVAL    SR2R             SCALE FROM B-27 TO B-29
 0231                        13,2676   77650 1          GOTO
 0232   REF   3   LAST 1242  13,2677   26667 1                   SETRXX
 0233   REF   12  LAST  766    0051              SETREX   =       S2
 0234                        13,2700   00065 1  504RM    2DEC    1738090 B-29     METERS B-29 (MOON RADIUS)
 0234                        13,2701   01265 1
```

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```
P0001   ..... RP-TO-R SUBROUTINE .....
R0002   SUBROUTINE TO CONVERT RP (VECTOR IN PLANETARY COORDINATE SYSTEM,EITHER
R0003    EARTH-FIXED OR MOON-FIXED) TO R (SAME VECTOR IN THE BASIC REF. SYSTEM)

R0004    R=MT(T)*(RP+LPXRP)     MT= M MATRIX TRANSPOSE

R0005   CALLING SEQUENCE
R0006    L        CALL
R0007    L+1              RP-TO-R

R0008   SUBROUTINES USED
R0009    EARTHMX,MOONMX,EARTHL

R0010      ITEMS AVAILABLE FROM LAUNCH DATA
R0011       504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0012       IN THE MOON-FIXED COORD. SYSTEM   RADIANS  B0
R0013         ITEMS NECESSARY FOR SUBR. USED (SEE DESCRIPTION OF SUBR.)

R0014   INPUT
R0015    MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0016    C-5D= RP VECTOR
R0017    6-7D= TIME

R0018   OUTPUT
R0019    MPAC= R VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

 0020   REF   1                26,2000                    SETLOC PLANTIN
 0021                          26,3345                    BANK

 0022   REF   1                                           COUNT* $$/LUROT

 0023                          26,3345   46020 1  RP-TO-R STQ    BHIZ
 0024   REF   1                26,3346   00050 1          RPREXIT
 0025   REF   1                26,3347   55362 0          RPTORA
 0026                          26,3350   77624 1          CALL                COMPUTE M MATRIX FOR MOON
 0027   REF   1                26,3351   55416 1          MOONMX              LP=LM FOR MOON  RADIANS B0
 0028                          26,3352   77775 1          VLOAD
 0029   REF   1                26,3353   02012 0          504LM
 0030                          26,3354   53235 0  RPTORB  VXV    VAD
 0031   REF   1                26,3355   00001 0          504RPR
 0032   REF   2  LAST 1243     26,3356   00001 0          504RPR
 0033                          26,3357   52105 1          VXM    GOTO
 0034   REF   1                26,3360   00025 0          MMATRIX             MPAC=R=MT(T)*(RP+LPXRP)
 0035   REF   1                26,3361   55406 0          RPRPXXXX            RESET PUSHLOC TO 0 BEFORE EXITING
 0036                          26,3362   77624 1  RPTORA  CALL                EARTH COMPUTATIONS
 0037   REF   1                26,3363   55567 0          EARTHMX             M MATRIX B-1
A0039                                                                        AND L VECTOR RADIANS B0
 0040                          26,3364   76521 0          MXV    VSL1         LP=M(T)*L  RAD B-0
 0041   REF   2  LAST 1243     26,3365   00025 0          MMATRIX
 0042                          26,3366   77650 1          GOTO
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0043  REF   1              26,3367   55354 0                RPTORB
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P0044   ..... R-TO-RP SUBROUTINE .....
R0045   SUBROUTINE TO CONVERT R (VECTOR IN REFERENCE COORD. SYSTEM) TO RP
R0046    (VECTOR IN PLANETARY COORD SYSTEM) EITHER EARTH-FIXED OR MOON-FIXED

R0047    RP=M(T)*(R-LXR)

R0048   CALLING SEQUENCE
R0049    L       CALL
R0050    L+1             R-TO-RP

R0051   SUBROUTINES USED
R0052    EARTHMX,MOONMX,EARTHL

R0053   INPUT
R0054    MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0055    0-5D= R VECTOR
R0056    6-7D= TIME

R0057      ITEMS AVAILABLE FROM LAUNCH DATA
R0058       504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0059       IN THE MOON-FIXED COORD. SYSTEM   RADIANS B0
R0060         ITEMS NECESSARY FOR SUBROUTINES USED (SEE DESCRIPTION OF SUBR.)

R0061   OUTPUT
R0062    MPAC=RP VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

0063                          26,3370  46020 1  R-TO-RP   STQ     BHIZ
0064   REF   2  LAST 1243    26,3371  00050 1                    RPREXIT
0065   REF   1                26,3372  55412 0                    RTORPA
0066                          26,3373  77624 1            CALL
0067   REF   2  LAST 1243    26,3374  55416 1                    MOONMX
0068                          26,3375  61375 1            VLOAD   VXM
0069   REF   2  LAST 1243    26,3376  02012 0                    504LM          LP=LM
0070   REF   3  LAST 1243    26,3377  00025 0                    MMATRIX
0071                          26,3400  77772 0            VSL1                   L=MT(T)*LP  RADIANS B0
0072                          26,3401  51235 1  RTORPB    VXV     BVSU
0073   REF   3  LAST 1243    26,3402  00001 0                    504RPR
0074   REF   4  LAST 1245    26,3403  00001 0                    504RPR
0075                          26,3404  77721 0            MXV                    M(T)*(R-LXR) B-2
0076   REF   4  LAST 1245    26,3405  00025 0                    MMATRIX
0077                          26,3406  40372 0  RPRPXXXX VSL1    SETPD
0078                          26,3407  00001 0                    CD
0079                          26,3410  77650 1            GOTO
0080   REF   3  LAST 1245    26,3411  00050 1                    RPREXIT
0081                          26,3412  77624 1  RTORPA    CALL                   EARTH COMPUTATIONS
0082   REF   2  LAST 1243    26,3413  55567 0                    EARTHMX
0085                          26,3414  77650 1            GOTO                   MPAC=L=(-AX,-AY,0) RAD B-0
0086   REF   1                26,3415  55401 1                    RTORPB
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R0087   ..... MOONMX SUBROUTINE .....
R0088   SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE MOON

R0089   CALLING SEQUENCE
R0090    L       CALL
R0091    L+1             MOONMX

R0092   SUBROUTINES USED
R0093    NEWANGLE

R0094   INPUT
R0095    6-7D= TIME
R0096      ITEMS AVAILABLE FROM LAUNCH DATA
R0097       BSUBO,BDOT
R0098       TIMSUBO,NODIO,NODDOT,FSUBO,FDOT
R0099       COSI= COS(I) B-1
R0100       SINI= SIN(I) B-1
R0101         I  IS THE ANGLE BETWEEN THE MEAN LUNAR EQUATORIAL PLANE AND THE
R0102         PLANE OF THE ECLIPTIC  (1 DEGREE  32.1 MINUTES)

R0103   OUTPUT
R0104    MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

 0105                       26,3416  40220 0  MOONMX   STQ     SETPD
 0106   REF   1             26,3417  00051 0           EARTHMXX
 0107                       26,3420  00011 1           8D
 0108                       26,3421  77770 1  AXT,1              B REQUIRES SL 0, SL 5 IN NEWANGLE
 0109                       26,3422  00005 1           5
 0110                       26,3423  65345 0  DLOAD    PDDL      PD 10D                  8-9D=BSUBO
 0111   REF   1             26,3424  15647 0           BSUBO                             10-11D= BDOT
 0112   REF   1             26,3425  15641 0           BDOT
 0113                       26,3426  45006 0  PUSH     CALL      PD 12D
 0114   REF   1             26,3427  55543 0           NEWANGLE  EXIT WITH PD 8D AND MPAC= B  REVS B0
 0115                       26,3430  71406 0  PUSH     COS       PD 10D
 0116   REF   1             26,3431  14041 1  STODL    COB       PD 8D     COS(B) B-1
 0117                       26,3432  77756 0  SIN                         SIN(B) B-1
 0118   REF   1             26,3433  14043 0  STODL    SOB                SETUP INPUT FOR NEWANGLE
 0119   REF   1             26,3434  15645 1           FSUBO                             8-9D=FSUBO
 0120                       26,3435  41525 0  PDDL     PUSH      PD 10D THEN 12D         10-11D=FDOT
 0121   REF   1             26,3436  15637 1           FDOT
 0122                       26,3437  45170 0  AXT,1    CALL      F REQUIRES SL 1, SL 6 IN NEWANGLE
 0123                       26,3440  00004 0           4
 0124   REF   2  LAST 1246 26,3441  55543 0           NEWANGLE  EXIT WITH PD 8D AND MPAC= F REVS B0
 0125   REF   1             26,3442  14027 1  STODL    AVECTR +2 SAVE F TEMP
 0126   REF   1             26,3443  15643 1           NODIO                             8-9D=NODIO
 0127                       26,3444  41525 0  PDDL     PUSH      PD 10D THEN 12D         10-11D=NODDOT
 0128   REF   1             26,3445  15635 0           NODDOT                            MPAC=T
 0129                       26,3446  45170 0  AXT,1    CALL      NODE REQUIRES SL 0, SL 5 IN NEWANGLE
 0130                       26,3447  00005 1           5
 0131   REF   3  LAST 1246 26,3450  55543 0           NEWANGLE  EXIT WITH PD 8D AND MPAC= NODI REVS 8D
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C132                          26,3451  71406 0    PUSH   COS          PD 10D   8-9D= NODI  REVS  B0
C133                          26,3452  77606 1    PUSH                PD 12D 10-11D= COS(NODI)  B-1
C134  REF   2  LAST 1246      26,3453  00025 0    STORE  AVECTR
C135                          26,3454  76405 1    DMP    SL1R
C136  REF   2  LAST 1246      26,3455  00041 1           COB                                 COS(NODI)    B-1
C137  REF   1                 26,3456  14035 1    STODL  BVECTR +2    PD 10D   20-25D=AVECTR= COB*SIN(NODI)
C138                          26,3457  76405 1    DMP    SL1R                               SOB*SIN(NODI)
C139  REF   2  LAST 1246      26,3460  00043 0           SOB
C140  REF   2  LAST 1247      26,3461  14037 0    STODL  BVECTR +4    PD 8D
C141                          26,3462  41556 1    SIN    PUSH         PD 10D                      -SIN(NODI)   B-1
C142                          26,3463  77676 0    DCOMP                          26-31D=BVECTR= COB*COS(NODI)
C143  REF   3  LAST 1247      26,3464  14033 1    STODL  BVECTR       PD 8D                       SOB*COS(NODI)
C144  REF   3  LAST 1247      26,3465  00027 1           AVECTR +2    MOVE F FROM TEMP LOC. TO 504F
C145  REF   1                 26,3466  14007 0    STODL  504F
C146                          26,3467  76405 1    DMP    SL1R
C147  REF   3  LAST 1247      26,3470  00041 1           COB
C148  REF   4  LAST 1247      26,3471  14027 1    STODL  AVECTR +2
C149  REF   1                 26,3472  00011 1           SINNODI      8-9D=SIN(NODI)  B-1
C150                          26,3473  76405 1    DMP    SL1R
C151  REF   3  LAST 1247      26,3474  00043 0           SOB
C152  REF   5  LAST 1247      26,3475  14031 0    STODL  AVECTR +4                                  0
C153  REF  26  LAST  940      26,3476  15336 0           HI6ZEROS                  8-13D= CVECTR= -SOB  B-1
C154                          26,3477  57525 1    PDDL   DCOMP        PD 10D                      COB
C155  REF   4  LAST 1247      26,3500  00043 0           SOB
C156                          26,3501  63325 0    PDDL   PDVL         PD 12D THEN PD 14D
C157  REF   4  LAST 1247      26,3502  00041 1           COB
C158  REF   4  LAST 1247      26,3503  00033 1           BVECTR
C159                          26,3504  63361 0    VXSC   PDVL         PD 20D          BVECTR*SINI  B-2
C160  REF   1                 26,3505  15633 0           SINI
C161  REF   1                 26,3506  00011 1           CVECTR
C162                          26,3507  53361 0    VXSC   VAD          PD 14D          CVECTR*COSI  B-2
C163  REF   1                 26,3510  15631 1           COSI
C164                          26,3511  77772 0    VSL1
C165  REF   5  LAST 1245      26,3512  24041 1    STOVL  MMATRIX +12D PD 8D  M2=BVECTR*SINI+CVECTR*COSI  B-1
C166                          26,3513  63361 0    VXSC   PDVL         PD 14D
C167  REF   2  LAST 1247      26,3514  15633 0           SINI                            CVECTR*SINI  B-2
C168  REF   5  LAST 1247      26,3515  00033 1           BVECTR
C169                          26,3516  52361 1    VXSC   VSU          PD 8D           BVECTR*COSI  B-2
C170  REF   2  LAST 1247      26,3517  15631 1           COSI
C171                          26,3520  65372 1    VSL1   PDDL         PD 14D
C172  REF   2  LAST 1247      26,3521  00007 0           504F         8-13D=DVECTR=BVECTR*COSI-CVECTR*SINI B-1
C173                          26,3522  74346 0    COS    VXSC
C174  REF   1                 26,3523  00011 1           DVECTR
C175                          26,3524  73525 1    PDDL   SIN          PD 20D  14-19D= DVECTR*COSF  B-2
C176  REF   3  LAST 1247      26,3525  00007 0           504F
C177                          26,3526  52361 1    VXSC   VSU          PD 14D           AVECTR*SINF  B-2
C178  REF   6  LAST 1247      26,3527  00025 0           AVECTR
C179                          26,3530  77772 0    VSL1
C180  REF   6  LAST 1247      26,3531  14033 1    STODL  MMATRIX +6   M1= AVECTR*SINF-DVECTR*COSF  B-1
C181  REF   4  LAST 1247      26,3532  00007 0           504F
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 0182                          26,3533  74356 1          SIN     VXSC            PD 8D
 0183                          26,3534  71525 0          PDDL    COS             PD 14D  8-13D=DVECTR*SINF B-2
 0184  REF   5  LAST 1247      26,3535  00007 0                  504F
 0185                          26,3536  53361 0          VXSC    VAD             PD 8D          AVECTR*COSF B-2
 0186  REF   7  LAST 1247      26,3537  00025 0                  AVECTR
 0187                          26,3540  57572 0          VSL1    VCOMP
 0188  REF   7  LAST 1247      26,3541  34025 1          STCALL  MMATRIX         MO= -(AVECTR*COSF+DVECTR*SINF)  B-1
 0189  REF   2  LAST 1246      26,3542  00051 0                  EARTHMXX
R0190  COMPUTE X=XO+(XDOT)(T+TO)
R0191  8-9D= XO (REVS B-0),PUSHLOC SET AT 12D
R0192  10-11D=XDOT (REVS/CSEC) SCALED B+23 FOR WEARTH,B+28 FOR NODDOT AND BDOT
R0193                  AND 8+27 FOR FDOT
R0194   X1=DIFFERENCE IN 23 AND SCALING OF XDOT,=0 FOR WEARTH,5 FOR NODDOT AND
R0195                                        BDOT AND 4 FOR FDOT
R0196  6-7D=T (CSEC B-28), TIMSUBO= (CSEC B-42 TRIPLE PREC.)

 0197                          26,3543  54345 1  NEWANGLE DLOAD  SR              ENTER PD 12D
 0198                          26,3544  00007 0                  6D
 0199                          26,3545  20617 0                  14D
 0200                          26,3546  72371 1          TAD     TLOAD           CHANGE MODE TO TP
 0201  REF   1                 26,3547  01707 0                  TIMSUBO
 0202  REF 642  LAST 1213      26,3550  00155 0                  MPAC
 0203  REF   1                 26,3551  14017 1          STODL   TIMSUBM         T+TO CSEC B-42
 0204  REF   2  LAST 1248      26,3552  00020 0                  TIMSUBM +1
 0205                          26,3553  77605 1          DMP                     PD 10D  MULT BY XDOT IN 10-11D
 0206                          26,3554  43257 0          SL*     DAD             PD 8D   ADD XO IN 8-9D AFTER SHIFTING
 0207                          26,3555  20206 1                  5,1                     SUCH THAT SCALING IS B-
 0208                          26,3556  67206 1          PUSH    SLOAD           PD 10D SAVE PARTIAL (XO+XDOT*T) IN 8-9D
 0209  REF   3  LAST 1248      26,3557  00017 1                  TIMSUBM
 0210                          26,3560  41261 1          SL      DMP
 0211                          26,3561  20212 1                  9D
 0212                          26,3562  00013 0                  10D             XDOT
 0213                          26,3563  43257 0          SL*     DAD             PD 8D   SHIFT SUCH THAT THIS PART OF X
 0214                          26,3564  20213 0                  10D,1                   IS SCALED REVS/CSEC B-
 02141                         26,3565  43400 1  HERE    BOV     RVQ             TURN OFF OVERFLOW IF SET BY SHIFT
 02142 REF   1                 26,3566  55565 1                  HERE                    INSTRUCTION BEFORE EXITING
A0215                                                                            MPAC=X=XO+(XDOT)(T+TO)  REVS 80
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RC216   ..... EARTHMX SUBROUTINE .....
RC217   SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE EARTH

RC218   CALLING SEQUENCE
RC219    L       CALL
RC220    L+1             EARTHMX

RC221   SUBROUTINES USED
RC222    NEWANGLE

RC223   INPUT
RC224      INPUT AVAILABLE FROM LAUNCH DATA     AZO  REVS B-0
RC225                                           TEPHEM  CSEC B-42
RC226    6-7D= TIME CSEC B-28

RC227   OUTPUT
RC228    MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

 C229                        26,3567  40220 0  EARTHMX  STQ     SETPD           SET   8-9D=AZO
 C230   REF   3  LAST 1248   26,3570  00051 0                   EARTHMXX
 C231                        26,3571  00011 1                   8D              10-11D=WEARTH
 C232                        26,3572  77770 1           AXT,1                   FOR SL 5, AND SL 10  IN NEWANGLE
 C233                        26,3573  00000 1                   0
 C234                        26,3574  65345 0           DLOAD   PDDL              LEAVING PD SET AT 12D FOR NEWANGLE
 C235   REF   1              26,3575  15653 0                   AZO
 C236   REF   1              26,3576  15651 1                   WEARTH
 C237                        26,3577  45006 0           PUSH    CALL
 C238   REF   4  LAST 1246   26,3600  55543 0                   NEWANGLE
 C239                        26,3601  41401 1           SETPD   PUSH            18-19D=504AZ
 C240                        26,3602  00023 0                   18D                          COS(AZ) SIN(AZ) 0
 C241                        26,3603  65346 0           COS     PDDL            20-37D=  MMATRIX= -SIN(AZ) COS(AZ) 0 B-1
 C242   REF   1              26,3604  00023 0                   504AZ                        0       0       1
 C243                        26,3605  65356 1           SIN     PDDL
 C244   REF  27  LAST 1247   26,3606  15336 0                   HI6ZEROS
 C245                        26,3607  73525 1           PDDL    SIN
 C246   REF   2  LAST 1249   26,3610  00023 0                   504AZ
 C247                        26,3611  65276 1           DCOMP   PDDL
 C248   REF   3  LAST 1249   26,3612  00023 0                   504AZ
 C249                        26,3613  63346 0           COS     PDVL
 C250   REF  28  LAST 1249   26,3614  15336 0                   HI6ZEROS
 C251                        26,3615  41525 0           PDDL    PUSH
 C252   REF  11  LAST  889   26,3616  15334 1                   HIDPHALF
RC253   FALL INTO EARTHL
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R0255   ..... EARTHL SUBROUTINE .....
R0256   SUBROUTINE TO COMPUTE L VECTOR FOR EARTH

R0257   CALLING SEQUENCE
R0258    L       CALL
R0259    L+1             EARTHL

R0260   INPUT
R0261    AXO,AYO SET AT LAUNCH TIME WITH AYO IMMEDIATELY FOLLOWING AXO IN CORE

R0262   OUTPUT
R0263             -AX
R0264     MPAC=   -AY    RADIANS B-0
R0265             0

 0266                          26,3617  71201 1  EARTHL   SETPD   DLOAD
 0267                          26,3620  00017 1                   14D
 0268   REF  29  LAST 1249    26,3621  15336 0                   HI6ZEROS
 0269                          26,3622  65325 0           PDDL    PDDL
 0270   REF   2  LAST  634    26,3623  01712 1                   -AYO
 0271   REF   2  LAST  634    26,3624  01714 1                   AXO
 0272                          26,3625  55476 1           DCOMP   VDEF
 0273                          26,3626  77650 1           GOTO
 0274   REF   4  LAST 1249    26,3627  00051 0                   EARTHMXX
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P0275   CONSTANTS AND ERASABLE ASSIGNMENTS
 0276   REF   5  LAST 1240   04,3757             1B1      =       DP1/2          1  SCALED B-1
 0277                        26,3630   17775 1   COSI     2DEC*   9.996417320 E-1 B-1*    COS (5521.5 SEC.)
 0277                        26,3631   02052 1
 0278                        26,3632   00333 1   SINI     2DEC*   2.676579050 E-2 B-1*    SIN (5521.5 SEC.)
 0278                        26,3633   10374 0
 0279   REF  35  LAST 1193      0050             RPREXIT  =       S1             R-TO-RP AND RP-TO-R SUBR EXIT
 0280   REF  13  LAST 1242      0051             EARTHMXX =       S2             EARTHMX,MOONMX SUBR. EXITS
 0281                            0000             504RPR   =       0D             6 REGS  R OR RP VECTOR
 0282                            0010             SINNODI  =       8D             2       SIN(NODI)
 0283                            0010             DVECTR   =       8D             6       D VECTOR MOON
 0284                            0010             CVECTR   =       8D             6       C VECTR MOON
 0285                            0022             504AZ    =       18D            2       AZ
 0286                            0016             TIMSUBM  =       14D            3       TIME SUB M (MOON) T+TO IN GETAZ
 0287                            0016             504LPL   =       14D            6       L OR LP VECTOR
 0288                            0024             AVECTR   =       20D            6       A VECTOR (MOON)
 0289                            0032             BVECTR   =       26D            6       B VECTOR (MOON)
 0290                            0024             MMATRIX  =       20D            18      M MATRIX
 0291                            0040             COB      =       32D            2       COS(B) B-1
 0292                            0042             SOB      =       34D            2       SIN(B) B-1
 0293                            0006             504F     =       6D             2       F (MOON)
 0297                        26,3634   77665 1   NODDOT   2DEC*   -1.703706128 E-11 B28*                  REV/CS.
 0297                        26,3635   42175 1
 0298                        26,3636   22211 0   FDOT     2DEC*   +4.253263471 E-9  B27*                  REV/CS.
 0298                        26,3637   00636 1
 0299                        26,3640   77777 0   BDOT     2DEC*   -1.145531390 E-16 B28*                  REV/CS.
 0299                        26,3641   77767 1
 0300                        26,3642   34076 1   NODIO    2DEC*   +8.788308600 E-1  B 0*                 REV.
 0300                        26,3643   30363 1
 0301                        26,3644   24760 0   FSUBO    2DEC*   +6.552737750 E-1  B 0*                 REV.
 0301                        26,3645   00133 0
 0302                        26,3646   02052 1   BSUBO    2DEC*   +6.511941688 E-2  B 0*                 REV.
 0302                        26,3647   35250 0
 0303                        26,3650   37116 0   WEARTH   2DEC*   +1.160576171 E-7  B23* REV/CS.
 0303                        26,3651   32631 1
 0304                        26,3652   30576 0   AZO      2DEC*   +7.733314844 E-1  B 0*                 REVS.
 0304                        26,3653   10326 1
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R0001    INCORP1--PERFORMS THE SIX DIMENSIONAL STATE VECTOR DEVIATION FOR POSITI
R0002   ON AND VELOCITY OR THE NINE DIMENSIONAL DEVIATION OF POSITION,VELOCITY,A
R0003   ND RADAR OR LANDMARK BIAS.THE OUTPUT OF THE BVECTOR ROUTINE ALONG WITH T
R0004   HE ERROR TRANSITION MATRIX(W) ARE USED AS INPUT TO THE ROUTINE.THE DEVIA
R0005   TION IS OBTAINED BY COMPUTING AN ESTIMATED TRACKING MEASUREMENT FROM THE
R0006   CURRENT STATE VECTOR AND COMPARING IT WITH AN ACTUAL TRACKING MEASUREMEN
R0007   T AND APPLYING A STATISTICAL WEIGHTING VECTOR.
R0008   INPUT
R0009      DMENFLG = 0 6DIMENSIONAL BVECTOR  1= 9DIMENSIONAL
R0010            W = ERROR TRANSITION MATRIX 6X6 OR 9X9
R0011     VARIANCE = VARIANCE (SCALAR)
R0012       DELTAQ = MEASURED DEVIATION(SCALAR)
R0013      BVECTOR = 6 OR 9 DIMENSIONAL BVECTOR

R0014   OUTPUT
R0015       DELTAX = STATE VECTOR DEVIATIONS 6 OR 9 DIMENSIONAL
R0016           ZI = VECTOR USED FOR THE INCORPORATION 6 OR 9 DIMENSIONAL
R0017        GAMMA = SCALAR
R0018        OMEGA = OMEGA WEIGHTING VECTOR 6 OR 9 DIMENTIONAL
R0019   CALLING SEQUENCE
R0020      L  CALL INCORP1

R0021   NORMAL EXIT

R0022      L+1 OF CALLING SEQUENCE

0024   REF   1              36,2000                    SETLOC MEASINC
0025                        36,3260                    BANK

0026   REF   1                                         COUNT* $$/INCOR

0027   REF  46  LAST  641   E5,1400                    EBANK= W

0028                        36,3260   77620 0  INCORP1 STQ
0029   REF  10  LAST  588   36,3261   02310 1          EGRESS
0030                        36,3262   66370 0          AXT,1  SSP
0031                        36,3263   00066 1          54D
0032   REF  36  LAST 1251   36,3264   00051 0          S1
0033                        36,3265   00022 1          18D                IX1 = 54  S1= 18
0034                        36,3266   66374 1          AXT,2  SSP
0035                        36,3267   00022 1          18D
0036   REF  14  LAST 1251   36,3270   00052 0          S2
0037                        36,3271   00006 1          6                  IX2 = 18  S2=6
0038                        36,3272   63775 1  Z123    VLOAD  MXV*
0039   REF  20  LAST  631   36,3273   03502 0          BVECTOR            BVECTOR (0)
0040   REF  47  LAST 1252   36,3274   02467 0          W +54D,1
0041   REF   1              36,3275   12731 1          STORE  ZI +18D,2
0042                        36,3276   77775 1          VLOAD
0043   REF  21  LAST 1252   36,3277   03510 0          BVECTOR +6         BVECTOR (1)
0044                        36,3300   52717 1          MXV*   VAD*
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0045   REF  48  LAST 1252   36,3301  02555 0                  W +108D,1
0046   REF   2  LAST 1252   36,3302  75046 1                  ZI +18D,2
0047   REF   3  LAST 1253   36,3303  12731 1          STORE   ZI +18D,2
0048                        36,3304  77775 1          VLOAD
0049   REF  22  LAST 1252   36,3305  03516 0                  BVECTOR +12D     BVECTOR (2)
0050                        36,3306  52717 1          MXV*    VAD*
0051   REF  49  LAST 1253   36,3307  02643 1                  W +162D,1
0052   REF   4  LAST 1253   36,3310  75046 1                  ZI +18D,2        B(0)*W+B(1)*(W+54)+B(2)*(W+108)FIRST PAS
0053   REF   5  LAST 1253   36,3311  12731 1          STORE   ZI +18D,2        ZI THEN Z2 THEN Z3
0054                        36,3312  77700 0          TIX,1
0055   REF   1              36,3313  75314 0                  INCOR1
0056                        36,3314  43104 0  INCOR1  TIX,2   BDN
0057   REF   1              36,3315  75272 1                  Z123             LOOP FOR Z1,Z2,Z3
0058   REF   7  LAST  631   36,3316  02706 1                  DMENFLG
0059   REF   1              36,3317  75323 1                  INCOR1A
0060                        36,3320  77775 1          VLOAD
0061   REF  36  LAST  898   36,3321  15336 0                  ZEROVECS
0062   REF   6  LAST 1253   36,3322  02723 0          STORE   ZI +12D
0063                        36,3323  77201 1  INCOR1A  SETPD   VLOAD
0064                        36,3324  00001 0                  0
0065   REF   7  LAST 1253   36,3325  02707 0                  ZI
0066                        36,3326  47036 1          VSQ     RTB
0067   REF   7  LAST  927   36,3327  45657 1                  TPMODE
0068                        36,3330  47515 0          PDVL    VSQ
0069   REF   8  LAST 1253   36,3331  02715 0                  ZI +6
0070                        36,3332  76234 0          RTB     TAD
0071   REF   8  LAST 1253   36,3333  45657 1                  TPMODE
0072                        36,3334  47515 0          PDVL    VSQ
0073   REF   9  LAST 1253   36,3335  02723 0                  ZI +12D
0074                        36,3336  76234 0          RTB     TAD
0075   REF   9  LAST 1253   36,3337  45657 1                  TPMODE
0076                        36,3340  77171 0          TAD     AXT,2
0077   REF  12  LAST  631   36,3341  03526 0                  VARIANCE
0078                        36,3342  00000 1                  0
0079   REF   1              36,3343  01114 1          STORE   TRIPA            ZI*2 + Z2*2 + Z3*2 + VARIANCE
0080                        36,3344  40151 0          TLOAD   BOV
0081   REF  13  LAST 1253   36,3345  03526 0                  VARIANCE         CLEAR OVFIND
0082                        36,3346  75347 0                  +1
0083   REF   1              36,3347  01117 1          STORE   TEMPVAR          TEMP STORAGE FOR VARIANCE
0084                        36,3350  77654 0          BZE
0085   REF   1              36,3351  75360 0                  INCOR1C
0086                        36,3352  40112 1  INCOR1B  SL2     BOV
0087   REF   2  LAST 1253   36,3353  75360 0                  INCOR1C
0088   REF   2  LAST 1253   36,3354  01117 1          STORE   TEMPVAR
0089                        36,3355  52114 1          INCR,2  GOTO
0090                        36,3356  00001 0          DEC     1
0091   REF   1              36,3357  75352 1                  INCOR1B
0092                        36,3360  61551 1  INCOR1C  TLOAD   ROUND
0093   REF   2  LAST 1253   36,3361  01114 1                  TRIPA
0094                        36,3362  75405 1          DMP     SQRT
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0095   REF   3  LAST 1253   36,3363   01117 1                TEMPVAR
0096                        36,3364   76257 0        SL*     TAD
0097                        36,3365   57576 1                0,2
0098   REF   3  LAST 1253   36,3366   01114 1                TRIPA
0099                        36,3367   63101 1        NORM    INCR,2
0100   REF  30  LAST 1122   36,3370   00050 1                X2
0101                        36,3371   77775 1        DEC     -2
0102                        36,3372   77134 1        SXA,2   AXT,2
0103   REF   2  LAST   93   36,3373   02214 1                NORMGAM      NORMALIZATION COUNT -2 FOR GAMMA
0104                        36,3374   00242 0                162D
0105                        36,3375   40265 1        BDDV    SETPD
0106   REF   9  LAST  938   36,3376   15326 1                DPI/4TH
0107                        36,3377   00001 0                0
0108   REF   2  LAST  125   36,3400   03456 0        STORE   GAMMA
0109                        36,3401   60351 0        TLOAD   NORM
0110   REF   4  LAST 1254   36,3402   01114 1                TRIPA
0111   REF  54  LAST 1193   36,3403   00047 1                X1
0112                        36,3404   65345 0        DLOAD   PDDL         PD 0-1 = NORM (A)
0113   REF 643  LAST 1248   36,3405   00155 0                MPAC
0114   REF   5  LAST  631   36,3406   03524 1                DELTAQ
0115                        36,3407   77701 1        NORM
0116   REF  37  LAST 1252   36,3410   00051 0                S1
0117                        36,3411   70460 1        XSU,1   SR1
0118   REF  38  LAST 1254   36,3412   00050 1                S1
0119                        36,3413   41471 0        DDV     PUSH         PD 0-1 = DELTAQ/A
01193                       36,3414   77650 1        GOTO
01196  REF   1              36,3415   63705 0                NEWZCOMP
0120                        36,3416   77731 1   -3   SSP
0121   REF  15  LAST 1252   36,3417   00052 0                S2
0122                        36,3420   00066 1                54D
0123                        36,3421   60775 1   INCOR2 VLOAD   VXM*         COMPUTE OMEGA1,2,3
0124   REF  10  LAST 1253   36,3422   02707 0                ZI
0125   REF  50  LAST 1253   36,3423   75134 0                W +162D,2
0126                        36,3424   77206 0        PUSH    VLOAD
0127   REF  11  LAST 1254   36,3425   02715 0                ZI +6
0128                        36,3426   53303 1        VXM*    VAD
0129   REF  51  LAST 1254   36,3427   75112 1                W +180D,2
0130                        36,3430   77206 0        PUSH    VLOAD
0131   REF  12  LAST 1254   36,3431   02723 0                ZI +12D
0132                        36,3432   53303 1        VXM*    VAD
0133   REF  52  LAST 1254   36,3433   75070 1                W +198D,2
0134                        36,3434   61006 0        PUSH    TIX,2        PD 2-7=OMEGA1,8-13=OMEGA2,14-19=OMEGA3
0135   REF   1              36,3435   75421 1                INCOR2
0136                        36,3436   45575 1        VLOAD   STADR
0137   REF   2  LAST  125   36,3437   74303 1        STORE   OMEGA +12D
0138                        36,3440   45575 1        VLOAD   STADR
0139   REF   3  LAST 1254   36,3441   74311 1        STORE   OMEGA +6
0140                        36,3442   45575 1        VLOAD   STADR
0141   REF   4  LAST 1254   36,3443   74317 1        STORE   OMEGA
0142                        36,3444   77214 0        BON     VLOAD
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0143  REF   8  LAST 1253   36,3445  02706 1                    DMENFLG
0144  REF   1               36,3446  75451 0                    INCOR2AB
0145  REF  37  LAST 1253   36,3447  15336 0                    ZEROVECS
0146  REF   5  LAST 1254   36,3450  03474 0           STORE    OMEGA +12D
0147                        36,3451  66374 1  INCOR2AB AXT,2    SSP
0148                        36,3452  00022 1                    18D
0149  REF  16  LAST 1254   36,3453  00052 0                    S2
0150                        36,3454  00006 1                    6
0151                        36,3455  77773 1  INCOR3    VLOAD*
0152  REF   6  LAST 1255   36,3456  74275 1                    OMEGA +18D,2
0153                        36,3457  53761 1           VXSC     VSL*
0154                        36,3460  00001 0                    0                    DELTAQ/A
0155                        36,3461  20201 0                    0,1
0156  REF  13  LAST  632   36,3462  11136 0           STORE    DELTAX +18D,2
0157                        36,3463  77304 0           TIX,2    VLOAD
0158  REF   1               36,3464  75455 1                    INCOR3
0159  REF  14  LAST 1255   36,3465  01122 1                    DELTAX +6
0160                        36,3466  77732 1           VSL3
0161  REF  15  LAST 1255   36,3467  01122 1           STORE    DELTAX +6
0162                        36,3470  77650 1           GOTO
0163  REF  11  LAST 1252   36,3471  02310 1                    EGRESS
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R0164    INCORP2 -INCORPORATES THE COMPUTED STATE VECTOR DEVIATIONS INTO THE
R0165   ESTIMATED STATE VECTOR. THE STATE VECTOR UPDATED MAY BE FOR EITHER THE
R0166   LEM OR THE CSM.DETERMINED BY FLAG VEHUPFLG.(ZERO = LEM) (1 = CSM)
R0167   INPUT
R0168      PERMANENT STATE VECTOR FOR EITHER THE LEM OR CSM
R0169      VEHUPFLG = UPDATE VEHICLE 0=LEM  1=CSM
R0170      W =        ERROR TRANSITION MATRIX
R0171      DELTAX  =  COMPUTED STATE VECTOR DEVIATIONS
R0172      DMENFLG =  SIZE OF W MATRIX (ZERO =6X6) (1=9X9)
R0173      GAMMA   =  SCALAR FOR INCORPORATION
R0174      ZI      =  VECTOR USED IN INCORPORATION
R0175      OMEGA   =  WEIGHTING VECTOR

R0176   OUTPUT
R0177      UPDATED PERMANENT STATE VECTOR

R0178   CALLING SEQUENCE
R0179      L  CALL INCORP2

R0180   NORMAL EXIT
R0181      L+1 OF CALLING SEQUENCE

 0182   REF   1              36,2000                    SETLOC MEASINC1
 0183                       36,3472                    BANK
 0184   REF   2 LAST 1252 TO 1256:   138   138*        COUNT* $$/INCOR

 0185                       36,3472   45020 1  INCORP2  STQ     CALL
 0186   REF  12  LAST 1255  36,3473   02310 1           EGRESS
 0187   REF  20  LAST  922  36,3474   27516 0           INTSTALL
 0188                       36,3475   74375 0           VLOAD   VXSC          CALC. GAMMA * OMEGA1,2,3
 0189   REF   7  LAST 1255  36,3476   03460 0           OMEGA
 0190   REF   3  LAST 1254  36,3477   03456 0           GAMMA
 0191   REF   2  LAST  101  36,3500   26643 1           STOVL   OMEGAM1
 0192   REF   8  LAST 1256  36,3501   03466 0           OMEGA +6
 0193                       36,3502   77761 1           VXSC
 0194   REF   4  LAST 1256  36,3503   03456 0           GAMMA
 0195   REF   2  LAST  101  36,3504   26651 1           STOVL   OMEGAM2
 0196   REF   9  LAST 1256  36,3505   03474 0           OMEGA +12D
 0197                       36,3506   77761 1           VXSC
 0198   REF   5  LAST 1256  36,3507   03456 0           GAMMA
 0199   REF   2  LAST  101  36,3510   02657 1           STORE   OMEGAM3
 0200                       36,3511   77776 1           EXIT
 0201   REF   1              36,3512   3 3763 0          CAF     54DD        INITIAL IX 1 SETTING FOR W MATRIX
 0202   REF   2  LAST   79  36,3513   55'107 1          TS      WIXA
 0203   REF   2  LAST   79  36,3514   55'110 1          TS      WIXB
 0204   REF 246  LAST 1231  36,3515   3 4772 1          CAF     ZERO
 0205   REF   2  LAST   79  36,3516   55'111 0          TS      ZIXA        INITIAL IX 2 SETTING FOR Z COMPONENT
 0206   REF   2  LAST   79  36,3517   55'112 0          TS      ZIXB
 0207   REF  95  LAST 1081  36,3520   0 5402 1  FAZA    TC      PHASCHNG
```

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0208                                36,3521  04022 0          OCT     04022
0209  REF  67  LAST 1015           36,3522  0 5547 1         TC      UPFLAG
0210  REF   2  LAST  515           36,3523  00230 0          ADRES   REINTFLG
0212  REF   3  LAST 1256           36,3524  3 1110 0  FAZA1   CA      WIXB      START FIRST PHASE OF INCORP2
0213  REF   3  LAST 1256           36,3525  55'107 1         TS      WIXA       TO UPDATE 6 OR 9 DIM. W MATRIX IN TEMP
0214  REF   3  LAST 1256           36,3526  3 1112 1         CA      ZIXB
0215  REF   3  LAST 1256           36,3527  55'111 0         TS      ZIXA
0216  REF 228  LAST 1129           36,3530  0 6006 1         TC      INTPRET
0217                                36,3531  73150 1          LXA,1   LXA,2
0218  REF   4  LAST 1257           36,3532  01107 0                  WIXA
0219  REF   4  LAST 1257           36,3533  01111 1                  ZIXA
0220                                36,3534  70731 0          SSP     DLOAD*
0221  REF  39  LAST 1254           36,3535  00051 0                  S1
0222                                36,3536  00006 1                  6
0223  REF  13  LAST 1254           36,3537  75070 1                  ZI,2
0224                                36,3540  60276 1          DCOMP   NORM      CALC UPPER 3X9 PARTITION OF W MATRIX
0225  REF  17  LAST 1255           36,3541  00052 0                  S2
0226                                36,3542  45161 0          VXSC    CALL
0227  REF   3  LAST 1256           36,3543  02643 1                  OMEGAM1
0228  REF   1                      36,3544  75753 1                  FAZA2
0235                                36,3545  77653 1          VAD*
0236  REF  53  LAST 1254           36,3546  02467 0                  W +54D,1
0237  REF   2  LAST  101           36,3547  02665 0          STORE   HOLDW
0238                                36,3550  57543 1          DLOAD*  DCOMP     CALC MIDDLE 3X9 PARTITION OF W MATRIX
0239  REF  14  LAST 1257           36,3551  75070 1                  ZI,2
0240                                36,3552  74301 0          NORM    VXSC
0241  REF  18  LAST 1257           36,3553  00052 0                  S2
0242  REF   3  LAST 1256           36,3554  02651 1                  OMEGAM2
0243                                36,3555  77624 1          CALL
0244  REF   2  LAST 1257           36,3556  75753 1                  FAZA2
0250                                36,3557  77653 1          VAD*
0251  REF  54  LAST 1257           36,3560  02555 0                  W +108D,1
0252  REF   3  LAST 1257           36,3561  02673 1          STORE   HOLDW +6
0253                                36,3562  77614 1          BOFF
0254  REF   9  LAST 1255           36,3563  02746 0                  DMENFLG   BRANCH IF 6 DIMENSIONAL
0255  REF   1                      36,3564  75577 0                  FAZB
0256                                36,3565  57543 1          DLOAD*  DCOMP     CALC LOWER 3X9 PARTITION OF W MATRIX
0257  REF  15  LAST 1257           36,3566  75070 1                  ZI,2
0258                                36,3567  74301 0          NORM    VXSC
0259  REF  19  LAST 1257           36,3570  00052 0                  S2
0260  REF   3  LAST 1256           36,3571  02657 1                  OMEGAM3
0261                                36,3572  77624 1          CALL
0262  REF   3  LAST 1257           36,3573  75753 1                  FAZA2
0268                                36,3574  77653 1          VAD*
0269  REF  55  LAST 1257           36,3575  02643 1                  W +162D,1
0270  REF   4  LAST 1257           36,3576  02701 0          STORE   HOLDW +12D
0271                                36,3577  77624 1  FAZB    CALL
0272  REF  22  LAST  631           36,3600  22327 1                  GRP2PC
0273                                36,3601  77776 1          EXIT
0274  REF   5  LAST 1257           36,3602  3 1107 0  FAZB1   CA      WIXA      START 2ND PHASE OF INCORP2 TO TRANSFER
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0275  REF   1             36,3603  6 3764 1          AD      6DD          TEMP REG TO PERM W MATRIX
0276  REF   4  LAST 1257  36,3604  55'110 1          TS      WIXB
0277  REF   5  LAST 1257  36,3605  3 1111 1          CA      ZIXA
0278  REF   1             36,3606  6 7701 0          AD      MINUS2
0279  REF   4  LAST 1257  36,3607  55'112 0          TS      ZIXB
0280  REF 229  LAST 1257  36,3610  0 6006 1          TC      INTPRET
0281                       36,3611  66350 1           LXA,1   SSP
0282  REF   6  LAST 1257  36,3612  01107 0                   WIXA
0283  REF  40  LAST 1257  36,3613  00051 0                   S1
0284                       36,3614  00006 1                   6
0285                       36,3615  77775 1           VLOAD
0286  REF   5  LAST 1257  36,3616  02665 0                   HOLDW
0287  REF  56  LAST 1257  36,3617  06467 1           STORE   W +54D,1
0288                       36,3620  77775 1           VLOAD
0289  REF   6  LAST 1258  36,3621  02673 1                   HOLDW +6
0290  REF  57  LAST 1258  36,3622  06555 1           STORE   W +108D,1
0291                       36,3623  77214 0           BOFF    VLOAD
0292  REF  10  LAST 1257  36,3624  02746 0                   DMENFLG
0293  REF   1             36,3625  75635 0                   FAZB5
0294  REF   7  LAST 1258  36,3626  02701 0                   HOLDW +12D
0295  REF  58  LAST 1258  36,3627  06643 0           STORE   W +162D,1
0296                       36,3630  52100 1  FAZB2    TIX,1   GOTO
0297                       36,3631  75633 0                   +2
0298  REF   1             36,3632  75643 1                   FAZC         DONE WITH W MATRIX. UPDATE STATE VECTOR
0299                       36,3633  77634 0           RTB
0300  REF   1             36,3634  75520 1                   FAZA
0301                       36,3635  43335 0  FAZB5    SLOAD   DAD
0302  REF   5  LAST 1258  36,3636  01113 0                   ZIXB
0303  REF   1             36,3637  35766 0                   12DD
0304                       36,3640  52030 0           BHIZ    GOTO
0305  REF   2  LAST 1258  36,3641  75643 1                   FAZC
0306  REF   1             36,3642  75630 0                   FAZB2
0307                       36,3643  77624 1  FAZC     CALL
0308  REF  23  LAST 1257  36,3644  22327 1                   GRP2PC
0309                       36,3645  53375 0           VLOAD   VAD          START 3RD PHASE OF INCORP2
0310  REF   8  LAST  618  36,3646  01701 0                   X789         7TH,8TH,9TH,COMPONENT OF STATE VECTOR
0311  REF  16  LAST 1255  36,3647  01130 1                   DELTAX +12D  INCORPORATION FOR X789
0312  REF   2  LAST  125  36,3650  03450 0           STORE   TX789
0313                       36,3651  47014 1           BON     RTB
0314  REF  10  LAST  632  36,3652  00707 1                   VEHUPFLG
0315  REF   1             36,3653  75743 0                   DOCSM
0316  REF   1             36,3654  27070 0                   MOVEPLEM
0317                       36,3655  77004 0  FAZAB    BOVB    AXT,2
0318  REF   9  LAST  933  36,3656  57544 0                   TCDANZIG
0319                       36,3657  00000 1                   0
0320                       36,3660  77014 1           BOFF    AXT,2
0321  REF   7  LAST  584  36,3661  04343 1                   MOONTHIS
0322                       36,3662  75664 1                   +2
0323                       36,3663  00002 0                   2
0324                       36,3664  53775 1           VLOAD   VSR*
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0325  REF  17  LAST 1258   36,3665  01114 1                DELTAX      B27 IF MOON ORBIT, B29 IF EARTH
0326                       36,3666  57205 1                0 -7,2
0327                       36,3667  40055 0          VAD   BOV
0328  REF   4  LAST  301   36,3670  01521 0                TDELTAV
0329  REF   1              36,3671  75703 1                FAZAB1
0330  REF   5  LAST 1259   36,3672  25521 0          STOVL TDELTAV
0331  REF  18  LAST 1259   36,3673  01122 1                DELTAX +6   B5 IF MOON ORBIT, B7 IF EARTH
0332                       36,3674  53257 1          VSR*  VAD
0333                       36,3675  57202 0                0 -4,2
0334  REF   4  LAST  302   36,3676  01527 0                TNUV
0335                       36,3677  77600 1          BOV
0336  REF   1              36,3700  75707 0                FAZAB2
0337  REF   5  LAST 1259   36,3701  35527 1          STCALL TNUV
0338  REF   1              36,3702  75716 0                FAZAB3
0339                       36,3703  53375 0  FAZAB1  VLOAD VAD
0340  REF  13  LAST  922   36,3704  01535 0                RCV
0341  REF  19  LAST 1259   36,3705  01114 1                DELTAX
0342  REF  14  LAST 1259   36,3706  01535 0          STORE RCV
0343                       36,3707  53375 0  FAZAB2  VLOAD VAD
0344  REF  12  LAST  922   36,3710  01543 1                VCV
0345  REF  20  LAST 1259   36,3711  01122 1                DELTAX +6
0346  REF  13  LAST 1259   36,3712  01543 1          STORE VCV
0347                       36,3713  45134 0          SXA,2 CALL
0348  REF   3  LAST  274   36,3714  02150 1                PBODY
0349  REF   1              36,3715  23420 0                RECTIFY
03491                      36,3716  77624 1  FAZAB3  CALL
03492 REF  24  LAST 1258   36,3717  22327 1                GRP2PC
0350                       36,3720  47014 1          BON   RTB
0351  REF  11  LAST 1258   36,3721  00707 1                VEHUPFLG
0352  REF   1              36,3722  75746 0                DOCSM1
0353  REF   1              36,3723  27047 1                MOVEALEM
0354                       36,3724  77624 1          CALL
0355  REF   2  LAST  274   36,3725  20264 0                SVDWN2      STORE DOWNLINK STATE VECTOR
0356                       36,3726  77624 1  FAZAB4  CALL
0357  REF  25  LAST 1259   36,3727  22327 1                GRP2PC      PHASE CHANGE
0358                       36,3730  77214 0          BOFF  VLOAD
0359  REF  11  LAST 1258   36,3731  02746 0                DMENFLG
0360  REF   1              36,3732  75735 1                FAZAB5      6 DIMENSIONAL
0361  REF   3  LAST 1258   36,3733  03450 0                TX789       9 DIMENSIONAL
0362  REF   9  LAST 1258   36,3734  01701 0          STORE X789
0363                       36,3735  66150 0  FAZAB5  LXA,1 SXA,1
0364  REF  13  LAST 1256   36,3736  02310 1                EGRESS
0365  REF   8  LAST 1196   36,3737  00052 0                GPRET
0366                       36,3740  77776 1          EXIT
0367  REF  55  LAST 1068   36,3741  0 4655 0         TC    POSTJUMP    EXIT
0368  REF   2  LAST  642   36,3742  27527 1          CADR  INTWAKE
0369                       36,3743  52034 1  DOCSM   RTB   GOTO
0370  REF   1              36,3744  27023 0                MOVEPCSM
0371  REF   1              36,3745  75655 0                FAZAB
0372                       36,3746  45034 1  DOCSM1  RTB   CALL
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L MEASUREMENT INCORPORATION USER'S PAGE NO. 9 E5 S3

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0373   REF   2  LAST   35   36,3747   26774 1                    MOVEAGSM
0374   REF   2  LAST  274   36,3750   20240 0                    SVDWN1          STORE DOWNLINK STATE VECTOR
0375                        36,3751   77650 1           GOTO
0376   REF   1              36,3752   75726 0                    FAZAB4
03761                       36,3753   71124 0  FAZA2    XCHX,2   LXC,2
03762  REF  20  LAST 1257   36,3754   00051 0                    S2
03763  REF  31  LAST 1254   36,3755   00047 1                    X2
03764                       36,3756   53674 1           XAD,2    VSL*
03765  REF   3  LAST 1254   36,3757   02214 1                    NORMGAM
03766                       36,3760   57576 1                    0,2
03767                       36,3761   43524 0           XCHX,2   RVQ
03768  REF  21  LAST 1260   36,3762   00051 0                    S2
0377   REF  38  LAST 1255   26,3335             ZEROO    =        ZEROVECS
0378                        36,3763   00066 1  54DD     DEC      54
0379                        36,3764   77771 0  6DD      DEC      -6
0380                        36,3765   00014 1  12DD     DEC      12
R0400


04005  REF   1              31,2000                    SETLOC   MEASINC3
0401                        31,3705                    BANK
0402   REF   1                                         COUNT*   $$/INCOR

0403                        31,3705   51575 1  NEWZCOMP VLOAD    ABVAL
0404   REF  16  LAST 1257   31,3706   02707 0                    ZI
0405   REF   1              31,3707   24045 0           STOVL    NORMZI
0406   REF  17  LAST 1260   31,3710   02715 0                    ZI +6
0407                        31,3711   41446 1           ABVAL    PUSH
0408                        31,3712   50025 0           DSU      BMN
0409   REF   2  LAST 1260   31,3713   00045 0                    NORMZI
0410                        31,3714   63717 0                    +3
0411                        31,3715   45545 1           DLOAD    STADR
0412   REF   3  LAST 1260   31,3716   77732 1           STORE    NORMZI
0413                        31,3717   51575 1           VLOAD    ABVAL
0414   REF  18  LAST 1260   31,3720   02723 0                    ZI +12D
0415                        31,3721   45206 1           PUSH     DSU
0416   REF   4  LAST 1260   31,3722   00045 0                    NORMZI
0417                        31,3723   71240 1           BMN      DLOAD
0418   REF   1              31,3724   63730 0                    NEWZCMP1
04185                       31,3725   77626 0           STADR
0419   REF   5  LAST 1260   31,3726   43732 0           STCALL   NORMZI          LARGEST ABVAL
0420   REF   2  LAST 1260   31,3727   63730 0                    NEWZCMP1

0423                        31,3730   66145 1  NEWZCMP1 DLOAD    SXA,1
0424   REF   6  LAST 1260   31,3731   00045 0                    NORMZI
0425   REF   7  LAST 1260   31,3732   00044 1                    NORMZI          SAVE X1
0426                        31,3733   62101 0           NORM     INCR,1
0427   REF  55  LAST 1254   31,3734   00047 1                    X1
0428                        31,3735   00002 0           DEC      2
0429                        31,3736   53775 1           VLOAD    VSL*
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L MEASUREMENT INCORPORATION USER'S PAGE NO. 10 E5 S3

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0430   REF  19  LAST 1260   31,3737   02707 0              ZI
0431                        31,3740   20201 0              0,1
0432   REF  20  LAST 1261   31,3741   26707 0     STOVL    ZI
0433   REF  21  LAST 1261   31,3742   02715 0              ZI +6
0434                        31,3743   77657 0     VSL*
0435                        31,3744   20201 0              0,1
0436   REF  22  LAST 1261   31,3745   26715 0     STOVL    ZI +6
0437   REF  23  LAST 1261   31,3746   02723 0              ZI +12D
0438                        31,3747   66057 0     VSL*     SXA,1
0439                        31,3750   20201 0              0,1
0440   REF   8  LAST 1260   31,3751   00045 0              NORMZI +1       SAVE SHIFT
0441   REF  24  LAST 1261   31,3752   02723 0     STORE    ZI +12D
0442                        31,3753   54150 1     LXA,1    XSU,1
0443   REF   4  LAST 1260   31,3754   02214 1              NORMGAM
0444   REF   9  LAST 1261   31,3755   00045 0              NORMZI +1
0445                        31,3756   77660 1     XSU,1
0446   REF  10  LAST 1261   31,3757   00045 0              NORMZI +1
0447                        31,3760   70130 1     SXA,1    LXC,1
0448   REF   5  LAST 1261   31,3761   02214 1              NORMGAM
0449   REF  11  LAST 1261   31,3762   00045 0              NORMZI +1
0450                        31,3763   40270 0     XAD,1    SETPD
0451   REF  12  LAST 1261   31,3764   00044 1              NORMZI
0452                        31,3765   00003 1              2D
0453                        31,3766   77650 1     GOTO
0454   REF   2  LAST 1254   31,3767   75416 0              INCOR2 -3
0455                         0044             NORMZI   =    36D
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L CONIC SUBROUTINES USER'S PAGE NO. 1 EO S3

P0001 PROGRAM DESCRIPTION - ENTIRE CONIC SUBROUTINE LOG SECTION DATE - 1 SEPTEMBER 1967
R0003 MOD NO. - 0 LOG SECTION - CONIC SUBROUTINES
R0005 MOD BY KRAUSE ASSEMBLY - COLOSSUS REVISION 88
R0007

R0008 FUNCTIONAL DESCRIPTION -

R0009 THE FOLLOWING SET OF SUBROUTINES SOLVE VARIOUS PROBLEMS INVOLVING THE TRAJECTORY PRODUCED BY A CENTRAL
R0011 INVERSE-SQUARE FORCE ACTING ON A POINT MASS, AS OUTLINED IN THE CMC AND LGC LUNAR LANDING MISSION GSOP, SECTION
R0013 5.5.1.2. A GENERAL USAGE POINT-OF-VIEW WAS TAKEN IN FORMULATING, MECHANIZING, AND SCALING THE SUBROUTINES,
R0015 RATHER THAN OPTIMIZING EACH FOR A PARTICULAR USE. THEREFORE, MULTIPLE USAGE CAN BE MADE OF THE SUBROUTINES
R0017 INVOLVING ANY REALISTIC SET OF CONSTRAINTS. IT SHOULD BE NOTED THAT ONLY ONE SET OF CODING IS USED, WHETHER THE
R0019 EARTH, MOON, OR ANY OTHER CELESTIAL BODY IS SPECIFIED AS THE CENTRAL BODY OF THE PROBLEM, PROVIDED ONE OBSERVES
R0021 THE INHERENT SCALE CHANGE REQUIRED IN POSITION, VELOCITY, MU, AND TIME, AS OUTLINED IN MISSION PROGRAMMING
R0023 DEFINITION MEMO NO. 10. THIS CAN BE ACCOMPLISHED BY SIMPLY ADDING TO THE MUTABLE AND INITIALIZING THE SUBROU-
R0025 TINES APPROPRIATELY.
R0026 DUE TO THE UNIFORMITY OF THE EQUATIONS INVOLVED, CODING WAS MINIMIZED BY TREATING INDIVIDUAL EQUATIONS AND
R0028 BLOCKS OF EQUATIONS AS SUBROUTINES OF LOWER RANK WHENEVER POSSIBLE. AS A RESULT, THREE BY-PRODUCTS SUBROUTINES,
R0030 DIRECTLY USABLE AS INDEPENDENT SUBROUTINES, WERE GENERATED.

R0031 RESTRICTIONS -

R0032 THE ONLY LIMITATION IN THE SCOPE OF PROBLEM WHICH CAN BE SOLVED BY A PARTICULAR SUBROUTINE IS THE SCALING
R0034 LIMIT OF EACH PARAMETER AS SPECIFIED IN THE GSOP. THESE SCALING LIMITS WERE CHOSEN SO THAT ALL FEASIBLE TRAJEC-
R0036 TORIES COULD BE HANDLED.
R0037 SINCE THE SUBROUTINES (EXCEPT KEPLER) USE COMMON SUBROUTINES OF LOWER RANK WHICH USE ERASABLE OTHER THAN
R0039 THE PUSHLIST (DUE TO ITS LIMITED SIZE) AND COMMON INTERPRETIVE SWITCHES, THE CONIC SUBROUTINES CANNOT BE ALLOWED
R0041 TO INTERRUPT EACH OTHER. IT IS UP TO THE USER TO GUARANTEE THIS CONDITION.
R0043

L CONIC SUBROUTINES USER'S PAGE NO. 2 EO S3

P0044 PROGRAM DESCRIPTION - KEPLER SUBROUTINE DATE - 11 OCTOBER 1967
R0046 MOD NO. -1 LOG SECTION - CONIC SUBROUTINES
R0048 MOD BY KRAUSE ASSEMBLY - COLOSSUS 103 AND SUNDANCE 222
R0050 MOD NO. - 2 (AUGUST 1968) BY ROBERTSON: TO PERMIT BACKDATING BY MORE THAN ONE ORBITAL PERIOD.

R0502 MOD NO. - 3 (DEC 1968) BY ROBERTSON: SUPPRESSION OF X-MODULO-ING

R0503 MOD. NO. - 4 (JAN 1969) BY ROBERTSON: CLEAR OVFIND AT KEPLER ENTRY

R0051 FUNCTIONAL DESCRIPTION -
R0052 THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND THE DESIRED TRANSFER TIME THROUGH WHICH THE STATE IS TO
R0054 BE UPDATED ALONG A CONIC TRAJECTORY, COMPUTES THE NEW, UPDATED STATE VECTOR. THE TRAJECTORY MAY BE ANY CONIC
R0056 SECTION - CIRCULAR, ELLIPTIC, PARABOLIC, HYPERBOLIC, OR RECTILINEAR WITH RESPECT TO THE EARTH OR THE MOON. THE
R0058 USE OF THE SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT
R0060 INTRODUCING ANY CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY. AN ITERA-
R0062 TION TECHNIQUE IS UTILIZED IN THE COMPUTATION.
R0063 IF A NEGATIVE TIME-OF-FLIGHT IS INPUT, THE PROGRAM WILL SOLVE FOR THE STATE WHICH WOULD BE PRODUCED BY
R0065 EXTRAPOLATING THE POSITION BACKWARD IN TIME.
R0651 IF THE ABSOLUTE VALUE OF THE DESIRED TRANSFER TIME EXCEEDS THE ORBITAL PERIOD, THE SUBROUTINE, THROUGH A
R0653 MODULAR TECHNIQUE, WILL COMPUTE THE STATE CORRESPONDING TO THE DESIRED TIME (WHETHER POSITIVE OR NEGATIVE).
R0066

R0067 THE RESTRICTIONS ARE -
R0068 1. (PREVIOUS RESTRICTION ON THE NEGATIVE DESIRED TRANSFER TIME IS NOW DELETED.)
R0071 2. THE PARAMETERS IN THE PROBLEM CANNOT EXCEED THEIR SCALING LIMITS AS SPECIFIED IN THE GSOP. IF
R0073 ANY OF THESE LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0075

R0076 THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATION SPEED IS DEPENDENT ON THE ACCURACY OF THE
R0078 GUESS, XKEPNEW. THE AGC COMPUTATION TIME IS APPROXIMATELY .061 SECONDS FOR INITIALIZATION, .065 SECONDS FOR THE
R0080 FINAL COMPUTATIONS, PLUS .083 SECONDS FOR EACH ITERATION.
R0081

R0082 REFERENCES -
R0083 R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP, SECTION 5.5, SGA
R0085 MEMO 67-4.
R0086

R0087 INPUT - ERASABLE INITIALIZATION REQUIRED

	* SCALE FACTOR *	
R0089 VARIABLE	*IN POWERS OF 2*	DESCRIPTION AND REMARKS
R0091 RRECT	* +29 FOR EARTH	DP INITIAL POSITION VECTOR IN METERS
R0092	* +27 FOR MOON *	

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R0093   VRECT    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0094             * +5 FOR MOON  *
R0095   X1 (38D)* NONE           *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0097             *              *RESPECTIVELY, IS THE CENTRAL BODY
R0098   TAU.     * +28            *DESIRED TRANSFER TIME IN CENTISECONDS (DP)
R00987            *              *    MAY BE POS OR NEG AND ABSOLUTE VALUE MAY BE GREATER OR LESS THAN ONE ORBITAL PERIOD.
R0099   XKEPNEW * +17 FOR EARTH*DP GUESS OF ROOT X OF KEPLERS EQN IN SQRT(METERS). SIGN SHOULD AGREE WITH THAT OF TAU.
R0100             * +16 FOR MOON *    AND ABS VALUE SHOULD BE LESS THAN THAT CORRESPONDING TO A PERIOD,VIZ, 2PI SQRT(SEMI-
R0101             *              *    MAJOR AXIS),FOR SPEED OF CONVERGENCE,BUT IF EITHER CONDITION FAILS, XKEPNEW IS RESET
R01017            *              *    BY KEPLER TO A POOR BUT VALID GUESS.
R0102   TC        * +28            *DP PREV. VALUE OF TIME IN CENTISECS.  MUST BE LESS THAN ONE ORBITAL PERIOD.
R0103   XPREV    * +17 FOR EARTH*DP PREV. VALUE OF X IN SQRT(METERS).  MUST BE LESS THAN AN X CORRESPONDING TO ONE
R0105             * +16 FOR MOON *    ORBITAL PERIOD,VIZ,2PI SQRT(SEMI-MAJOR AXIS)
R0106

R0107   SUBROUTINES CALLED -
R0108        DELTIME
R0109

R0110   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0111   KEPRTN-2 GOTO                  MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0113   KEPRTN-1        KEPLER        RETURNS WITH XPREV IN MPAC. PL IS AT 0.
R0114   KEPRTN   ...                  CONTINUE

R0115   KEPLER MUST NOT BE CALLED DIRECTLY SINCE AN INTERRUPTION OF IT WOULD DESTROY THE ERASABLES IT NEEDS TO COMPLETE
R0117   THE INTERRUPTED JOB.  THEREFORE THE USER MUST CALL CSMCONIC OR LEMCONIC WHICH GUARANTEES NO INTERRUPTS AND WHICH
R0119   ALSO CALLS KEPPREP TO COMPUTE A GUESS OF XKEPNEW.
R0120

R0121   ABORT EXIT MODES -
R0122        NONE
R0123

R0124   OUTPUT -

R0125             * SCALE FACTOR *
R0126   VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0127   --------*--------------*                        ----------------------
R0128   RCV       * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS
R0129             * +27 FOR MOON *
R0130   VCV       * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC
R0131             * +5 FOR MOON  *
R0132   TC        * +28            *DP TRANSFER TIME IN CENTISECS TO WHICH KEPLER CONVERGED. ALWAYS LESS THAN ONE PERIOD.
R0134   XPREV     * +17 FOR EARTH*DP VALUE OF X IN SQRT(METERS) TO WHCIH KEPLER CONVERGED. ALWAYS LESS THAN THE X
R0136             * +16 FOR MOON *    CORRESPONDING TO ONE PERIOD.
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RC137   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
RC138

RC139   DEBRIS -

RC140        PARAMETERS WHICH MAY BE OF USE -

RC141             * SCALE FACTOR *
RC142   VARIABLE *IN POWERS OF 2*                    DESCRIPTION AND REMARKS
RC143   ---------*--------------*                    -----------------------
RC144   URRECT   * +1           *DP UNIT VECTOR OF INITIAL POSITION
RC145   R1       * +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION IN METERS
RC146             * +27 FOR MOON *
RC147   ALPHA    * -22 FOR EARTH*DP INVERSE OF SEMIMAJOR AXIS IN 1/METERS
RC148             * -20 FOR MOON *
RC1481  TMODULO  * +28           *DP INTEGRAL NUMBER OF PERIODS IN  CENTISECS. WHICH WAS SUBTRACTED FROM TAU. TO PRODUCE A
RC1483           *               *TAU. OF LESS THAN ONE PERIOD.

RC149        PARAMETERS OF NO USE -
RC150   DP PARAMETERS - EPSILONT, DELX, DELT, RCNORM, XMODULO, PLUS PUSHLIST REGISTERS 0 THROUGH 39D.
RC152
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L CONIC SUBROUTINES USER'S PAGE NO. 5 EO S3

PC153 PROGRAM DESCRIPTION - LAMBERT SUBROUTINE DATE - 1 SEPTEMBER 1967
RC155 MOD NO. - 0 LOG SECTION - CONIC SUBROUTINES
RC157 MOD BY KRAUSE ASSEMBLY - COLOSSUS REVISION 88
RC159

RC160 FUNCTIONAL DESCRIPTION -

RC161 THIS SUBROUTINE CALCULATES THE INITIAL VELOCITY REQUIRED TO TRANSFER A POINT-MASS ALONG A CONIC TRAJECTORY
RC163 FROM AN INITIAL POSITION TO A TERMINAL POSITION IN A PRESCRIBED TIME INTERVAL. THE RESULTING TRAJECTORY MAY BE
RC165 A SECTION OF A CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON. THE USE OF THE
RC167 SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY
RC169 CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY. AN ITERATION TECHNIQUE IS
RC171 UTILIZED IN THE COMPUTATION.
RC172

RC173 THE RESTRICTIONS ARE -
RC174 1. RECTILINEAR TRAJECTORIES CANNOT BE COMPUTED.
RC175 2. AN ACCURACY DEGRADATION OCCURS AS THE COSINE OF THE TRUE ANOMALY DIFFERENCE APPROACHES +1.0.
RC177 3. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
RC179 AND LESS THAN 178 DEGREES 12.5 MINUTES.
RC180 4. NEGATIVE TRANSFER TIME IS AMBIGUOUS AND WILL RESULT IN NO SOLUTION.
RC182 5. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP. IF THE
RC184 LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
RC185 THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATIONS SPEED IS DEPENDENT ON THE ACCURACY OF THE FIRST
RC187 GUESS OF THE INDEPENDENT VARIABLE, COGA. THE AGC COMPUTATION TIME IS APPROXIMATE-
RC189 LY .105 SECONDS FOR INITIALIZATION, .069 SECONDS FOR FINAL COMPUTATIONS, PLUS .205 SECONDS FOR EACH ITERATION.
RC191

RC192 REFERENCES -
RC193 R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8,
RC195 SGA MEMO 67-4.
RC196

RC197 INPUT - ERASABLE INITIALIZATION REQUIRED

RC198 * SCALE FACTOR *
RC199 VARIABLE*IN POWERS OF 2* DESCRIPTION AND REMARKS
RC200 --------*-----------* ---------------------
RC201 R1VEC * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
RC202 * +27 FOR MOON *
RC203 R2VEC * +29 FOR EARTH*DP TARGET OR TERMINAL POSITION VECTOR IN METERS
RC204 * +27 FOR MOON *
RC205 TDESIRED* +28 *DP DESIRED TRANSFER TIME IN CENTISECONDS
RC206 X1 (38D)* NONE *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
RC208 * *RESPECTIVELY, IS THE CENTRAL BODY
RC209 GEOMSGN * NONE *SP +.5 IF DESIRED TRANSFER ANGLE IS LESS THAN 180 DEGREES, -.5 IF GREATER THAN 180 DEG.
RC211 GUESSW * NONE *AN INTERPRETER SWITCH TO BE SET IF NO GUESS OF COGA IS AVAILABLE, CLEAR IF A GUESS OF

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R0213          *              *COGA IS TO BE USED BY LAMBERT
R0214   COGA   * +5            *DP GUESS OF COTANGNT OF FLIGHT PATH ANGLE (MEASURED FROM VERTICAL).  THIS WILL BE
R0216                         *IGNORED IF GUESSW IS SET.
R0217   NORMSW * NONE         *AN INTERPRETER SWITCH TO BE SET IF ON IS TO BE AN INPUT TO THE SUBROUTINE, CLEAR IF
R0219          *              *LAMBERT IS TO COMPUTE ITS OWN NORMAL (UN).
R0220   UN     * +1           *DP UNIT  NORMAL TO THE DESIRED ORBIT PLANE IN THE DIRECTION OF THE RESULTING ANGULAR
R0222          *              *MOMENTUM VECTOR.  THIS WILL BE IGNORED IF NORMSW IS CLEAR.
R0224   VTARGTAG* NONE         *A S.P. TAG TO BE SET TO ZERO IF LAMBERT IS TO COMPUTE THE VELOCITY AT R2VEC AS WELL AS
R0226          *              *AT R1VEC.
R0227

R0228   SUBROUTINES CALLED -
R0229        GEOM, GETX, DELTIME, ITERATOR, LAMENTER (PART OF NEWSTATE)
R0230

R0231   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0232   L       CALL                  MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0234   L+1             LAMBERT       RETURNS WITH PL AT 0 AND WITH VVEC IN MPAC IF VTARGTAG WAS NON-ZERO OR VTARGET
R0236                                 IN MPAC IF VTARGTAG WAS ZERO
R0237   L+2     BON                   CONTINUE IF SOLNSW CLEAR SINCE SOLUTION IS ACCEPTABLE
R0239   L+3             SOLNSW
R0240   L+4             LAMABORT
R0241        IF A LAMBERT RESULT IS TO BE A FIRST GUESS FOR THE NEXT LAMBERT CALCULATION, COGA MUST BE PRESERVED AND
R0243   GUESSW MUST BE CLEAR FOR EACH SUCCEEDING LAMBERT CALL.
R0244

R0245   ABORT EXIT MODES -
R0246        IF SOLNSW WAS SET UPON EXITING, EITHER LAMBERT WAS ASKED TO COMPUTE A TRANSFER TOO NEAR 0 OR 360 DEG, OR T
R0248   WAS TOO SMALL TO PRODUCE A REALISTIC TRANSFER BETWEEN R1VEC AND R2VEC.  IN EITHER CASE THE FIX MUST BE MADE
R0250   ACCORDING TO THE NEEDS OF THE PARTICULAR USER.  THE ABORT EXIT MODE MAY BE CODED AS ...
R0252   LAMABORT DLOAD  ABS           A MEASURE OF PROXIMITY TO 0 OR
R0253                   I-CSTH        360 DEGREES.
R0254           DSU     BMN
R0255                   ONEBIT
R0256                   CHANGER2      CHANGE R2VEC DIRECTION SLIGHTLY.
R0257           DLOAD   DAD
R0258                   TDESIRED
R0259                   SOMETIME
R0260           STCALL  TDESIRED      INCREASE TDESIRED
R0261                   LAMBERT
R0262

R0263   OUTPUT -
R0264          * SCALE FACTOR *
R0265   VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
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R0266   --------*--------------*                    ----------------------
R0267   VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND REQUIRED TO SATISFY THE BOUNDARY VALUE
R0269           * +5 FOR MOON  *PROBLEM.
R0270   VTARGET * +7 FOR EARTH *DP RESULTANT VELOCITY VECTOR AT R2VEC IN METERS/CENTISECOND.
R0272           * +5 FOR MOON  *
R0273   SOLNSW  * NONE         *INTERPRETER SWITCH WHICH IS SET IF THE SUBROUTINE CANNOT SOLVE THE PROBLEM, CLEAR IF THE
R0275           *              *SOLUTION EXISTS.
R0276   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0277

R0278   DEBRIS -
R0279        PARAMETERS WHICH MAY BE OF USE -

R0280           * SCALE FACTOR *
R0281   VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
R0282   --------*--------------*                    ----------------------
R0283   SNTH    * +1           *DP SIN OF ANGLE BETWEEN R1VEC AND R2VEC
R0284   CSTH    * +1           *DP COSINE OF ANGLE
R0285   1-CSTH  * +2           *DP 1-CSTH
R0286   COTGA   * +5           *DP COTAN OF INITIAL REQUIRED FLIGHT PATH ANGLE MEASURED FROM VERTICAL
R0289   P       * +4           *DP RATIO  OF SEMILATUS RECTUM TO INITIAL RADIUS
R0290   R1A     * +6           *DP RATIO OF INITIAL RADIUS TO SEMIMAJOR AXIS
R0291   R1 (32D)* +29 FOR EARTH*DP INITIAL RADIUS IN METERS
R0292           * +27 FOR MOON *
R0293   UR1     * +1           *DP UNIT VECTOR OF R1VEC
R0294   U2      * +1           *DP UNIT VECTOR OF R2VEC

R0295        PARAMETERS OF NO USE
R0296   DP PARAMETERS - EPSILONL, CSTH-RHO, TPREV, TERRLAMB, R2, RTNLAMB (SP),  PLUS PUSHLIST REGISTER 0 THROUGH 41D
R0298   ADDITIONAL INTERPRETIVE SWITCHES USED - INFINFLG, 360SW, SLOPESW, ORDERSW
R0300
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L CONIC SUBROUTINES USER'S PAGE NO. 8 EO S3

PROGRAM DESCRIPTION - TIME-THETA SUBROUTINE
MOD NO. - 0
MOD BY KRAUSE

DATE - 1 SEPTEMBER 1967
LOG SECTION - CONIC SUBROUTINES
ASSEMBLY - COLOSSUS REVISION 88

FUNCTIONAL DESCRIPTION -

THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION, PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR. THE RESULTING TRAJECTORY MAY BE A SECTION OF A CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON. THE USE OF THE SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.

THE RESTRICTIONS ARE -

1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES AND LESS THAN 178 DEGREES 12.5 MINUTES.

2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP. IF THE LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

THE AGC COMPUTATION TIME IS APPROXIMATELY .292 SECONDS.

REFERENCES -

R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.

INPUT - ERASABLE INITIALIZATION REQUIRED

VARIABLE	* SCALE FACTOR * IN POWERS OF 2*	DESCRIPTION AND REMARKS
RVEC	* +29 FOR EARTH * +27 FOR MOON *	*DP INITIAL POSITION VECTOR IN METERS
VVEC	* +7 FOR EARTH * +5 FOR MOON *	*DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
SNTH	* +1	*DP SINE OF TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE STATE IS TO BE UPDATED
CSTH	* +1	*DP COSINE OF THE ANGLE
RVSW	* NONE	*AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE IS TO BE COMPUTED ALSO.
X1 (38D)	*NONE	*INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON, RESPECTIVELY, IS THE CENTRAL BODY.

SUBROUTINES CALLED -

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RC353          PARAM, GEOM, GETX, DELTIME, NEWSTATE
RC354
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RC355   CALLING SEQUENCE AND NORMAL EXIT MODES -

RC356      IF ONLY TIME IS DESIRED AS OUTPUT -
RC357   L        SET    CALL          MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
RC359   L+1             RVSW
RC360   L+2             TIMETHET      RETURN WITH PL AT 0 AND T IN MPAC
RC361   L+3      ...                  CONTINUE
RC362

RC363      IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
RC364   L        CLEAR  CALL          MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
RC366   L+1             RVSW
RC367   L+2             TIMETHET      RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN OD OF THE PUSHLIST AND
RC369                                 THE INITIAL VELOCITY VECTOR IN MPAC.
RC370   L+3      STOVL  NEWVVEC
RC371   L+4      STADR
RC372   L+5      STORE  NEWRVEC              NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
RC374   L+6      ...                         CONTINUE
RC375
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RC376   ABORT EXIT MODES -
RC377           IF COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-THETA, TIME-THETA WILL TRANSFER TO POODOO WITH
RC379           AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 AND 721).
RC386
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RC387   OUTPUT -
RC388           * SCALE FACTOR *
RC389   VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
RC390   --------*--------------*                    -----------------------
RC391   T (3OD) * +28           *DP TRANSFER TIME IN CENTISECONDS
RC392   INFINFLG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF THE TRANSFER ANGLE REQUIRES CLOSURE THROUGH
RC394           *               *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
RC396   COGAFLAG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
RC398           *               *CLEAR IF NOT.

RC399   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

RC400   MPAC -  * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
RC401    MPAC +5* +5 FOR MOON  *
RC402   OD - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
RC403           * +27 FOR MOON *

RC404   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
RC405
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L CONIC SUBROUTINES USER'S PAGE NO. 10 ED 53

DEBRIS -

PARAMETERS WHICH MAY BE OF USE -

VARIABLE	* SCALE FACTOR * IN POWERS OF 2	DESCRIPTION AND REMARKS
R1 (32D)	* +29 FOR EARTH * +27 FOR MOON	*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R1A	* +6	*DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
P	* +4	*DP RATIO OF SEMILATUS RECTUM TO R1
COGA	* +5	*DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
UR1	* +1	*DP UNIT VECTOR OF RVEC
U2	* +1	*DP UNIT VECTOR OF VVEC
UN	* +1	*DP UNIT VECTOR OF UR1*U2

PARAMETERS OF NO USE -

SP PARAMETERS - RTNTT, GEOMSGN, RTNPRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D

ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW

L CONIC SUBROUTINES USER'S PAGE NO. 11 EC 53

R0428 PROGRAM DESCRIPTION - TIME-RADIUS SUBROUTINE DATE - 11 OCTOBER 1967
R0430 MOD NO. -1 LOG SECTION - CONIC SUBROUTINES
R0432 MOD BY KRAUSE ASSEMBLY - COLOSSUS REVISION 88
R0434

R0435 FUNCTIONAL DESCRIPTION -

R0436 THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED RADIUS TO WHICH THE
R0438 STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0440 PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR. THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0442 CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON. THE USE OF THE SUBROUTINE CAN BE
R0444 EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0446 ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0447 IF THE DESIRED RADIUS IS BEYOND THE RADIUS OF APOCENTER OF THE CONIC OR BELOW THE RADIUS OF PERICENTER,
R0449 APSESW WILL BE SET AND THE SUBROUTINE WILL RETURN THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY.
R0451

R0452 THE RESTRICTIONS ARE -
R0453 1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0455 AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0456 2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP. IF THE LIMITS
R0458 ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0458 3. AN ACCURACY DEGRADATION OCCURS AS THE SENSITIVITIES OF TIME AND UPDATED STATE VECTOR TO CHANGES IN
R0583 RDESIRED INCREASE. THIS WILL OCCUR NEAR EITHER APSIS OF THE CONIC AND WHEN THE CONIC IS NEARLY CIRCULAR. IN
R0585 PARTICULAR, IF THE CONIC IS AN EXACT CIRCLE, THE PROBLEM IS UNDEFINED AND THE SUBROUTINE WILL ABORT.
R0587

R0459 THE AGC COMPUTATION TIME IS APPROXIMATELY .363 SECONDS
R0460

R0461 REFERENCES -
R0462 R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0464

R0465 INPUT - ERASABLE INITIALIZATION REQUIRED

R0466		* SCALE FACTOR *	
R0467	VARIABLE	*IN POWERS OF 2*	DESCRIPTION AND REMARKS
R0468	--------	*------------*	----------
R0469	RVEC	* +29 FOR EARTH	*DP INITIAL POSITION VECTOR IN METERS
R0470		* +27 FOR MOON *	
R0471	VVEC	* +7 FOR EARTH	*DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0472		* +5 FOR MOON *	
R0473	RDESIRED	* +29 FOR EARTH	*DP TERMINAL RADIAL DISTANCE ON CONIC TRAJECTORY FOR WHICH TRANSFER TIME IS TO BE
R0475		* +27 FOR MOON	*COMPUTED.
R0476	SGNRDOT	* NONE	*SP TAG SET TO +.5 OR -.5 ACCORDING TO WHETHER THE RADIAL VELOCITY AT RDESIRED IS TO BE
R0478		*	*POSITIVE OR NEGATIVE, RESPECTIVELY. THIS TAG REDUCES THE DOUBLE-VALUED PROBLEM TO A

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RC480           *                   *SINGLE-VALUED PROBLEM.
RC481   XI (380)*NONE               *INDEX REGISTER TO BE SET TO -2D OR -1 D ACCORDING TO WHETHER THE EARTH OR MOON,
RC483           *                   *RESPECTIVELY, IS THE CENTRAL BODY.
RC484   RVSW     * NONE              *AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
RC486           *                   *IS TO BE COMPUTED ALSO.
RC487


RC488   SUBROUTINES CALLED -
RC489        PARAM, GEOM, GETX, DELTIME, NEWSTATE
RC490


RC491   CALLING SEQUENCE AND NORMAL EXIT MODES -

RC492      IF ONLY TIME IS DESIRED AS OUTPUT -
RC493   L          SET    CALL             MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
RC495   L+1               RVSW
RC496   L+2               TIMERAD          RETURN WITH PL AT 0 AND T IN MPAC
RC497   L+3        ...                     CONTINUE
RC498

RC499      IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
RC500   L          CLEAR  CALL             MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
RC502   L+1               RVSW
RC503   L+2               TIMERAD          RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN 0D OF THE PUSHLIST AND
RC505                                       THE INITIAL VELOCITY VECTOR IN MPAC.
RC506   L+3        STOVL  NEWVVEC
RC507   L+4        STADR
RC508   L+5        STORE  NEWRVEC                  NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
RC510   L+6        ...                             CONTINUE
RC511


RC512   ABORT EXIT MODES -
RC513        IF SOLNSW AND/OR COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-RADIUS, TIME-RADIUS WILL TRANSFER
RC515        TO POODOO WITH AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 & 721)
RC522


RC523   OUTPUT -
RC524           * SCALE FACTOR *
RC525   VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
RC526   --------*--------------*                    -----------------------
RC527   T (30D) * +28           *DP TRANSFER TIME IN CENTISECONDS
RC528   INFINFLG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED AND SGNRDOT REQUIRE CLOSURE THROUGH
RC530           *               *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
RC532   COGAFLAG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
RC534           *               *CLEAR IF NOT.
RC535   APSESW  * NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED WAS GREATER THAN RADIUS OF APOCENTER OR
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R0537           *               *LESS THAN RADIUS OF PERICENTER.  THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY,
R0539           *               *WILL THEN BE RETURNED.  THE SWITCH IS CLEAR IF RDESIRED WAS BETWEEN PERICENTER AND
R0541           *               *APOCENTER.
R0541.1 SCLNSW  * NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF THE CONIC IS SO CLOSE TO A CIRCLE THAT THE TERMIN
R0541.3                         *POINT IS AMBIGUOUS, VIOLATING RESTRICTION 3.  IF ECCENTRICITY IS GREATER THAN 2-TO-THE-
R0541.5                         *MINUS-18, THE SWITCH IS CLEAR.
R0542

R0543   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0544   MPAC -   * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0545    MPAC +5* +5 FOR MOON   *
R0546   QC - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0547           * +27 FOR MOON *

R0548   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0549


R0550   DEBRIS -

R0551         PARAMETERS WHICH MAY BE OF USE -

R0552           * SCALE FACTOR *
R0553   VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
R0554   --------*--------------*                    ----------------------
R0555   R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0557           * +27 FOR MOON *
R0558   R1A      * +6           *DP RATIO OF R1 TC SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0560   P        * +4           *DP RATIO OF SEMILATUS RECTUM TO R1
R0561   COGA     * +5           *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0563   UR1      * +1           *DP UNIT VECTOR OF RVEC
R0564   U2       * +1           *DP UNIT VECTOR OF VVEC
R0565   UN       * +1           *DP UNIT VECTOR OF UR1*U2
R0566   CSTH     * +1           *DP COSINE OF TRUE ANOMALY DIFFERENCE BETWEEN RVEC AND RDESIRED.
R0568   SNTH     * +1           *DP SINE OF TRUE ANOMALY DIFFERENCE.
R0569

R0570         PARAMETERS OF NO USE -
R0571   SP PARAMETERS -  RTNTT, GEOMSGN, RTNPRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D
R0573   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0574
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PROGRAM DESCRIPTION - APSIDES SUBROUTINE
MOD NO. - 0
MOD BY KRAUSE

DATE - 1 SEPTEMBER 1967
LOG SECTION - CONIC SUBROUTINES
ASSEMBLY - COLOSSUS REVISION 88

FUNCTIONAL DESCRIPTION -

THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR CALCULATES THE RADIUS OF PERICENTER AND OF APOCENTER AND THE ECCENTRICITY OF THE RESULTING CONIC TRAJECTORY, WHICH MAY BE A STRAIGHT LINE, CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON. THE USE OF THE SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.

THE RESTRICTIONS ARE -

1. IF APOCENTER IS BEYOND THE SCALING OF POSITION, THE SCALE FACTOR LIMIT (536,870,910 METERS WITH RESPECT TO THE EARTH OR 134,217,727.5 METERS WITH RESPECT TO THE MOON) WILL BE RETURNED.
2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP. IF THE LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

THE AGC COMPUTATION TIME IS APPROXIMATELY .103 SECONDS.

REFERENCES -

MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5

INPUT - ERASABLE INITIALIZATION REQUIRED

VARIABLE	* SCALE FACTOR * IN POWERS OF 2 *	DESCRIPTION AND REMARKS
RVEC	* +29 FOR EARTH * +27 FOR MOON *	DP INITIAL POSITION VECTOR IN METERS
VVEC	* +7 FOR EARTH * +5 FOR MOON *	DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
XI (38D)	* NONE *	INDEX REGISTER TO BE SET TO -2D OR -1DD ACCORDING TO WHETHER THE EARTH OR MOON, RESPECTIVELY, IS THE CENTRAL BODY.

SUBROUTINES CALLED -

PARAM, GEOM

CALLING SEQUENCE AND NORMAL EXIT MODES -

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R0623       IF ONLY TIME IS DESIRED AS OUTPUT -
R0624  L     CALL                MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0626  L+1           APSIDES     RETURNS WITH PL AT 0, RADIUS OF APOCENTER IN MPAC AND RADIUS OF PERICENTER IN OD
R0628  L+2     STODL APOAPSE
R0629  L+3           OD
R0630  L+4     STORE PERIAPSE          APOAPSE AND PERIAPSE ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS
R0632  L+5     ...                 CONTINUE
R0633
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R0634  OUTPUT -
R0635          * SCALE FACTOR *
R0636  VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
R0637  --------*--------------*                    -----------------------
R0638  MPAC    * +29 FOR EARTH*DP RADIUS OF APOCENTER IN METERS
R0639          * +27 FOR MOON *
R0640  OD-1D   * +29 FOR EARTH*DP RADIUS OF PERICENTER IN METERS
R0641          * +27 FOR MOON *
R0642  ECC     * +3            *DP ECCENTRICITY OF CONIC TRAJECTORY.

R0643  FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0644
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R0645  DEBRIS -

R0646       PARAMETERS WHICH MAY BE OF USE -

R0647          * SCALE FACTOR *
R0648  VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
R0649  --------*--------------*                    -----------------------
R0650  R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0652          * +27 FOR MOON *
R0653  R1A     * +6            *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0655  P       * +4            *DP RATIO OF SEMILATUS RECTUM TO R1
R0656  COGA    * +5            *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0658  UR1     * +1            *DP UNIT VECTOR OF RVEC
R0659  U2      * +1            *DP UNIT VECTOR OF VVEC
R0660  UN      * +1            *DP UNIT VECTOR OF UR1*U2
R0661  MAGVEC2 * +7 FOR EARTH *DP MAGNITUDE OF VVEC
R0662          * +5 FOR MOON  *
R0663
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R0664       PARAMETERS OF NO USE -
R0665  SP PARAMETERS - RTNAPSE, GEOMSGN, RTNPRM, PLUS PUSHLIST LOCATIONS 0-5,10D-11D, 14D-21D, 31D-38D.
R0667  ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW
R0668


 C669  REF   1            12,2000                  SETLOC CONICS
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L CONIC SUBROUTINES USER'S PAGE NO. 16 E0 S3

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0670                            12,2077                         BANK

0671   REF   1                                                  COUNT* $$/CONIC
0672   REF   2  LAST  100      E5,1723                          EBANK= URT
0685                            12,2077    77624 1  KEPLERN     CALL
0686   REF   1                 12,2100    24577 1              COMSETUP
0687                            12,2101    53575 0              VLOAD   UNIT
0688   REF   3  LAST  515      12,2102    01503 0              RRECT
0689   REF   2  LAST  100      12,2103    16647 0              STODL   URRECT
0690                            12,2104    00045 0              360
0691   REF   5  LAST  915      12,2105    24041 1              STOVL   R1
0692   REF   4  LAST 1277      12,2106    01503 0              RRECT
0693                            12,2107    76441 1              DOT     SL1R
0694   REF   2  LAST   89      12,2110    01511 0              VRECT
0695                            12,2111    76405 1              DMP     SL1R
0696   REF   1                 12,2112    00023 0              1/ROOTMU        1/ROOTMU (-17 OR -14)
0697   REF   1                 12,2113    24043 0              STOVL   KEPC1   C1=R.V/ROOTMU (+17 OR +16)

0698   REF   3  LAST 1277      12,2114    01511 0              VRECT
0699                            12,2115    57236 1              VSQ     DMPR
0700   REF   1                 12,2116    00017 1              1/MU            1/MU (-34 OR -28)
0701                            12,2117    52405 1              DMP     SL3
0702   REF   6  LAST 1277      12,2120    00041 1              R1
0703                            12,2121    61425 0              DSU     ROUND
0704   REF   1                 12,2122    33410 1              D1/64
0705   REF   1                 12,2123    00045 0              STORE   KEPC2   C2=RV.V/MU -1 (+6)

0706                            12,2124    74421 0              BDSU    SR1R
0707   REF   2  LAST 1277      12,2125    33410 1              D1/64
0708                            12,2126    77671 1              DDV
0709   REF   7  LAST 1277      12,2127    00041 1              R1
0710   REF   1                 12,2130    00011 1              STORE   ALPHA   ALPHA=(1-C2)/R1 (-22 OR -20)

0711                            12,2131    71244 0              BPL     DLOAD   MAXIMUM X DEPENDS ON TYPE OF CONIC
0712   REF   1                 12,2132    24141 0              1REV
0713   REF   1                 12,2133    33426 1              -50SC           -50SC (+12)
0714                            12,2134    40071 0              DDV     BOV
0715   REF   2  LAST 1277      12,2135    00011 1              ALPHA
0716   REF   1                 12,2136    24145 1              STOREMAX
0717                            12,2137    52166 1              SQRT    GOTO
0718   REF   2  LAST 1277      12,2140    24145 1              STOREMAX

0719                            12,2141    55366 1  1REV        SQRT    BDDV
0720   REF   4  LAST  677      12,2142    33430 0              2PISC           2PISC (+6)
0721                            12,2143    77600 1              BOV
0722   REF   3  LAST 1277      12,2144    24145 1              STOREMAX
0723   REF   1                 12,2145    00013 0  STOREMAX    STORE   XMAX
0724                            12,2146    65205 0              DMP     PDDL
0725   REF   2  LAST 1277      12,2147    00023 0              1/ROOTMU
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C726   REF   3  LAST 1277   12,2150  00011 1                    ALPHA
C727                        12,2151  65301 0            NORM     PDDL
C728   REF  56  LAST 1260   12,2152  00047 1                    X1
C729                        12,2153  56257 1            SL*      DDV
C730                        12,2154  20173 0                     0 -0,1
C731                        12,2155  50000 1            BOV      BMN
C732   REF   1              12,2156  24172 0                     MODDONE
C733   REF   2  LAST 1278   12,2157  24172 0                     MODDONE      MPAC=PERIOD
C734                        12,2160  51525 1  PERIODCH  PDDL     ABS          OD=PERIOD
C735   REF   2  LAST   93   12,2161  02303 0                     TAU.
C736                        12,2162  50025 0            DSU      BMN
C737                        12,2163  00001 0                     OD
C738   REF   3  LAST 1278   12,2164  24172 0                     MODDONE
C739                        12,2165  77765 0            SIGN
C740   REF   3  LAST 1278   12,2166  02303 0                     TAU.
C741   REF   4  LAST 1278   12,2167  16303 0            STODL    TAU.
C750                        12,2170  77650 1            GOTO
C751   REF   1              12,2171  24160 0                     PERIODCH
C752                        12,2172  71201 1  MODDONE   SETPD    DLOAD
C753                        12,2173  00001 0                     0
C754   REF   2  LAST   93   12,2174  02277 1                     XKEPNEW
C755   REF   1              12,2175  00025 0            STORE    X
C7555                       12,2176  53165 0            SIGN     BZE
C756   REF   5  LAST 1278   12,2177  02303 0                     TAU.
C7565  REF   1              12,2200  24347 1                     BADX
C757                        12,2201  51440 0            BMN      ABS
C7575  REF   2  LAST 1278   12,2202  24347 1                     BADX
C758                        12,2203  51025 1            DSU      BPL
C7585  REF   2  LAST 1277   12,2204  00013 0                     XMAX
C759   REF   3  LAST 1278   12,2205  24347 1                     BADX
C7595                       12,2206  51145 0  STORBNDS  DLOAD    BPL
C760   REF   6  LAST 1278   12,2207  02303 0                     TAU.
C7605  REF   1              12,2210  24217 0                     STOREMIN
C761                        12,2211  57545 1            DLOAD    DCOMP
C7615  REF   3  LAST 1278   12,2212  00013 0                     XMAX
C762   REF   1              12,2213  14015 0            STODL    XMIN
C7625  REF   1              12,2214  11762 1                     KEPZERO
C763   REF   4  LAST 1278   12,2215  34013 1            STCALL   XMAX
C764   REF   1              12,2216  24222 0                     DXCOMP
C7645                       12,2217  77745 1  STOREMIN  DLOAD
C765   REF   2  LAST 1278   12,2220  11762 1                     KEPZERO
C7655  REF   2  LAST 1278   12,2221  00015 0            STORE    XMIN
C766                        12,2222  57345 1  DXCOMP    DLOAD    DMPR
C767   REF   7  LAST 1278   12,2223  02303 0                     TAU.
C768   REF   1              12,2224  33421 0                     BEE22
C7685                       12,2225  77646 0            ABS
C769   REF   1              12,2226  15026 1            STODL    EPSILONT
C770   REF   1              12,2227  01553 0                     XPREV
C779                        12,2230  77621 1  XDIFF     BDSU
C780   REF   2  LAST 1278   12,2231  00025 0                     X
```

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0781   REF   2  LAST  100   12,2232   02643 1          STORE  DELX


0782                        12,2233   63545 0  KEPLOOP DLOAD  DSQ
0783   REF   3  LAST 1278   12,2234   00025 0          X      X=XKEP
0784                        12,2235   41501 0          NORM   PUSH   OD=XSQ (+34 OR +32 -N1)     PL AT 2
0785   REF  57  LAST 1278   12,2236   00047 1          XI
0786                        12,2237   53605 1          DMP    SRR*
0787   REF   4  LAST 1278   12,2240   00011 1          ALPHA
0788                        12,2241   21573 0          0 -6,1
0789   REF   1              12,2242   34031 1          STCALL XI     XI=ALPHA XSQ (+6)
0790   REF   1              12,2243   24462 1          DELTIME
0791                        12,2244   44200 0          BOV    BDSU
0792   REF   1              12,2245   24355 1          TIMEOVFL UNLIKELY
0793   REF   8  LAST 1278   12,2246   02303 0          TAU
0794   REF   2  LAST  100   12,2247   02645 1          STORE  DELT   DELT=DELINDEP
0795                        12,2250   44246 1          ABS    BDSU
0796   REF   2  LAST 1278   12,2251   01026 1          EPSILONT
0797                        12,2252   71244 0          BPL    DLOAD
0798   REF   1              12,2253   24375 0          KEPCONVG
0799   REF   6  LAST  917   12,2254   00037 0          T
0800                        12,2255   60225 1          DSU    NORM
0801   REF   2  LAST   89   12,2256   01551 1          TC
0802   REF  58  LAST 1279   12,2257   00047 1          XI
0803                        12,2260   60325 0          PDDL   NORM
0804   REF   3  LAST 1279   12,2261   02643 1          DELX
0805   REF  32  LAST 1260   12,2262   00050 1          X2
0806                        12,2263   41260 0          XSU,1  DMP
0807   REF  33  LAST 1279   12,2264   00047 1          X2
0808   REF   3  LAST 1279   12,2265   02645 1          DELT
0809                        12,2266   56257 1          SLR*   DDV
0810                        12,2267   21202 1          1,1
0811                        12,2270   41542 1          SR1    PUSH   OD=TRIAL DELX               PL AT 2
0812                        12,2271   71244 0          BPL    DLOAD
0813   REF   1              12,2272   24313 0          POSDELX
0814   REF   4  LAST 1279   12,2273   00025 0          X
0815   REF   5  LAST 1278   12,2274   00013 0          STORE  XMAX   MOVE MAX BOUND IN
0816                        12,2275   45221 1          BDSU   DSU                         PL AT 0
0817   REF   3  LAST 1278   12,2276   00015 0          XMIN
0818                        12,2277   51000 0          BOV    BPL
0819   REF   1              12,2300   24305 1          NDXCHNGE
0820   REF   2  LAST 1279   12,2301   24305 1          NDXCHNGE
0821                        12,2302   52145 0          DLOAD  GOTO
0822                        12,2303   00001 0          OD
0823   REF   1              12,2304   24325 0          NEWDELX


0824                        12,2305   45345 1  NDXCHNGE DLOAD  DSU
0825   REF   4  LAST 1279   12,2306   00015 0          XMIN
0826   REF   5  LAST 1279   12,2307   00025 0          X
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0827                          12,2310  52075 1          DMPR   GOTO                TO FORCE MPAC +2 TO ZERO
0828   REF   1                12,2311  33424 0                 DP9/10
0829   REF   2  LAST 1279     12,2312  24325 0                 NEWDELX

0830                          12,2313  77745 1  POSDELX DLOAD
0831   REF   6  LAST 1279     12,2314  00025 0                 X
0832   REF   5  LAST 1279     12,2315  00015 0          STORE  XMIN                MOVE MIN BOUND IN
0833                          12,2316  45221 1          BDSU   DSU                                     PL AT 0
0834   REF   6  LAST 1279     12,2317  00013 0                 XMAX
0835                          12,2320  50000 1          BOV    BMN
0836   REF   1                12,2321  24341 1                 PDXCHNGE
0837   REF   2  LAST 1280     12,2322  24341 1                 PDXCHNGE
0838                          12,2323  77745 1          DLOAD
0839                          12,2324  00001 0                 ONE
0840   REF   4  LAST 1279     12,2325  02643 1  NEWDELX STORE  DELX
0841                          12,2326  43254 0          BZE    DAD
0842   REF   2  LAST 1279     12,2327  24375 0                 KEPCONVG
0843   REF   7  LAST 1280     12,2330  00025 0                 X
0844   REF   8  LAST 1280     12,2331  14025 0          STODL  X
0845   REF   7  LAST 1279     12,2332  00037 0                 T
0846   REF   3  LAST 1279     12,2333  01551 1          STORE  TC
0847                          12,2334  46034 1  BRNCHCTR RTB   BHIZ
0848   REF   1                12,2335  24716 1                 CHECKCTR
0849   REF   3  LAST 1280     12,2336  24375 0                 KEPCONVG
0850                          12,2337  77650 1          GOTO
0851   REF   1                12,2340  24233 0                 KEPLOOP            ITERATE

0852                          12,2341  45345 1  PDXCHNGE DLOAD  DSU
0853   REF   7  LAST 1280     12,2342  00013 0                 XMAX
0854   REF   9  LAST 1280     12,2343  00025 0                 X
0855                          12,2344  52075 1          DMPR   GOTO                TO FORCE MPAC +2 TO ZERO
0856   REF   2  LAST 1280     12,2345  33424 0                 DP9/10
0857   REF   3  LAST 1280     12,2346  24325 0                 NEWDELX

0858                          12,2347  70545 1  BADX    DLOAD  SR1
0859   REF   8  LAST 1280     12,2350  00013 0                 XMAX
0860                          12,2351  77765 0          SIGN
0861   REF   9  LAST 1279     12,2352  02303 0                 TAU
0862   REF  10  LAST 1280     12,2353  34025 1          STCALL X
0864   REF   1                12,2354  24206 0                 STORBNDS
0879                          12,2355  50145 1  TIMEOVFL DLOAD  BMN                X WAS TOO BIG
0880   REF  11  LAST 1280     12,2356  00025 0                 X
08805  REF   1                12,2357  24373 0                 NEGTOVFL
0881   REF   9  LAST 1280     12,2360  00013 0          STORE  XMAX
0882                          12,2361  70545 1  CMNTOVFL DLOAD  SR1
0883   REF   5  LAST 1280     12,2362  02643 1                 DELX
0884   REF   6  LAST 1280     12,2363  02643 1          STORE  DELX
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0885                          12,2364  44254 1          BZE     BDSU
08855  REF    1               12,2365  02267 0                  KEPRTN
0886   REF   12  LAST 1280    12,2366  00025 0                  X
0887   REF   13  LAST 1281    12,2367  14025 0          STODL   X
0888   REF    4  LAST 1280    12,2370  01551 1                  TC
0889   REF    8  LAST 1280    12,2371  34037 1          STCALL  T
0891   REF    1               12,2372  24334 0                  BRNCHCTR
08911  REF    6  LAST 1280    12,2373  34015 1 NEGTOVFL STCALL  XMIN
08913  REF    1               12,2374  24361 0                  CMNTOVFL
0892                          12,2375  44545 0 KEPCONVG DLOAD   SR4R
0893   REF    8  LAST 1277    12,2376  00041 1                  R1
0894                          12,2377  74225 1          DSU     VXSC
0895   REF    1               12,2400  00035 1                  XSQC(XI)
0896   REF    3  LAST 1277    12,2401  02647 0                  URRECT
0897                          12,2402  65372 1          VSL1    PDDL        OD=(R1-XSQC(XI))URRECT (+33 OR +31)
0898   REF   14  LAST 1281    12,2403  00025 0                  X
0899                          12,2404  60316 0          DSQ     NORM
0900   REF   59  LAST 1279    12,2405  00047 1                  X1
0901                          12,2406  57275 0          DMPR    DMPR
0902   REF    3  LAST 1277    12,2407  00023 0                  1/ROOTMU
0903   REF   15  LAST 1281    12,2410  00025 0                  X
0904                          12,2411  53605 1          DMP     SRR*
0905   REF    1               12,2412  00033 1                  S(XI)
0906                          12,2413  21572 1                  0 -7,1
0907                          12,2414  77621 1          BDSU
0908   REF    9  LAST 1281    12,2415  00037 0                  T
0909                          12,2416  74352 0          SL1     VXSC
0910   REF    4  LAST 1277    12,2417  01511 0                  VRECT
0911                          12,2420  53372 1          VSL1    VAD                          PL AT 0
0912                          12,2421  77712 0          VSL4
0913   REF   15  LAST 1259    12,2422  01535 0          STORE   RCV         RCV (+29 OR +27)


0914                          12,2423  60246 1          ABVAL   NORM
0915   REF   34  LAST 1279    12,2424  00050 1                  X2
0916   REF    2  LAST  100    12,2425  16655 0          STODL   RCNORM
0917   REF    2  LAST 1279    12,2426  00031 0                  XI
0918                          12,2427  45275 0          DMPR    DSU
0919   REF    2  LAST 1281    12,2430  00033 1                  S(XI)
0920   REF    1               12,2431  33406 0                  DI/128
0921                          12,2432  76405 1          DMP     SL1R
0922   REF    1               12,2433  00021 1                  ROOTMU
0923                          12,2434  53605 1          DMP     SLR*
0924   REF   16  LAST 1281    12,2435  00025 0                  X
0925                          12,2436  56601 0                  0 -3,2
0926                          12,2437  74271 0          DDV     VXSC
0927   REF    3  LAST 1281    12,2440  02655 0                  RCNORM
0928   REF    4  LAST 1281    12,2441  02647 0                  URRECT
0929                          12,2442  65372 1          VSL1    PDDL        OD=URRECT(XI S(XI)-1)X ROOTMU/RCV (+15
0930   REF    2  LAST 1281    12,2443  00035 1                  XSQC(XI)    OR +13)                      PL AT 6
```

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```
0931                              12,2444  56257 1        SLR*    DDV
0932                              12,2445  56602 0                0 -4,2
0933   REF    4  LAST 1281        12,2446  02655 0                RCNORM
0934                              12,2447  74221 0        BDSU    VXSC
0935   REF    1                   12,2450  33422 0                D1/256
0936   REF    5  LAST 1281        12,2451  01511 0                VRECT
0937                              12,2452  42455 0        VAD     VSL8                                    PL AT 0
0938                              12,2453  77626 0        STADR
0939   REF   14  LAST 1259        12,2454  62234 0        STODL   VCV             VCV (+7 OR +5)
0940   REF   10  LAST 1281        12,2455  00037 0                T
0943   REF    5  LAST 1281        12,2456  15551 1        STODL   TC
0944   REF   17  LAST 1281        12,2457  00025 0                X
0947   REF    2  LAST 1278        12,2460  35553 1        STCALL  XPREV
0949   REF    2  LAST 1281        12,2461  02267 0                KEPRTN
```

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```
0950                        12,2462   77776 1  DELTIME  EXIT                MPAC=XI (+6), OD=XSQ (+34 OR +32 -N1)
0951   REF   7 LAST 1190   12,2463  0 7171 1           TC      POLY
0952                        12,2464   00010 0           DEC     8
0953                        12,2465   02525 1           2DEC    .083333334
0953                        12,2466   12526 0
0954                        12,2467   67356 0           2DEC    -.266666684
0954                        12,2470   75666 0
0955                        12,2471   15001 1           2DEC    .406349155
0955                        12,2472   23771 1
0956                        12,2473   64342 0           2DEC    -.361198675
0956                        12,2474   43674 0
0957                        12,2475   06563 1           2DEC    .210153242
0957                        12,2476   04645 1
0958                        12,2477   75173 0           2DEC    -.086221951
0958                        12,2500   52672 0
0959                        12,2501   00656 1           2DEC    .026268812
0959                        12,2502   14331 0
0960                        12,2503   77633 1           2DEC    -.006163316
0960                        12,2504   40512 0
0961                        12,2505   00023 0           2DEC    .001177342
0961                        12,2506   11210 1
0962                        12,2507   77774 0           2DEC    -.000199055
0962                        12,2510   67506 0
0963   REF 230 LAST 1258    12,2511  0 6006 1           TC      INTPRET
0964   REF   3 LAST 1281   12,2512   14033 1           STODL   S(XI)
0965   REF   3 LAST 1281   12,2513   00031 0                   XI
0966                        12,2514   77776 1           EXIT
0967   REF   8 LAST 1283   12,2515  0 7171 1           TC      POLY
0968                        12,2516   00010 0           DEC     8
0969                        12,2517   01000 0           2DEC    .031250001
0969                        12,2520   00000 1
0970                        12,2521   72525 0           2DEC    -.166666719
0970                        12,2522   52506 0
0971                        12,2523   13301 1           2DEC    .355555413
0971                        12,2524   15337 1
0972                        12,2525   62776 0           2DEC    -.406347410
0972                        12,2526   54733 1
0973                        12,2527   11176 1           2DEC    .288962094
0973                        12,2530   13267 0
0974                        12,2531   73410 0           2DEC    -.140117894
0974                        12,2532   51674 0
0975                        12,2533   01446 0           2DEC    .049247387
0975                        12,2534   33641 1
0976                        12,2535   77451 1           2DEC    -.013081923
0976                        12,2536   65233 0
0977                        12,2537   00055 1           2DEC    .002806389
0977                        12,2540   37266 1
0978                        12,2541   77767 1           2DEC    -.000529414
0978                        12,2542   52336 0
0979   REF 231 LAST 1283    12,2543  0 6006 1           TC      INTPRET
```

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```
0980                        12,2544  53605 1    DMP     SRR*                                    PL AT 0
0981                        12,2545  00001 0               OD
0982                        12,2546  21574 1               0 -5,1
0983  REF   3  LAST 1281   12,2547  00035 1    STORE   XSQC(XI)     XSQC(XI) (+33 OR +31)
0984                        12,2550  72405 0    DMP     SL1
0985  REF   2  LAST 1277   12,2551  00043 0               KEPC1
0986                        12,2552  65234 1    RTB     PDDL        XCH WITH PL. OD=C1 XSQ C(XI) (+49 OR +46
0987  REF  10  LAST 1253   12,2553  45657 1               TPMODE                                  PL AT 0,3
0988                        12,2554  53605 1    DMP     SRR*
0989  REF   4  LAST 1283   12,2555  00033 1               S(XI)
0990                        12,2556  21574 1               0 -5,1
0991                        12,2557  72405 0    DMP     SL1
0992  REF   2  LAST 1277   12,2560  00045 0               KEPC2
0993                        12,2561  65234 1    RTB     PDDL        3D=C2 XSQ S(XI) (+35 OR +33)  PL AT 6
0994  REF  11  LAST 1284   12,2562  45657 1               TPMODE
0995  REF   9  LAST 1281   12,2563  00041 1               R1
0996                        12,2564  76261 0    SR      TAD                                     PL AT 3
0997                        12,2565  20607 1               6
0998                        12,2566  41301 0    NORM    DMP         TO PRESERVE SIGNIF.
0999  REF  60  LAST 1281   12,2567  00047 1               X1
1000  REF  18  LAST 1282   12,2570  00025 0               X
1001                        12,2571  76257 0    SR*     TAD         X(C2 XSQ S(XI) +R1) (+49 OR +46) PL AT 0
1002                        12,2572  20576 1               0 -3,1
1003                        12,2573  57232 0    SL4R    DMPR
1004  REF   4  LAST 1281   12,2574  00023 0               1/ROOTMU
1005  REF  11  LAST 1282   12,2575  00037 0    STORE   T
1006                        12,2576  77616 0    RVQ
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```
100605                          12,2577  40001 1  COMSETUP SETPD  BOV
10061                           12,2600  00001 0                  DD
100615                          12,2601  24602 0                  +1
10062                           12,2602  76731 0           SSP    VLOAD*
100625 REF   1                  12,2603  00027 1                  ITERCTR
10063                           12,2604  00024 1                  2DD
100635 REF   4  LAST  653       12,2605  22301 0                  MUTABLE,1
10064  REF   2  LAST 1277       12,2606  00017 1           STORE  1/MU
100645                          12,2607  77616 0           RVQ

1007                            12,2610  71214 0  ITERATOR BONCLR DLOAD
1008   REF   1                  12,2611  00614 1                  SLOPESW
1009   REF   1                  12,2612  24660 1                  FIRSTIME
1010   REF   1                  12,2613  00037 0                  DEP
1011                            12,2614  60225 1           DSU    NORM
1012   REF   2  LAST  100       12,2615  02764 0                  DEPREV
1013   REF  61  LAST 1284       12,2616  00047 1                  X1
1014                            12,2617  60325 0           PDDL   NORM
1015   REF   1                  12,2620  00015 0                  DELINDEP
1016   REF  35  LAST 1281       12,2621  00050 1                  X2
1017                            12,2622  41260 0           XSU,1  DMP
1018   REF  36  LAST 1285       12,2623  00047 1                  X2
1019   REF   3  LAST  100       12,2624  02762 0                  DELDEP
1020                            12,2625  56257 1           SLR*   DDV                                    PL UP 2
1021                            12,2626  21202 1                  1,1
1022                            12,2627  43142 1           SR1    BOFF
1023   REF   1                  12,2630  04351 1                  ORDERSW
1024   REF   1                  12,2631  24634 0                  SGNCHECK
1025                            12,2632  75246 0           ABS    SIGN     IN CASE 2ND DERIV. CHANGED SIGN, MUST
1026   REF   4  LAST 1285       12,2633  02762 0                  DELDEP   DISREGARD IT TO FIND MIN.

1027                            12,2634  51006 0  SGNCHECK PUSH   BPL      TRIAL DELINDEP                PL DOWN 2
1028   REF   1                  12,2635  24672 1                  POSDEL
1029                            12,2636  43145 0           DLOAD  BCN
1030   REF   1                  12,2637  03770 1                  INDEP
1031   REF   2  LAST 1285       12,2640  04311 0                  ORDERSW
1032   REF   1                  12,2641  24643 0                  MINCHECK
1033   REF   1                  12,2642  00017 1           STORE  MAX      IF NOT 2ND ORDER, CAN MOVE MAX BOUND IN.

1034                            12,2643  45221 1  MINCHECK BDSU   DSU
1035   REF   1                  12,2644  00011 1                  MIN
1036                            12,2645  51000 0           BOV    BPL
1037   REF   1                  12,2646  24652 0                  MODNGDEL
1038   REF   2  LAST 1285       12,2647  24652 0                  MODNGDEL
1039                            12,2650  77650 1           GOTO
1040   REF   1                  12,2651  24704 1                  DELOK

1041                            12,2652  45345 1  MODNGDEL DLOAD  DSU      TRIAL DELINDEP WOULD EXCEED MIN BOUND
1042   REF   2  LAST 1285       12,2653  00011 1                  MIN
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1043   REF   2  LAST 1285   12,2654   03770 1                 INDEP
1044                        12,2655   52005 0          DMP    GOTO
1045   REF   3  LAST 1280   12,2656   33424 0                 DP9/10
1046   REF   1              12,2657   24706 0                 NEWDEL

1047                        12,2660   41335 1  FIRSTIME SLOAD  DMP
1048   REF   1              12,2661   00051 0                 TWEEKIT
1049   REF   3  LAST 1285   12,2662   00011 1                 MIN
1050                        12,2663   67206 1          PUSH   SLOAD
1052   REF   2  LAST 1286   12,2664   00051 0                 TWEEKIT
1053                        12,2665   45205 1          DMP    DSU
10535  REF   2  LAST 1285   12,2666   00017 1                 MAX
1054                        12,2667   52165 1          SIGN   GOTO
1055   REF   5  LAST 1285   12,2670   02762 0                 DELDEP
1056   REF   2  LAST 1285   12,2671   24634 0                 SGNCHECK

1057                        12,2672   43145 0  POSDEL  DLOAD  BON
1058   REF   3  LAST 1286   12,2673   03770 1                 INDEP
1059   REF   3  LAST 1285   12,2674   04311 0                 ORDERSW
1060   REF   1              12,2675   24677 1                 MAXCHECK
1061   REF   4  LAST 1286   12,2676   00011 1          STORE  MIN          IF NOT 2ND ORDER, CAN MOVE MIN BOUND IN.

1062                        12,2677   45221 1  MAXCHECK BDSU  DSU
1063   REF   3  LAST 1286   12,2700   00017 1                 MAX
1064                        12,2701   50000 1          BOV    BMN
1065   REF   1              12,2702   24710 1                 MODPSDEL
1066   REF   2  LAST 1286   12,2703   24710 1                 MODPSDEL
1067                        12,2704   77745 1  DELOK   DLOAD
1068                        12,2705   00001 0                 1D
1069   REF   2  LAST 1285   12,2706   00015 0  NEWDEL  STORE  DELINDEP
1070                        12,2707   77616 0          RVQ

1071                        12,2710   45345 1  MODPSDEL DLOAD  DSU
1072   REF   4  LAST 1286   12,2711   00017 1                 MAX
1073   REF   4  LAST 1286   12,2712   03770 1                 INDEP
1074                        12,2713   52005 0          DMP    GOTO
1075   REF   4  LAST 1286   12,2714   33424 0                 DP9/10
1076   REF   2  LAST 1286   12,2715   24706 0                 NEWDEL

1077   REF 147  LAST 1230   12,2716   4 4770 1 CHECKCTR CS     ONE
1078   REF  34  LAST 1213   12,2717   50 120 1         INDEX  FIXLOC
1079   REF   2  LAST 1285   12,2720   26 026 1         ADS    ITERCTR
1082   REF 644  LAST 1254   12,2721   54 154 0         TS     MPAC
1083   REF  63  LAST 1199   12,2722   0 6030 1         TC     DANZIG
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1084                          12,2723  44545 0  NEWSTATE DLOAD   SR4R
1085  REF  10  LAST 1284     12,2724  00041 1           R1
1089                          12,2725  74225 1           DSU     VXSC
1090  REF   4  LAST 1284     12,2726  00035 1                   XSQC(XI)
1091  REF   3  LAST 1277     12,2727  02724 1                   UR1
1092                          12,2730  65372 1           VSL1    PDDL            6D=(R1-XSQC(XI))UR1 (+33 OR 31) PL AT 6
1093  REF  19  LAST 1284     12,2731  00025 0                   X
1094                          12,2732  60316 0           DSQ     NORM
1095  REF  62  LAST 1285     12,2733  00047 1                   X1
1096                          12,2734  57275 0           DMPR    DMPR
1097  REF   5  LAST 1284     12,2735  00023 0                   1/ROOTMU
1098  REF  20  LAST 1287     12,2736  00025 0                   X
1099                          12,2737  53605 1           DMP     SRR*
1100  REF   5  LAST 1284     12,2740  00033 1                   S(XI)
1101                          12,2741  21572 1                   0 -7,1
1102                          12,2742  77621 1           BDSU
1103  REF  12  LAST 1284     12,2743  00037 0                   T
1104                          12,2744  74352 0           SL1     VXSC
1105  REF  14  LAST  917     12,2745  02746 0                   VVEC
1106                          12,2746  53372 1           VSL1    VAD                                   PL AT 0
1107                          12,2747  41512 1           VSL4    PUSH
1108                          12,2750  77646 0           ABVAL
1109                          12,2751  77701 1  LAMENTER NORM
1110  REF  63  LAST 1287      12,2752  00047 1                   X1
1111  REF   1                 12,2753  16722 1           STODL   R2
1112  REF   4  LAST 1283     12,2754  00031 0                   XI
1113                          12,2755  45205 1           DMP     DSU
1114  REF   6  LAST 1287     12,2756  00033 1                   S(XI)
1115  REF   2  LAST 1281     12,2757  33406 0                   D1/128
1116                          12,2760  76405 1           DMP     SL1R
1117  REF   2  LAST 1281     12,2761  00021 1                   ROOTMU
1118                          12,2762  53605 1           DMP     SLR*
1119  REF  21  LAST 1287     12,2763  00025 0                   X
1120                          12,2764  21176 1                   0 -3,1
1121                          12,2765  74271 0           DDV     VXSC
1122  REF   2  LAST 1287     12,2766  02722 1                   R2
1123  REF   4  LAST 1287     12,2767  02724 1                   UR1
1124                          12,2770  65372 1           VSL1    PDDL            6D=V2VEC PART (+15 OR 13)     PL AT 12
1125  REF   5  LAST 1287     12,2771  00035 1                   XSQC(XI)
1126                          12,2772  56257 1           SLR*    DDV
1127                          12,2773  21175 1                     -4,1
1128  REF   3  LAST 1287     12,2774  02722 1                   R2
1129                          12,2775  77621 1           BDSU
1130  REF   2  LAST 1282     12,2776  33422 0                   D1/256
1131                          12,2777  53361 0           VXSC    VAD                                   PL AT 6
1132  REF  15  LAST 1287     12,3000  02746 0                   VVEC
1133                          12,3001  43412 1           VSL8    RVQ
R1134
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```
1135   REF   1                15,2000                    SETLOC CONICS1
1136                          15,3402                    BANK

1137   REF   1                                           COUNT* $$/CONIC
R1138  DO NOT DISTURB THE ORDER OF THESE CDS, OVERLAYS HAVE BEEN MADE.
1139                          15,3402   00000 1  BEE17   DEC    0                KEEP WITH D1/8 2DEC 1.0B-17 (0000004000)
1140                          15,3403   04000 0  D1/8     2DEC   1.0 B-3
1140                          15,3404   00000 1
1141                          15,3405   00200 0  D1/128   2DEC   1.0 B-7
1141                          15,3406   00000 1
1142                          15,3407   00400 0  D1/64    2DEC   1.0 B-6
1142                          15,3410   00000 1
1143                          15,3411   10000 0  D1/4     2DEC   1.0 B-2
1143                          15,3412   00000 1
1144                          15,3413   02000 0  D1/16    2DEC   1.0 B-4
1144                          15,3414   00000 1
1145                          15,3415   01000 0  D1/32    2DEC   1.0 B-5
1145                          15,3416   00000 1
1146                          15,3417   00020 0  D1/1024  2DEC   1.0 B-10
1146                          15,3420   00000 1
1147                          15,3421   00100 0  D1/256   2DEC   1.0 B-8
1147                          15,3422   00000 1
1148                          15,3423   34631 1  DP9/10   2DEC   .9
1148                          15,3424   23146 0
1149   REF   4  LAST  731     04,3761              KEPZERO  EQUALS LOGZEROS
1150                          15,3425   77467 1  -50SC    2DEC   -50.0 B-12
1150                          15,3426   77777 0
1151                          15,3427   03110 1  2PISC    2DEC   6.28318530 B-6
1151                          15,3430   17665 1
1152   REF   2  LAST  653     15,3414              BEE19    EQUALS D1/32 -1          2DEC 1.0 B-19 (00000 01000)
1153   REF   3  LAST 1287     15,3420              BEE22    EQUALS D1/256 -1         2DEC 1.0 B-22 (00000 00100)
1154                          15,3431   00000 1  ONEBIT   2DEC   1.0 B-28
1154                          15,3432   00001 0
1155                          15,3433   37767 0  COGUPLIM 2DEC   .999511597
1155                          15,3434   37737 0
1156                          15,3435   40010 1  COGLOLIM 2DEC   -.999511597
1156                          15,3436   40040 1
R1157
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```
1158   REF   2 LAST 1276   12,2000                      SETLOC  CONICS
1159                       12,3002                      BANK

1160   REF   2 LAST 1277 TO 1288:   451   451*          COUNT*  $$/CONIC
1161                       12,3002   45020 1  TIMETHET  STQ     CALL
1162   REF   1             12,3003   02712 1                    RTNTT
1163   REF   1             12,3004   25763 1                    PRAMSET
1167                       12,3005   77624 1            CALL
1168   REF   2 LAST  915   12,3006   37727 1                    PARAM
1169                       12,3007   45000 0            BOV     CALL                                    PL AT 0
1170   REF   1             12,3010   25027 0                    COGAOVFL
1171   REF   1             12,3011   25032 1                    GETX
1172                       12,3012   43145 0  COMMNOUT  DLOAD   BON
1173   REF   5 LAST 1287   12,3013   00031 0                    XI
1174   REF   1             12,3014   04310 1                    INFINFLG
1175   REF   1             12,3015   25760 1                    ABTCONIC
1176                       12,3016   45014 0            CLEAR   CALL
1177   REF   1             12,3017   04273 0                    COGAFLAG
1178   REF   2 LAST 1279   12,3020   24462 1                    DELTIME
1179                       12,3021   45014 0            BON     CALL
1180   REF  10 LAST  917   12,3022   03706 0                    RVSW
1181   REF   2 LAST 1289   12,3023   02712 1                    RTNTT
1182   REF   1             12,3024   24723 1                    NEWSTATE
1183                       12,3025   77650 1            GOTO
1184   REF   3 LAST 1289   12,3026   02712 1                    RTNTT


1185                       12,3027   77614 1  COGAOVFL  SETGO
1186   REF   2 LAST 1289   12,3030   04033 0                    COGAFLAG
1187   REF   2 LAST 1289   12,3031   25760 1                    ABTCONIC
11874  REF   1             17,2000                      SETLOC  CONICS2
11876                      17,3727                      BANK
11878  REF   1                                          COUNT*  $$/CONIC
1188                       17,3727   43020 1  PARAM     STQ     CLEAR           MPAC=VIVEC, OD=R1VEC        PL AT 6
1189   REF   2 LAST  100   17,3730   02755 1                    RTNPRM
1190   REF   6 LAST  905   17,3731   03665 1                    NORMSW
11901                      17,3732   77614 1            CLEAR
11902  REF   3 LAST 1289   17,3733   04273 0                    COGAFLAG
1191                       17,3734   45131 0            SSP     CALL
1192   REF   3 LAST  492   17,3735   02675 1                    GEOMSGN
1193                       17,3736   27777 0                    37777           GAMMA ALWAYS LESS THAN 180DEG
1194   REF   1             17,3737   13717 1                    GEOM            MPAC=SNGA (+1), OD=CSGA (+1) PL AT 2
1195                       17,3740   14045 0            STODL   36D             36D=SIN GAMMA (+1)          PL AT 0
1196                       17,3741   56261 1            SR      DDV
1197                       17,3742   20606 0                    5


1198                       17,3743   00045 0                    36D
1199   REF   4 LAST  915   17,3744   33770 1            STOVL*  COGA
1200   REF   5 LAST 1285   17,3745   22301 0                    MUTABLE,1
1201   REF   3 LAST 1285   17,3746   14017 1            STODL   1/MU
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```
1202  REF   3  LAST  100   17,3747  02722 1          MAGVEC2
1203                       17,3750  60316 0   DSQ    NORM
1204  REF  64  LAST 1287   17,3751  00047 1          X1
1205                       17,3752  41275 1   DMPR   DMP
1206  REF   4  LAST 1289   17,3753  00017 1          1/MU
1207  REF  11  LAST 1287   17,3754  00041 1          R1
1208                       17,3755  77657 0   SRR*
1209                       17,3756  21576 0          0 -3,1
1210                       17,3757  44206 0   PUSH   BDSU      0D=R1 V1SQ/MU (+6)      PL AT 2
1211  REF   3  LAST 1288   17,3760  33416 1          D1/32
1212  REF   4  LAST  915   17,3761  16744 1   STODL  R1A       R1A (+6)                PL AT 0

1213                       17,3762  60205 0   DMP    NORM
1214                       17,3763  00045 0          36D
1215  REF  65  LAST 1290   17,3764  00047 1          X1
1216                       17,3765  53605 1   DMP    SR*
1217                       17,3766  00045 0          36D
1218                       17,3767  20575 1          0 -4,1
1219  REF   5  LAST  915   17,3770  36742 0   STCALL P         P (+4)
1221  REF   3  LAST 1289   17,3771  02755 1          RTNPRM
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```
1222  REF  1              05,2000                    SETLOC  CONICS4
1223                      05,3717                    BANK

1224  REF  1                                         COUNT*  $$/CONIC
1225                      05,3717  77656 1  GEOM     UNIT                    MPAC=V2VEC, OD=R1VEC          PL AT 6
1226  REF  2  LAST  100   05,3720  16714 1           STODL   U2              U2 (+1)
1227                      05,3721  00045 0           36D
1228  REF  4  LAST 1290   05,3722  26722 1           STOVL   MAGVEC2                                       PL AT 0
1229                      05,3723  77656 1           UNIT
1230  REF  5  LAST 1287   05,3724  02724 1           STORE   URI             URI (+1)
1231                      05,3725  72441 0           DOT     SL1
1232  REF  3  LAST 1291   05,3726  02714 1           U2
1233                      05,3727  77725 1           PDDL                    OD=CSTH (+1)                  PL AT 2
1234                      05,3730  00045 0           36D
1235  REF 12  LAST 1290   05,3731  24041 1           STOVL   R1              R1 (+29 OR +27)
1236  REF  6  LAST 1291   05,3732  02724 1           URI
1237                      05,3733  76435 1           VXV     VSL1
1238  REF  4  LAST 1291   05,3734  02714 1           U2
1239                      05,3735  75214 1           BON     SIGN
1240  REF  7  LAST 1289   05,3736  03705 0           NORMSW
1241  REF  1              05,3737  13751 0           HAVENORM
1242  REF  4  LAST 1289   05,3740  02675 1           GEOMSGN
1243                      05,3741  40056 0           UNIT    BOV
1244  REF  1              05,3742  13747 1           COLINEAR
1245  REF  4  LAST  491   05,3743  16676 1  UNITNORM STODL   UN              UN (+1)
1246                      05,3744  00045 0           36D
1247                      05,3745  43565 0           SIGN    RVQ             MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
1248  REF  5  LAST 1291   05,3746  02675 1           GEOMSGN

1249                      05,3747  52162 0  COLINEAR VSR1    GOTO
1250  REF  1              05,3750  13743 0           UNITNORM

1251                      05,3751  75246 0  HAVENORM ABVAL   SIGN
1252  REF  6  LAST 1291   05,3752  02675 1           GEOMSGN
1253                      05,3753  77616 0           RVQ             MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
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```
1255   REF   3 LAST 1289   12,2000                    SETLOC CONICS
1256                       12,3032                    BANK

12565  REF   3 LAST 1289 TO 1289:    24   475*       COUNT* $$/CONIC
1257                       12,3032   66374 1  GETX     AXT,2  SSP      ASSUMES P (+4) IN MPAC
1258                       12,3033   00003 1           3
1259   REF  22  LAST 1260  12,3034   00052 0           S2
1260                       12,3035   00001 0           1
1261                       12,3036   77614 1           CLEAR
1262   REF   1             12,3037   04276 0           360SW
1263                       12,3040   65366 1  SQRT     PDDL     OD=SQRT(P)                    PL AT 2
1264   REF   7  LAST  904  12,3041   02734 0           CSTH
1265                       12,3042   44342 1  SR1      BDSU
1266   REF   3  LAST  671  12,3043   33412 0           D1/4
1267                       12,3044   54325 1  PDDL     SRR                                    PL AT 4D
1268   REF   9  LAST  904  12,3045   02732 0           SNTH
1269                       12,3046   21607 0           6
1270                       12,3047   77671 1  DDV                                             PL AT 2
1271                       12,3050   77600 1  BOV
1272   REF   1             12,3051   25165 1           360CHECK
1273                       12,3052   41225 1  DSU      DMP
1274   REF   5  LAST 1289  12,3053   03770 1           COGA                                   PL AT 0
1275                       12,3054   40132 0  SL2R     BOV
1276   REF   2  LAST 1292  12,3055   25165 1           360CHECK
1277                       12,3056   63406 0  WLOOP    PUSH     DSQ      OD=W (+5)                     PL AT 2
1278                       12,3057   65351 0           TLOAD    PDDL     2D=WSQ (+10)                  PL AT 5
1279   REF 645  LAST 1286  12,3060   00155 0           MPAC
1280   REF   5  LAST 1290  12,3061   02744 1           RTA
1281                       12,3062   76202 0  SR4      TAD                                    PL AT 2
1282                       12,3063   75440 0           BMN      SQRT
1283   REF   1             12,3064   25250 1           INFINITY
1284                       12,3065   43306 0  ROOND    DAD                                    PL AT 0D
1285                       12,3066   61000 0  BOV      TIX,2
1286   REF   1             12,3067   25163 1           RESETX2
1287   REF   1             12,3070   25056 0           WLOOP


1288                       12,3071   40065 0           BDDV     BOV
1289   REF   3  LAST 1287  12,3072   33406 0           D1/128
1290   REF   2  LAST 1292  12,3073   25250 1           INFINITY
1291                       12,3074   41440 1  POLYCOEF BMN      PUSH     OD=1/W (+2) OR 16/W (+6)      PL AT 2
1292   REF   3  LAST 1292  12,3075   25250 1           INFINITY
1293                       12,3076   77716 1           DSQ
1294                       12,3077   41301 0           NORM     DMP
1295   REF  66  LAST 1290  12,3100   00047 1           X1
1296   REF   6  LAST 1292  12,3101   02744 1           RTA
1297                       12,3102   77457 1  SRR*     EXIT
1298                       12,3103   21567 0           0 -10D,1
1299   REF   9  LAST 1283  12,3104   0 7171 1          TC       POLY
1300                       12,3105   00005 1           DEC      5
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```
1301                        12,3106  20000 0          2DEC    .5
1301                        12,3107  00000 1
1302                        12,3110  72525 0          2DEC    -.166666770
1302                        12,3111  52471 1
1303                        12,3112  03146 1          2DEC    .100000392
1303                        12,3113  15003 0
1304                        12,3114  75556 0          2DEC    -.071401086
1304                        12,3115  45210 0
1305                        12,3116  01615 1          2DEC    .055503292
1305                        12,3117  13553 0
1306                        12,3120  76371 0          2DEC    -.047264098
1306                        12,3121  63777 0
1307                        12,3122  01232 0          2DEC    .040694204
1307                        12,3123  27367 0
1308  REF 232  LAST 1283    12,3124  0 6006 1         TC      INTPRET
1309                        12,3125  76405 1          DMP     SLIR                    PL AT 0D
1310                        12,3126  43006 0          PUSH    BON
1311  REF   2  LAST 1292    12,3127  04316 1                  360SW
1312  REF   1                12,3130  25235 1                  TRUE360X
1313                        12,3131  60316 0  XCOMMON DSQ     NORM
1314  REF  67  LAST 1292    12,3132  00047 1                  X1
1315                        12,3133  53605 1          DMP     SRR*
1316  REF   7  LAST 1292    12,3134  02744 1                  R1A
1317                        12,3135  21565 1                  C -120,1
1318  REF   6  LAST 1289    12,3136  14031 0          STODL   XI              XI (+6)

1319  REF  13  LAST 1291    12,3137  00041 1                  R1
1320                        12,3140  75542 0  SR1     SQRT
1321                        12,3141  41306 1  ROUND   DMP
1322                        12,3142  77632 0  SL4R                            PL AT 0
1323  REF  22  LAST 1287    12,3143  00025 0  STORE   X               X (+17 OR +16)

1324                        12,3144  60316 0  DSQ     NORM
1325  REF  68  LAST 1293    12,3145  00047 1                  XI
1326                        12,3146  41325 0  PDDL    DMP             OD=XSQ (+34 OR +32 -N1)     PL AT 2
1327  REF   6  LAST 1290    12,3147  02742 1                  P
1328  REF  14  LAST 1293    12,3150  00041 1                  R1
1329                        12,3151  75452 0  SL3     SQRT
1330                        12,3152  56405 0  DMP     SL3R
1331  REF   6  LAST 1292    12,3153  03770 1                  COGA
1332  REF   3  LAST 1284    12,3154  14043 0  STODL   KEPC1
1333  REF   8  LAST 1293    12,3155  02744 1                  R1A
1334                        12,3156  43021 0  BDSU    CLEAR
1335  REF   3  LAST 1277    12,3157  33410 1                  D1/64
1336  REF   2  LAST 1289    12,3160  04270 0                  INFINFLG
1337  REF   3  LAST 1284    12,3161  00045 0  STORE   KEPC2
1338                        12,3162  77616 0  RVQ
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1339                        12,3163  77774 0  RESETX2  AXT,2
1340                        12,3164  00003 1           3

1341                        12,3165  51001 1  360CHECK SETPD  BPL
1342                        12,3166  00001 0           0D
1343  REF   1               12,3167  25172 1           INVRSEQN
1344                        12,3170  77614 1     SET
1345  REF   3  LAST 1293    12,3171  04076 1           360SW

1346                        12,3172  75545 1  INVRSEQN DLOAD   SQRT
1347  REF   7  LAST 1293    12,3173  02742 1           P
1348                        12,3174  41325 0     PDDL  DMP     0D=SQRT(P)  (+2)          PL AT 2
1349  REF  10  LAST 1292    12,3175  02732 0           SNTH
1350  REF   7  LAST 1293    12,3176  03770 1           COSA
1351                        12,3177  65352 0     SL1   PDDL    2D=SNTH COSA (+5)          PL AT 4
1352  REF   8  LAST 1292    12,3200  02734 0           CSTH
1353                        12,3201  43202 0     SR4   DAD
1354  REF   4  LAST 1290    12,3202  33416 1           D1/32
1355                        12,3203  41225 1     DSU   DMP                               PL AT 2,0
1356                        12,3204  55301 0     NORM  BDDV
1357  REF  69  LAST 1293    12,3205  00047 1           X1
1358  REF  11  LAST 1294    12,3206  02732 0           SNTH
1359                        12,3207  51457 0     SLR*  ABS     NOTE: NEAR 360 CASE TREATED DIFFERENTLY
1360                        12,3210  21174 0           0 -5,1
1361                        12,3211  63406 0     PUSH  DSQ     0D=1/W (-1)               PL AT 2
1362                        12,3212  14043 0     STODL 34D
1363  REF   1               12,3213  33414 0           D1/16
1364                        12,3214  63406 0  1/WLOOP  PUSH    DSQ     2D=G (+4)                 PL AT 4
1365                        12,3215  65234 1           RTB     PDDL                      PL AT 7
1366  REF  12  LAST 1284    12,3216  45657 1           TPMODE
1367  REF   9  LAST 1293    12,3217  02744 1           R1A
1368                        12,3220  40405 1     DMP   SR4
1369                        12,3221  00043 0           34D
1370                        12,3222  77771 0     TAD                                     PL AT 4
1371                        12,3223  75440 0     BMN   SQRT
1372  REF   4  LAST 1292    12,3224  25250 1           INFINITY
1373                        12,3225  77615 0     DAD                                     PL AT 2
1374                        12,3226  60304 0     TIX,2 NORM
1375  REF   1               12,3227  25214 1           1/WLOOP
1376  REF  70  LAST 1294    12,3230  00047 1           X1
1377                        12,3231  77665 1     BDDV                                    PL AT 0
1378                        12,3232  52057 1     SLR*  GOTO
1379                        12,3233  21172 0           0 -7,1
1380  REF   1               12,3234  25074 0           POLYCOEF

1381                        12,3235  50145 1  TRUE360X DLOAD   BMN
1382  REF  10  LAST 1294    12,3236  02744 1           R1A
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1383  REF   5  LAST 1294   12,3237  25250 1                INFINITY
1384                       12,3240  60366 1          SQRT  NORM
1385  REF  71  LAST 1294   12,3241  00047 1                X1
1386                       12,3242  53665 1          BODV  SL*
1387  REF   5  LAST 1277   12,3243  33430 0                2PISC
1388                       12,3244  20176 0                0 -3,1
1389                       12,3245  41425 1          DSU   PUSH          OD=2PI/SQRT(R1A) -X          PL AT 0,2
1390                       12,3246  77650 1          GOTO
1391  REF   1              12,3247  25131 0                XCOMMON
1392                       12,3250  40001 1  INFINITY SETPD BOV           NO SOLUTION EXISTS SINCE CLOSURE THROUGH
1393                       12,3251  00001 0                0             INFINITY IS REQUIRED
1394  REF   1              12,3252  25253 1                OVFLCLR
1395                       12,3253  43414 1  OVFLCLR  SET  RVQ
1396  REF   3  LAST 1293   12,3254  04070 1                INFINFLG
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1397                          12,3255  45020 1  LAMBERT  STQ     CALL
1398  REF   5  LAST  100     12,3256  02712 1           RTNLAMB
1399  REF   2  LAST 1277     12,3257  24577 1           COMSETUP
1405                          12,3260  57345 1           DLOAD   DMPR
1406  REF   3  LAST  491     12,3261  02673 1           TDESIRED
1407  REF   1                 12,3262  33415 1           BEE19
1408  REF   1                 12,3263  03772 0           STORE   EPSILONL
1409                          12,3264  77214 0           SET     VLOAD
1410  REF   2  LAST 1285     12,3265  00474 0           SLOPESW
1411  REF   7  LAST  492     12,3266  02657 1           R1VEC
1412                          12,3267  45115 0           PDVL    CALL            OD=R1VEC (+29 OR +27)          PL AT 6
1413  REF  10  LAST  493     12,3270  02665 0           R2VEC   MPAC=R2VEC (+29 OR +27)
1414  REF   2  LAST 1289     12,3271  13717 1           GEOM
1415  REF  12  LAST 1294     12,3272  16732 0           STODL   SNTH            OD=CSTH (+1)                   PL AT 2
1416  REF   5  LAST 1291     12,3273  02722 1           MAGVEC2
1417                          12,3274  65301 0           NORM    PDDL                                           PL AT 4
1418  REF  72  LAST 1295     12,3275  00047 1           X1
1419  REF  15  LAST 1293     12,3276  00041 1           R1
1420                          12,3277  56342 1           SR1     DDV                                            PL AT 2
1421                          12,3300  65257 1           SL*     PDDL            DXCH WITH OD, OD=R1/R2 (+7)    PL AT 0,2
1422                          12,3301  20173 0                   0 -6,1
1423                          12,3302  77626 0           STADR
1424  REF   9  LAST 1294     12,3303  75043 1           STORE   CSTH            CSTH (+1)
1425                          12,3304  44342 1           SR1     BDSU
1426  REF   4  LAST 1292     12,3305  33412 0                   D1/4
1427  REF   2  LAST  100     12,3306  02736 1           STORE   1-CSTH          1-CSTH (+2)

1428                          12,3307  53106 0           ROUND   BZE
1429  REF   1                 12,3310  25524 0                   360LAMB
1430                          12,3311  65301 0           NORM    PDDL                                           PL AT 4
1431  REF  73  LAST 1296     12,3312  00047 1           X1
1432                          12,3313  00001 0                   OD
1433                          12,3314  56342 1           SR1     DDV                                            PL AT 2
1434                          12,3315  75457 0           SL*     SQRT
1435                          12,3316  20176 0                   0 -3,1
1436                          12,3317  54325 1           PDDL    SR              2D=SQRT(2R1/R2(1-CSTH)) (+5)   PL AT 4
1437  REF  13  LAST 1296     12,3320  02732 0                   SNTH
1438                          12,3321  20607 1                   6
1439                          12,3322  43271 1           DDV     DAD                                            PL AT 2
1440  REF   3  LAST 1296     12,3323  02736 1                   1-CSTH
14401                         12,3324  77626 0           STADR
14402 REF   1                 12,3325  77760 0           STORE   COGAMAX
1441                          12,3326  50000 1           BOV     BMN             IF OVFL, COGAMAX=COGUPLIM
1442  REF   1                 12,3327  25334 1                   UPLIM           IF NEG, USE EVEN IF LT COGLOLIM, SINCE
14421 REF   1                 12,3330  25337 1                   MAXCOGA           THIS WOULD BE RESET IN LAMBLOOP
14422                         12,3331  50025 0           DSU     BMN             IF COGAMAX GT COGUPLIM, COGAMAX=COGUPLIM
14423 REF   1                 12,3332  33434 1                   COGUPLIM
14424 REF   2  LAST 1296     12,3333  25337 1                   MAXCOGA         OTHERWISE OK, SO GO TO MAXCOGA
14425                         12,3334  77745 1  UPLIM    DLOAD
14426 REF   2  LAST 1296     12,3335  33434 1                   COGUPLIM        COGUPLIM=.999511597 = MAX VALUE OF COGA
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```
14427  REF   2  LAST 1296   12,3336  00017 1           STORE  COGAMAX          NOT CAUSING OVFL IN R1A CALCULATION
1443                        12,3337  54345 1  MAXCOGA  DLOAD  SR
1444   REF  10  LAST 1296   12,3340  02734 0           CSTH
1445                        12,3341  20607 1           6
1446                        12,3342  45425 0           DSU    STADR
1448   REF   2  LAST  100   12,3343  61037 1           STODL  CSTH-RHO
1449   REF   7  LAST 1291   12,3344  02675 1           GEOMSGN
1450                        12,3345  71240 1           BMN    DLOAD
1451   REF   1              12,3346  25543 1                  LOLIM
1452   REF   3  LAST 1297   12,3347  02740 0           CSTH-RHO
1453                        12,3350  56352 0           SL1    DDV
1454   REF  14  LAST 1296   12,3351  02732 0           SNTH
1455                        12,3352  77600 1           BOV
1456   REF   2  LAST 1297   12,3353  25543 1                  LOLIM
1457   REF   1              12,3354  00011 1  MINCOGA  STORE  COGAMIN         COGAMIN (+5)
1458                        12,3355  66214 0           BON    SSP
1459   REF   4  LAST  729   12,3356  00715 1                  GUESSW
1460   REF   1              12,3357  25530 0                  NOGUESS
1461   REF   3  LAST 1286   12,3360  00051 0                  TWEEKIT
1462                        12,3361  00001 0                  00001
1463                        12,3362  77745 1           DLOAD
1464   REF   8  LAST 1294   12,3363  03770 1                  COGA
1465                        12,3364  77605 1  LAMBLOOP DMP
1466   REF  15  LAST 1297   12,3365  02732 0           SNTH
1467                        12,3366  45342 0           SR1    DSU
1468   REF   4  LAST 1297   12,3367  02740 0           CSTH-RHO
1469                        12,3370  65301 0           NORM   PDDL             OD=SNTH COGA-(CSTH-RHO) (+7+C(X1)) PL=2
1470   REF  74  LAST 1296   12,3371  00047 1                  X1
1471   REF   4  LAST 1296   12,3372  02736 1                  1-CSTH
1472                        12,3373  56257 1           SL*    DDV              1-CSTH  (+2)                  PL AT 0
1473                        12,3374  20170 0                  0 -9D,1
1474                        12,3375  53040 0           BMN    BZE
1475   REF   1              12,3376  25462 0                  NEGP
1476   REF   2  LAST 1297   12,3377  25462 0                  NEGP
1477   REF   8  LAST 1294   12,3400  16742 1           STODL  P                P=(1-CSTH)/(SNTH COGA-(CSTH-RHO)) (+4)
1478   REF   9  LAST 1297   12,3401  03770 1                  COGA
1479                        12,3402  43316 1           DSQ    DAD
1480   REF   2  LAST  671   12,3403  33420 1                  D1/1024
1481                        12,3404  41301 0           NORM   DMP
1482   REF  75  LAST 1297   12,3405  00047 1                  X1
1483   REF   9  LAST 1297   12,3406  02742 1                  P
1484                        12,3407  44257 1           SR*    BDSU
1485                        12,3410  20571 0                  0 -8D,1
1486   REF   5  LAST 1294   12,3411  33416 1                  D1/32
1487   REF  11  LAST 1294   12,3412  16744 1           STODL  R1A              R1A=2-P(1+COGA COGA) (+6)
1488   REF  10  LAST 1297   12,3413  02742 1                  P
1489                        12,3414  45000 0           BOV    CALL
```

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```
1490  REF   1                 12,3415  25465 1                HIENERGY
1491  REF   2  LAST 1289     12,3416  25032 1                GETX
1492                          12,3417  77745 1          DLOAD
1493  REF  13  LAST 1287     12,3420  00037 0                T
1494  REF   1                 12,3421  16764 0          STODL TPREV
1495  REF   7  LAST 1293     12,3422  00031 0                XI
1496                          12,3423  45014 0          BON   CALL
1497  REF   4  LAST 1295     12,3424  04310 1                INFINFLG
1498  REF   3  LAST 1297     12,3425  25462 0                NEGP          HAVE EXCEEDED THEORETICAL BOUNDS
1499  REF   3  LAST 1289     12,3426  24462 1                DELTIME
1500                          12,3427  44200 0          BOV   BDSU
1501  REF   1                 12,3430  25501 1                BIGTIME
1502  REF   4  LAST 1296     12,3431  02673 1                TDESIRED
1503  REF   1                 12,3432  02762 0          STORE TERRLAMB
1504                          12,3433  44246 1          ABS   BDSU
1505  REF   2  LAST 1296     12,3434  03772 0                EPSILONL
1506                          12,3435  47044 1          BPL   RTB
1507  REF   1                 12,3436  25546 1                INITV
1508  REF   2  LAST 1280     12,3437  24716 1                CHECKCTR
1509                          12,3440  43030 0          BHIZ  BON
15091 REF   1                 12,3441  25511 0                SUFFCHEK
15092 REF   3  LAST 1296     12,3442  00714 0                SLOPESW
15093 REF   1                 12,3443  25451 0                GOITER
15094                         12,3444  45345 1          DLOAD DSU
15095 REF  14  LAST 1298     12,3445  00037 0                T
15096 REF   2  LAST 1298     12,3446  02764 0                TPREV
15097                         12,3447  77654 0          BZE
1510  REF   2  LAST 1298     12,3450  25511 0                SUFFCHEK
15105                         12,3451  77624 1  GOITER  CALL
1511  REF   1                 12,3452  24610 0                ITERATOR
1512                          12,3453  53145 1          DLOAD BZE
1513  REF 646  LAST 1292     12,3454  00155 0                MPAC
1514  REF   3  LAST 1298     12,3455  25511 0                SUFFCHEK
1515                          12,3456  77615 0          DAD
1516  REF  10  LAST 1297     12,3457  03770 1                COGA
1517  REF  11  LAST 1298     12,3460  37770 0          STCALL COGA
1519  REF   1                 12,3461  25364 1                LAMBLOOP

1520                          12,3462  51145 0  NEGP    DLOAD BPL     IMPOSSIBLE TRAJECTORY DUE TO INACCURATE
1521  REF   1                 12,3463  00015 0                DCOGA   BOUND CALCULATION. TRY NEW COGA.
1522  REF   1                 12,3464  25504 1                LOENERGY

1523                          12,3465  71201 1  HIENERGY SETPD DLOAD   HIGH ENERGY TRAJECTORY RESULTED
1524                          12,3466  00001 0                1
1525  REF  12  LAST 1298     12,3467  03770 1                COGA    IN OVFL OF P OR R1A, OR XI EXCEEDING 50.
1526  REF   2  LAST 1297     12,3470  00011 1          STORE COGAMIN THIS IS THE NEW BOUND.
1527                          12,3471  70545 1  COMMONLM DLOAD SR1
1528  REF   2  LAST 1298     12,3472  00015 0                DCOGA
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1529    REF   3  LAST 1298   12,3473   00015 0            STORE   DCOGA          USE DCOGA/2 AS DECREMENT
1530                         12,3474   44254 1            BZE     BDSU
15301   REF   4  LAST 1298   12,3475   25511 0                    SUFFCHEK
1531    REF  13  LAST 1298   12,3476   03770 1                    COGA
1532    REF  14  LAST 1299   12,3477   37770 0            STCALL  COGA
1534    REF   2  LAST 1298   12,3500   25364 1                    LAMBLOOP


1535                         12,3501   77745 1  BIGTIME   DLOAD
1536    REF   3  LAST 1298   12,3502   02764 0                    TPREV
1537    REF  15  LAST 1298   12,3503   00037 0            STORE   T


1538                         12,3504   71201 1  LOENERGY  SETPD   DLOAD          LOW ENERGY TRAJECTORY RESULTED
1539                         12,3505   00001 0                    0
1540    REF  15  LAST 1299   12,3506   03770 1                    COGA           IN OVERFLOW OF TIME.
1541    REF   3  LAST 1297   12,3507   34017 0            STCALL  COGAMAX        THIS IS THE NEW BOUND.
1543    REF   1              12,3510   25471 1                    COMMONLM


1544                         12,3511   51545 1  SUFFCHEK  DLOAD   ABS
1545    REF   2  LAST 1298   12,3512   02762 0                    TERRLAMB
1546                         12,3513   41325 0            PDDL    DMP                                  PL AT 2D
1547    REF   5  LAST 1298   12,3514   02673 1                    TDESIRED
1548    REF   5  LAST 1296   12,3515   33412 0                    D1/4
1549                         12,3516   45215 0            DAD     DSU                                  PL AT DD
1550    REF   3  LAST  671   12,3517   33432 1                    CNEBIT
1551                         12,3520   43044 0            BPL     SETGO
1552    REF   2  LAST 1298   12,3521   25546 1                    INITV
1553    REF   1              12,3522   02434 0                    SOLNSW
1554    REF   6  LAST 1296   12,3523   02712 1                    RTNLAMB


1555                         12,3524   43001 1  360LAMB   SETPD   SETGO          LAMBERT CANNOT HANDLE CSTH=1
1556                         12,3525   00001 0                    0
1557    REF   2  LAST 1299   12,3526   02434 0                    SOLNSW
1558    REF   7  LAST 1299   12,3527   02712 1                    RTNLAMB


1559                         12,3530   71331 0  NOGUESS   SSP     DLOAD
1560    REF   4  LAST 1297   12,3531   00051 0                    TWEEKIT
1561                         12,3532   10000 0                    20000
1562    REF   3  LAST 1298   12,3533   00011 1                    COGAMIN
1563                         12,3534   65342 1            SRI     PDDL                                 PL AT 2
1564    REF   4  LAST 1299   12,3535   00017 1                    COGAMAX
1565                         12,3536   43342 0            SRI     DAD
1566                         12,3537   77626 0            STADR                                        PL AT 0
1567    REF  16  LAST 1299   12,3540   74007 0            STORE   COGA
1568    REF   4  LAST 1299   12,3541   34015 1            STCALL  DCOGA
1570    REF   3  LAST 1299   12,3542   25364 1                    LAMBLOOP
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1574                        12,3543  52145 0  LOLIM   DLOAD   GOTO
1575  REF   1               12,3544  33436 0          COGLOLIM        COGLOLIM=-.999511597
1576  REF   1               12,3545  25354 1          MINCOGA

1577                        12,3546  60345 0  INITV   DLOAD   NORM
1578  REF  16  LAST 1296    12,3547  00041 1          R1
1579  REF  76  LAST 1297    12,3550  00047 1          X1
1580                        12,3551  70525 1          PDDL    SR1                             PL AT 2
1581  REF  11  LAST 1297    12,3552  02742 1          P
1582                        12,3553  77671 1          DDV                                     PL AT 0
1583                        12,3554  75457 0          SL*     SQRT
1584                        12,3555  20175 0                  0 -4,1
1585                        12,3556  72405 0          DMP     SL1
1586  REF   3  LAST 1287    12,3557  00021 1          ROOTMU
1587                        12,3560  41206 0          PUSH    DMP             OD=VTAN (+7)    PL AT 2
1588  REF  17  LAST 1299    12,3561  03770 1          COGA
1589                        12,3562  74261 1          SL      VXSC
1590                        12,3563  20206 1                  5
1591  REF   7  LAST 1291    12,3564  02724 1          UR1
1592                        12,3565  77725 1          PDDL            XCH WITH OD             PL AT 0,6
1593                        12,3566  76561 1          VXSC    VSL1
1594  REF   5  LAST 1291    12,3567  02676 1          UN
1595                        12,3570  53235 0          VXV     VAD                             PL AT 0
1596  REF   8  LAST 1300    12,3571  02724 1                  UR1
1597                        12,3572  43172 1          VSL1    CLEAR
1598  REF   3  LAST 1299    12,3573  02674 0                  SOLNSW
1599  REF  16  LAST 1287    12,3574  02746 0          STORE   VVEC
1600                        12,3575  53135 0          SLOAD   BZE
1601  REF   5  LAST  493    12,3576  02704 0                  VTARGTAG
1602  REF   1               12,3577  25602 1                  TARGETV
1603                        12,3600  77650 1          GOTO
1604  REF   8  LAST 1299    12,3601  02712 1                  RTNLAMB

1605                        12,3602  45145 0  TARGETV DLOAD   CALL
1606  REF   6  LAST 1296    12,3603  02722 1                  MAGVEC2
1607  REF   1               12,3604  24751 1                  LAMENTER
1608  REF   4  LAST  493    12,3605  36705 0          STCALL  VTARGET
1610  REF   9  LAST 1300    12,3606  02712 1                  RTNLAMB
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1611                          12,3607  45020 1  TIMERAD  STQ     CALL
1612   REF   1                12,3610  02712 1           RTNTR
1613   REF   2  LAST 1289     12,3611  25763 1           PRAMSET
1617                          12,3612  77624 1           CALL
1618   REF   3  LAST 1289     12,3613  37727 1           PARAM
1619                          12,3614  71200 0           BOV     DLOAD                                  PL AT 0
1620   REF   2  LAST 1289     12,3615  25027 0           COGAOVFL
1621   REF   6  LAST 1297     12,3616  33416 1           D1/32
1622                          12,3617  41225 1           DSU     DMP
1623   REF  12  LAST 1297     12,3620  02744 1           RIA
1624   REF  12  LAST 1300     12,3621  02742 1           P
1625                          12,3622  41366 1           SQRT    DMP
1626   REF  18  LAST 1300     12,3623  03770 1           COGA
1627                          12,3624  74212 0           SL4     VXSC
1628   REF   5  LAST 1291     12,3625  02714 1           U2
1629                          12,3626  45325 1           PDDL    DSU                                    PL AT 6
1630   REF   4  LAST 1293     12,3627  33410 1           D1/64
1631   REF  13  LAST 1301     12,3630  02744 1           RIA
1632                          12,3631  52361 1           VXSC    VSU                                    PL AT 0
1633   REF   9  LAST 1300     12,3632  02724 1           URI
1634                          12,3633  53512 1           VSL4    UNIT
16345                         12,3634  77600 1           BOV
16346  REF   1                12,3635  25713 0           CIRCULAR
1635                          12,3636  60325 0           PDDL    NORM           0D=UNIT(ECC) (+3)       PL AT 6
1636   REF   5  LAST  917     12,3637  02760 1           RDESIRED       36D=ECC (+3)
1637   REF  77  LAST 1300     12,3640  00047 1           X1
1638                          12,3641  41325 0           PDDL    DMP                                    PL AT 8
1639   REF  17  LAST 1300     12,3642  00041 1           R1
1640   REF  13  LAST 1301     12,3643  02742 1           P
1641                          12,3644  56257 1           SL*     DDV                                    PL AT 6
1642                          12,3645  20201 0           0,1
1643                          12,3646  56225 1           DSU     DDV
1644   REF   2  LAST 1294     12,3647  33414 0           D1/16
1645                          12,3650  00045 0           36D            36D=ECC (+3)
1646   REF   1                12,3651  00031 0           STORE   COSF
1647                          12,3652  63400 0           BOV     DSQ
1648   REF   1                12,3653  20453 1           BADR2
1649                          12,3654  50021 1           BDSU    BMN
1650   REF   6  LAST 1299     12,3655  33412 0           D1/4
16505  REF   2  LAST 1301     12,3656  20453 1           BADR2
1651                          12,3657  75366 0           SQRT    SIGN
1652   REF   4  LAST  917     12,3660  02757 0           SGNRDOT
16525                         12,3661  77614 1           CLEAR
1653   REF   1                12,3662  04272 1           APSESW

1654                          12,3663  76561 1  TERMNVEC VXSC    VSL1
1655   REF   6  LAST 1300     12,3664  02676 1           UN
1656                          12,3665  63235 0           VXV     PDVL           VXCH WITH 0D            PL AT 0,6
1657                          12,3666  00001 0           0D
1658                          12,3667  53361 0           VXSC    VAD                                    PL AT 0
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1659   REF   2  LAST 1301   12,3670   00031 0                  COSF
1660                        12,3671   41572 1          VSL1    PUSH      OD=U2                    PL AT 6

1661                        12,3672   56241 0          DOT     DDV       LIMITS RESULT TO POSMAX OR NEGMAX
1662   REF  10  LAST 1301   12,3673   02724 1                  UR1
16622  REF   1              12,3674   33412 0                  DP1/4
16624                       12,3675   40142 1          SR1     BOV       SCALE BACK DOWN TO NORMAL
16625                       12,3676   25677 0                  +1        CLEAR OVFIND IF SET
1663   REF  11  LAST 1297   12,3677   26734 0          STOVL   CSTH      CSTH (+1)
1664   REF  11  LAST 1302   12,3700   02724 1                  UR1
1665                        12,3701   76435 1          VXV     VSL1
1666                        12,3702   72441 0          DOT     SL1
1667   REF   7  LAST 1301   12,3703   02676 1                  UN
1668   REF  16  LAST 1297   12,3704   16732 0          STODL   SNTH      SNTH (+1)
1669   REF  14  LAST 1301   12,3705   02742 1                  P
1670                        12,3706   77624 1          CALL
1671   REF   3  LAST 1298   12,3707   25032 1                  GETX
1672                        12,3710   77614 1          CLRGO
16725  REF   4  LAST 1300   12,3711   02634 1                  SOLNSW
1673   REF   1              12,3712   25012 0                  COMMNOUT

16734                       12,3713   43001 1  CIRCULAR SETPD  SETGO
16735                       12,3714   00001 0                  0
1676   REF   5  LAST 1302   12,3715   02434 0                  SOLNSW
16737  REF   3  LAST 1289   12,3716   25760 1                  ABTCONIC

16738  REF   1              10,2000                    SETLOC  CONICS5
16739                       10,2453                    BANK

16739S REF   1                                         COUNT*  $$/CONIC
1674                        10,2453   75345 1  BADR2   DLOAD   SIGN
16741  REF   3  LAST  732   10,2454   11760 0                  LOOPHALF
16742  REF   3  LAST 1302   10,2455   00031 0                  COSF
16743  REF   4  LAST 1302   10,2456   14031 0          STODL   COSF
1675   REF   3  LAST 1278   10,2457   11762 1                  KEPZERO
16755                       10,2460   77614 1          SETGO
1676   REF   2  LAST 1301   10,2461   04032 1                  APSESW
1677   REF   1              10,2462   25663 0                  TERMNVEC
```

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```
16771  REF   4  LAST 1292   12,2000                        SETLOC  CONICS
16772                       12,3717                        BANK

16773  REF   4 LAST 1292 TO 1302:   437   912*             COUNT*  $$/CONIC
1678                        12,3717   45020 1  APSIDES     STQ     CALL
1679   REF   1              12,3720   02712 1              RTNAPSE
1680   REF   3  LAST 1301   12,3721   25763 1              PRAMSET
1684                        12,3722   77624 1              CALL
1685   REF   4  LAST 1301   12,3723   37727 1              PARAM
1686                        12,3724   77600 1              BOV                          PL AT  0
1687   REF   1              12,3725   25726 0              GETECC
1688                        12,3726   42405 0  GETECC      DMP     SL4
1689   REF  14  LAST 1301   12,3727   02744 1              R1A
1690                        12,3730   75421 1              BDSU    SQRT
1691   REF   5  LAST 1301   12,3731   33410 1              D1/64
1692   REF   3  LAST  674   12,3732   02754 0              STORE   ECC
1693                        12,3733   65215 1              DAD     PDDL                 PL AT  2
1694   REF   1              12,3734   33404 1              D1/8
1695   REF  18  LAST 1301   12,3735   00041 1              R1
1696                        12,3736   72405 0              DMP     SL1
1697   REF  15  LAST 1302   12,3737   02742 1              P
1698                        12,3740   77671 1              DDV                          PL AT  0
1699                        12,3741   60325 0              PDDL    NORM          OD=RP (+29 OR +27)   PL AT  2
1700   REF  15  LAST 1303   12,3742   02744 1              R1A
1701   REF  78  LAST 1301   12,3743   00047 1              X1
1702                        12,3744   53725 1              PDDL    SL*                  PL AT  4
1703   REF  19  LAST 1303   12,3745   00041 1              R1
1704                        12,3746   20174 1              0 -5,1
1705                        12,3747   45271 1              DDV     DSU                  PL AT 2,0
1706                        12,3750   50000 1              BOV     BMN
1707   REF   1              12,3751   25755 1              INFINAPO
1708   REF   2  LAST 1303   12,3752   25755 1              INFINAPO
1709                        12,3753   77650 1              GOTO
1710   REF   2  LAST 1303   12,3754   02712 1              RTNAPSE
1711                        12,3755   52145 0  INFINAPO DLOAD  GOTO      RETURNS WITH APOAPSIS IN MPAC,PERIAPSIS
1712   REF   1              12,3756   11773 1              LOPOSMAX
1713   REF   3  LAST 1303   12,3757   02712 1              RTNAPSE      THAT PL IS AT 0.
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17136                          12,3760   77776 1  ABTCONIC EXIT
17137  REF   7  LAST 1223      12,3761   0 5726 1           TC      POODOO
17138                          12,3762   20607 1            OCT     20607          NO SOLUTION FROM TIMETHET OR TIMERAD
```

```
171385                          12,3763   40001 1  PRAMSET  SETPD   BOV
171386                          12,3764   00001 0                   CD
171387                          12,3765   25766 1                   +1
171388                          12,3766   63375 0           VLOAD   PDVL
171389 REF  12  LAST  917       12,3767   02657 1                   RVEC
17139  REF  17  LAST 1300      12,3770   02746 0                   VVEC
171391                          12,3771   77616 0           RVQ

1714   REF   1                  11,2000                     SETLOC  CONICS3
1715                            11,2300                     BANK

1716   REF   1                                              COUNT*  $$/CONIC
1717                            11,2300   22437 1  MUTABLE  2DEC*   3.986032 E10 B-36*     MUE
1717                            11,2301   16067 1
1718                            11,2302   15625 1           2DEC*   .25087606 E-10 B+34*  1/MUE
1718                            11,2303   21042 1
1719                            11,2304   30276 1           2DEC*   1.99650495 E5 B-18*   SQRT(MUE)
1719                            11,2305   04773 0
1720                            11,2306   25004 1           2DEC*   .50087529 E-5 B+17*   1/SQRT(MUE)
1720                            11,2307   06702 1

1721                            11,2310   16471 1           2DEC    4.902778 E8 B-30       MUM
1721                            11,2311   01352 1
1722                            11,2312   21412 0           2DEC    .203966 E-8 B+28       1/MUM
1722                            11,2313   20500 0
1723                            11,2314   25477 1           2DEC*   2.21422176 E4 B-15*    SQRT(MUM)
1723                            11,2315   03367 0
1724                            11,2316   27533 1           2DEC*   .45162595 E-4 B+14*    1/SQRT(MUM)
1724                            11,2317   07571 0

1725   REF   1                  04,3772           LDPOSMAX EQUALS LODPMAX          DPPOSMAX IN LOW MEMORY.

R1727  ERASABLE ASSIGNMENTS

R1728  KEPLER SUBROUTINE

R1729      INPUT -
R1730  RRECT     ERASE  +5
R1731  VRECT     ERASE  +5
R1732  TAU.      ERASE  +1
R1733  XKEP      ERASE  +1
R1734  TC        ERASE  +1
R1735  XPREV     ERASE  +1
 1736                           0016          1/MU      EQUALS 14D
 1737                           0020          ROOTMU    EQUALS 16D
 1738                           0022          1/ROOTMU  EQUALS 18D
R1739      OUTPUT -
R1740  RCV       ERASE  +5
```

```
R1741   VCV       ERASE  +5
R1742   RC        ERASE  +1
R1743   XPREV     ERASE  +1

R1744   DEBRIS -
 1745                       0010        ALPHA     EQUALS 8D
 1746                       0012        XMAX      EQUALS 10D
 1747                       0014        XMIN      EQUALS 12D
 1748                       0024        X         EQUALS 20D
 1749                       0030        XI        EQUALS 24D
 1750                       0032        S(XI)     EQUALS 26D
 1751                       0034        XSQC(XI)  EQUALS 28D
 1752                       0036        T         EQUALS 30D
 1753                       0040        R1        EQUALS 32D
 1754                       0042        KEPC1     EQUALS 34D
 1755                       0044        KEPC2     EQUALS 36D
R1756   DELX      ERASE  +1
R1757   DELT      ERASE  +1
R1758   URRECT    ERASE  +5
R1759   RCNORM    ERASE  +1
R1760   XPREV     EQUALS XKEP


R1761   LAMBERT SUBROUTINE

R1762      INPUT-
R1763   R1VEC     ERASE  +5
R1764   R2VEC     ERASE  +5
R1765   TDESIRED  ERASE  +1
R1766   GEOMSGN   ERASE  +0
R1767   GUESSW                        0 IF COGA GUESS AVAILABLE, 1 IF NOT
R1768   COGA      ERASE  +1           INPUT ONLY IF GUESSW IS ZERO.
R1769   NORMSW                        0 IF UN TO BE COMPUTED, 1 IF UN INPUT
R1770   UN        ERASE  +5           ONLY USED IF NORMSW IS 1
R1771   VTARGTAG  ERASE  +0
R1772   TWEEKIT   EQUALS 40D          ONLY USED IF GUESSW IS 0

R1773      OUTPUT -
R1774   VTARGET   ERASE  +5           AVAILABLE ONLY IF VTARGTAG IS ZERO.
R1775   V1VEC     EQUALS MPAC

R1776      DEBRIS -
R1777   RTNLAMB   ERASE  +0
R1778   U2        ERASE  +5
R1779   MAGVEC2   ERASE  +1
R1780   UR1       ERASE  +5
R1781   R1        EQUALS 31D
R1782   UN        ERASE  +5
R1783   SNTH      ERASE  +1
R1784   CSTH      ERASE  +1
```

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```
R1785   1-CSTH    ERASE  +1
R1786   CSTH-RHO  ERASE  +1
 1787                      0016          COGAMAX  EQUALS 14D          CLOBBERS 1/MU
 1788                      0010          COGAMIN  EQUALS 8D
 1789                      0014          DCOGA    EQUALS 12D
R1790   TWEEKIT   EQUALS 40D
R1791   P         ERASE  +1
R1792   COGA      ERASE  +1
R1793   R1A       ERASE  +1
R1794   X         EQUALS 20D
R1795   XSQ       EQUALS 22D
R1796   XI        EQUALS 24D
R1797   S(XI)     EQUALS 26D
R1798   XSQC(XI)  EQUALS 28D
R1799   T         EQUALS 30D
R1800   KEPC1     EQUALS 34D
R1801   KEPC2     EQUALS 36D
R1802   SLOPESW
R1803   SOLNSW
R1804   OTHERS -

R1805   RVEC      EQUALS R1VEC
R1806   VVEC      ERASE  +5
R1807   CCGAFLAG
R1808   RVSW
R1809   INFINFLG
R1810   APSESW
R1811   360SW
R1812   RTNTT     EQUALS RTNLAMB
R1813   ECC       ERASE  +1
R1814   RTNTR     EQUALS RTNLAMB
R1815   RTNAPSE   EQUALS RTNLAMB
R1816   R2        EQUALS MAGVEC2
 1817                      0030          COSF     EQUALS 24D
R1818   RTNPRM    ERASE  +0
R1819   SGNRDOT   ERASE  +0
R1820   RDESIRED  ERASE  +1


R1821   ITERATOR SUBROUTINE

R1822   ORDERSW
 1823                      0016          MAX      EQUALS 14D          CLOBBERS 1/MU
 1824                      0010          MIN      EQUALS 8D
R1825   INDEP     ERASE  +1
 1826                      0014          DELINDEP EQUALS 12D
 1827                      0026          ITERCTR  EQUALS 22D
 1828                      0036          DEP      EQUALS 30D
R1829   DELDEP    ERASE  +1
R1830   DEPREV    ERASE  +1
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 1831                          0050          TWEEKIT  EQUALS 40D

R1832   MORE KEPLER

R1833   EPSILONT ERASE  +1

R1834   MORE LAMBERT

R1835   TERRLAMB EQUALS DELDEP
R1836   TPREV    EQUALS DEPREV

R1837   EPSILONL EQUALS EPSILONT +2     DOUBLE PRECISION WORD
```

L INTEGRATION INITIALIZATION USER'S PAGE NO. 1 E0 S3

R0006 1.0 INTRODUCTION
R0007 ----------
R0008
R0009 FROM A USERS POINT OF VIEW, ORBITAL INTEGRATION IS ESSENTIALLY THE SAME AS THE 278 INTEGRATION
R0011 PROGRAM. THE SAME ENTRANCES TO THE PROGRAM WILL BE MAINTAINED, THE SAME STALLING ROUTINE WILL BE USED AND
R0013 OUTPUT WILL STILL BE VIA THE PUSHLIST. THE PRIMARY DIFFERENCES TO A USER INVOLVE THE ADDED CAPABILITY OF
R0015 TERMINATING INTEGRATION AT A SPECIFIC FINAL RADIUS AND THE DIFFERENCE IN STATE VECTOR SCALING INSIDE AND OUT-
R0017 SIDE THE LUNAR SPHERE OF INFLUENCE.
R0018
R0019 IN ORDER TO MAKE THE CSM(LEM)PREC AND CSM(LEM)CONIC ENTRANCES SIMILAR TO FLIGHT 278, THE INTEGRATION PROGRAM
R0021 WILL ITSELF SET THE FINAL RADIUS (RFINAL) TO 0 SO THAT REACHING THE DESIRED TIME ONLY WILL TERMINATE
R0023 INTEGRATION. THE DP REGISTER RFINAL MUST BE SET BY USERS OF INTEGRVS AND INTEGRV, AND MUST BE DONE AFTER THE
R0025 CALL TO INTSTALL.
R0026
R0027 WHEN THE LM IS ON THE LUNAR SURFACE (INDICATED BY LUNAR SURFACE FLAG SET) CALLS TO LEMCONIC, LEMPREC, AND
R0029 INTEGRV WITH VINFLAG = 0 WILL RESULT IN THE USE OF THE PLANETARY INERTIAL ORIENTATION SUBROUTINES TO PROVIDE
R0031 BOTH THE LMS POSITION AND VELOCITY IN THE REFERENCE COORDINATE SYSTEM.
R0032 THE PROGRAM WILL PROVIDE OUTPUT AS IF INTEGRATION WAS USED. THAT IS, THE PUSHLIST WILL BE SET AS NOTED BELOW AND
R0034 THE PERMANENT STATE VECTOR UPDATED WHEN SPECIFIED BY AN INTEGRV CALL.
R0035
R0036 USERS OF INTEGRVS DESIRING INTEGRATION (INTYPFLG = 0) SHOULD NOTE THAT THE OBLATENESS PERTURBATION COMPUTATION
R0038 IN LUNAR ORBIT IS TIME DEPENDENT. THEREFORE, THE USER SHOULD SUPPLY AN INITIAL STATE VECTOR VALID AT SOME REAL
R0040 TIME AND THE DESIRED TIME (TDEC1) ALSO AT SOME REAL TIME. FOR CONIC ,,INTEGRATION,, THE USER MAY STILL USE ZERO
R0042 AS THE INITIAL TIME AND DELTA TIME AS THE DESIRED TIME.
R0043
R0044 2.0 GENERAL DESCRIPTION
R0045 ----------
R0046
R0047 THE INTEGRATION PROGRAM OPERATES AS A CLOSED INTERPRETIVE SUBROUTINE AND PERFORMS THESE FUNCTIONS---
R0049 1) INTEGRATES (PRECISION OR CONIC) EITHER CSM OR LM STATE VECTOR
R0050 2) INTEGRATES THE W-MATRIX
R0051 3) PERMANENT OR TEMPORARY UPDATE OF THE STATE VECTOR
R0052
R0053 THERE ARE SIX ENTRANCES TO THE INTEGRATION PROGRAM. FOUR OF THESE (CSMPREC, LEMPREC, CSMCONIC, LEMCONIC) SET
R0055 ALL THE FLAGS REQUIRED IN THE INTEGRATION PROGRAM ITSELF TO CAUSE THE PRECISION OR CONIC INTEGRATION (KEPLER) OF
R0057 THE LM OR CSM STATE VECTOR, AS THE NAMES SUGGEST. ONE ENTRANCE (INTEGRVS) PERMITS THE CALLING PROGRAM TO
R0059 PROVIDE A STATE VECTOR TO BE INTEGRATED. THE CALLING PROGRAM MUST SET THE FLAGS INDICATING (1) PRECISION OR
R0061 CONIC INTEGRATION, (2) IN OR OUT OF LUNAR SPHERE, (3) MIDCOURSE OR NOT, AND THE INTEGRATION PROGRAM COMPLETES
R0063 THE FLAG SETTING TO BYPASS W-MATRIX INTEGRATION. THE LAST ENTRANCE (INTEGRV, USED IN GENERAL BY THE
R0065 NAVIGATION PROGRAMS) PERMITS THE CALLER TO SET FIVE FLAGS (NOT MOONFLAG OR MIDFLAG) BUT NOT TO INPUT A STATE
R0067 VECTOR. ANY PROGRAM WHICH CALLS INTEGRVS OR INTEGRV MUST CALL INTSTALL BEFORE IT SETS THE INTEGRATION FLAGS
R0069 AND/OR STATE VECTOR.
R0070
R0071 THREE SETS OF 42 REGISTERS AND 2 FLAGS ARE USED FOR THE STATE VECTORS. TWO SETS, WHICH MAY NOT BE OVERLAYED, ARE
R0073 USED FOR THE PERMANENT STATE VECTORS FOR THE CSM AND LM. THE THIRD SET, WHICH MAY BE OVERLAYED WHEN INTEGRATION
R0075 IS NOT BEING DONE, IS USED IN THE COMPUTATIONS.
R0076
R0077 THE PERMANENT STATE VECTORS WILL BE PERIODICALLY UPDATED SO THAT THE VECTORS WILL NOT BE OLDER THAN 4 TIMESTEPS.
R0079 THE PERMANENT STATE VECTORS WILL ALSO BE UPDATED WHENEVER THE W-MATRIX IS INTEGRATED OR WHEN A CALLER OF INTEGRV
R0081 SETS STATEFLG (THE NAVIGATION PROGRAMS P20, P22.)

APPENDIX B OF THE USERS GUIDE LISTS THE STATE VECTOR QUANTITIES.

2.1 RESTARTS

PHASE CHANGES WILL BE MADE IN THE INTEGRATION PROGRAM ONLY FOR THE INTEGRV ENTRANCE (I.E., WHEN THE W-MATRIX IS INTEGRATED OR PERMANENT STATE VECTOR IS UPDATED.) THE GROUP NUMBER USED WILL BE THAT FOR THE P20-25 PROGRAMS (I.E., GROUP2) SINCE THE INTEGRV ENTRANCE WILL ONLY BE USED BY THESE PROGRAMS. IF A RESTART OCCURS DURING AN INTEGRATION OF THE STATE VECTOR ONLY, THE RECOVERY WILL BE TO THE LAST PHASE IN THE CALLING PROGRAM. CALLING PROGRAMS WHICH USE THE INTEGRV OR INTEGRVS ENTRANCE OF INTEGRATION SHOULD ENSURE THAT IF PHASE CHANGING IS DONE THAT IT IS PRIOR TO SETTING THE INTEGRATION INPUTS IN THE PUSHLIST.
THIS IS BECAUSE THE PUSHLIST IS LOST DURING A RESTART.

2.2 SCALING

THE INTEGRATION ROUTINE WILL MAINTAIN THE PERMANENT MEMORY STATE VECTORS IN THE SCALING AND UNITS DEFINED IN APPENDIX B OF THE USERS GUIDE. THE SCALING OF THE OUTPUT POSITION VECTORDEPENDS ON THE ORIGIN OF THE COORDINATE SYSTEM AT THE DESIRED INTEGRATION TIME. THE COORDINATE SYSTEM TRANSFORMATION WILL BE DONE AUTOMATICALLY ON MULTIPLE TIMESTEP ENCKE INTEGRATION ONLY. THUS IT IS POSSIBLE TO HAVE OUTPUT FROM SUCCESSIVE INTEGRATIONS IN DIFFERENT SCALING.
HOWEVER, RATT, VATT WILL ALWAYS BE SCALED THE SAME.

3.0 INPUT/OUTPUT

PROGRAM INPUTS ARE THE FLAGS DESCRIBED IN APPENDIX A AND THE PERMANENT STATE VECTOR QUANTITIES DESCRIBED IN APPENDIX B OF THE USERS GUIDE, PLUS THE DESIRED TIME TO INTEGRATE TO IN TDEC1 (A PUSH LIST LOCATION).
FOR INTEGRVS, THE RCV,VCV, TET OF THE TEMPORARY STATE VECTOR MUST BE SET, PLUS MOONFLAG AND MIDFLAG

FOR SIMULATION THE FOLLOWING QUANTITIES MUST BE PRESET ---

			EARTH	MOON
			29	27
RRECTCSM(LEM)	- RECTIFIED POSITION VECTOR	METERS	2	2
			7	5
VRECTCSM(LEM)	- RECTIFIED VELOCITY VECTOR	M/CSEC	2	2
			28	28
TETCSM(LEM)	- TIME STATE VECTOR IS VALID CUSTOMARILY 0, BUT NOTE LUNAR ORBIT DEPENDENCE ON REAL TIME.	CSEC	2	2
			22	18
DELTAVCSM(LEM)	- POSITION DEVIATION 0 IF TCCSM(LEM) = 0	METERS	2	2
			3	-1
NUVCSM(LEM)	- VELOCITY DEVIATION 0 IF TCCSM(LEM) = 0	M/CSEC	2	2

					29	27
	RCVCSM(LEM)	- CONIC POSITION	METERS	2	2	
		EQUALS RRECTCSM(LEM) IF				
		TCCSM(LEM) = 0				
				7	5	
	VCVCSM(LEM)	- CONIC VELOCITY	M/CSEC	2	2	
		EQUALS VRECTCSM(LEM) IF				
		TCCSM(LEM) = 0				
				28	28	
	TCCSM(LEM)	- TIME SINCE RECTIFICATION	CSECS	2	2	
		CUSTOMARILY 0				
			1/2	17	16	
	XKEPCSM(LEM)	- ROOT OF KEPLERS EQUATION	M	2	2	
		0 IF TCCSM(LEM) = 0				
	CMOONFLG	- PERMANENT FLAGS CORRESPONDING		0	0	
	CMIDFLAG	TO MOONFLAG AND MIDFLAG		0,1	0,1	
	LMOONFLG	C = CSM, L = LM		0	0	
	LMIDFLG			0,1	0,1	
	SURFFLAG	- LUNAR SURFACE FLAG		0,1	0,1	

IN ADDITION, IF (L)CMIDFLAG IS SET, THE INITIAL INPUT VALUES FOR LUNAR SOLAR EPHEMERIDES SUBROUTINE AND PLANETARY INERTIAL ORIENTATION SUBROUTINE MUST BE PRESET.

OUTPUT
AFTER EVERY CALL TO INTEGRATION

					EARTH	MOON
					29	29
	0D	RATT	POSITION	METERS	2	2
					7	7
	6D	VATT	VELOCITY	M/CSEC	2	2
					28	28
	12D	TAT	TIME		2	2
					29	27
	14D	RATTI	POSITION	METERS	2	2
					7	5
	20D	VATTI	VELOCITY	M/CSEC	2	2
				3 2	36	30
	26D	MU(P)	MU	M /CS	2	2
	X1		MUTABLE ENTRY		-2	-10D
	X2		COORDINT			
	X2		COORDINATE SYSTEM ORIGEN		0	2
			(THIS, NOT MOONFLAG, SHOULD BE			

```
R0194                   USED TO DETERMINE ORIGIN.)
R0195
R0196   IN ADDITION TO THE ABOVE, THE PERMANENT STATE VECTOR IS UPDATED WHENEVER
R0197   STATEFLG WAS SET AND WHENEVER A W-MATRIX IS TO BE INTEGRATED. THE PUSH
R0198   COUNTER IS SET TO 0 AND OVERFLOW IS CLEARED BEFORE RETURNING TO THE
R0199   CALLING PROGRAM.
R0200
R0201   4.0 CALLING SEQUENCES AND SAMPLE CODE
R0202   ------------------------------------
R0203
R0204      A) PRECISION ORBITAL INTEGRATION. CSMPREC,LEMPREC ENTRANCES
R0205            L-X    STORE TIME TO 95T5791T5 T  95 PUS  L9ST (T4531)
R0206            L      CALL
R0207            L+1            CSMPREC (OR LEMPREC)
R0208            L+2    RETURN
R0209         INPUT                                                    28
R0210            TDEC1 (PD 32D) TIME TO INTEGRATE TO...CENTISECONDS SCALED 2
R0211         OUTPUT
R0212            THE DATA LISTED IN SECTION 3.0 PLUS
R0213            RQVV   POSITION VECTOR OF VEHICLE WITH RESPECT TO SECONDARY
R0214            BODY... METERS B-29 ONLY IF MIDFLAG = DIMOFLAG = 1
R0215      B) CONIC INTEGRATION. CSMCONIC, LEMCONIC ENTRANCES
R0216            L-X    STORE TIME IN PUSH LIST (TDEC1)
R0217            L      CALL
R0218            L+1            CSMCONIC (OR LEMCONIC)
R0219         INPUT/OUTPUT
R0220            SAME AS PRECISION INTEGRATION, EXCEPT RQVV NOT SET
R0221      C) INTEGRATE GIVEN STATE VECTOR. INTEGRVS ENTRANCE
R0222                  CALL
R0223                        INTSTALL
R0224                  VLOAD
R0225                        POSITION VECTOR
R0226                  STOVL  RCV
R0227                        VELOCITY VECTOR
R0228                  STODL  VCV
R0229                        TIME STATE VECTOR VALID
R0230                  STODL  TET
R0231                        FINAL RADIUS
R0232                  STORE  RFINAL
R0233                  SET(CLEAR)  SET(CLEAR)
R0234                              INTYPFLAG
R0235                              MOONFLAG
R0236                  SET(CLEAR)  DLOAD
R0237                              DESIRED TIME
R0238                  STCALL      TDEC1
R0239                              INTEGRVS
R0240         INPUT
R0241            RCV    POSITION VECTOR                    METERS
R0242            VCV    VELOCITY VECTOR                    M/CSEC
R0243            TET    TIME OF STATE VECTOR(MAY = 0)      CSEC B-28
```

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R0244           TDEC1  TIME TO INTEGRATE TO              CSEC B-28 (PD 32D)
R0245                  (MAY BE INCREMENT IF TET=0)
R0246         OUTPUT
R0247           SAME AS FOR PRECISION OR CONIC INTEGRATION,
R0248           DEPENDING ON INTYPFLG.
R0249       D) INTEGRATE STATE VECTOR.INTGRV ENTRANCE
R0250           L-X    STORE TIME IN PUSH LIST (TDEC1)(MAY BE DONE AFTER CALL TO INTSTALL)
R0252           L-8    CALL
R0253           L-7
R0254           L-6    SET(CLEAR) SET(CLEAR)
R0255           L-5               VINTFLAG   1=CSM, 0=LM
R0256           L-4               INTYPFLAG  1=CONIC, 0=PRECISION
R0257           L-3    SET(CLEAR) SET(CLEAR)
R0258           L-2               DIMOFLAG   1=W-MATRIX, 0=NO W-MATRIX
R0259           L-1               D6OR9FLG   1=9X9, 0=6X6
R0260           L      SET        DLOAD
R0261           L+1               STATEFLG   DESIRE PERMANENT UPDATE
R0262           L+2               FINAL RAD. OF STATE VECTOR
R0263           L+3    STCALL     RFINAL
R0264           L+4               INTEGRV
R0265           L      CALL                  NORMAL USE-- WILL UPDATE STATE
R0266           L+1               INTEGRV    VECTOR IF DIMOFLAG=1.(STATEFLG IS
R0267           L+2    RETURN                ALWAYS RESET IN INTEGRATION AFTER
R0268                                        IT IS USED.)
R0269         INPUT
R0270           TDEC1 (PD 32D) TIME TO INTEGRATE TO    CSEC B-28
R0271         OUTPUT
R0272           SAME AS FOR PRECISION OR CONIC INTEGRATION
R0273         THE PROGRAM WILL SET MOONFLAG, MIDFLAG DEPENDING ON
R0274         THE PERMANENT STATE VECTOR REPRESENTATION.

 02742  REF   2  LAST  227   13,2000                          SETLOC  INTINIT
 02743                      13,2702                          BANK
 02744  REF   7  LAST  653   E3,1554                          EBANK=  RRECTCSM
 02745  REF   2 LAST  227 TO  230:    30    30*              COUNT*  $$/INTIN
 0275   REF  96  LAST 1256   13,2702  0 5402 1  STATEINT    TC      PHASCHNG
 0276                       13,2703   00052 0                OCT     00052
 02765  REF   4  LAST  555   01,2036              2P5SPT4    =       2.5SPOT
 0277   REF   8  LAST  941   13,2704  3 5047 1                CAF     PRIO5
 0278   REF  36  LAST  829   13,2705  0 5135 0                TC      FINDVAC
 0279   REF   8  LAST 1313   E3,1554                          EBANK=  RRECTCSM
 0280   REF   3  LAST  555   13,2706   02711 1                2CADR   STATINT1
 0280                       13,2707   26063 0
 0281   REF  57  LAST 1225   13,2710  0 5314 1                TC      TASKOVER
 0282   REF 233  LAST 1293   13,2711  0 6006 1  STATINT1      TC      INTPRET
 0283                       13,2712   47014 1                BOV     RTB
 02831  REF   2  LAST  276   13,2713   04712 1                        QUITFLAG
 02832  REF   1              13,2714   26753 1                        NOINT          NO STATEINT IF V96
 0284   REF  26  LAST  940   13,2715   51751 0                        LOADTIME
 0286   REF  41  LAST  940   13,2716   00041 1                STORE   TDEC1
```

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```
0323                                13,2717   45014 0                CLEAR   CALL
03235  REF   2  LAST  276           13,2720   04274 1                        V960NFLG
0324   REF  21  LAST 1256           13,2721   27516 0                        INTSTALL
0325                                13,2722   45014 0                SET     CALL
03251  REF   4  LAST  515           13,2723   01076 1                        NODOFLAG
0326   REF   2  LAST  228           13,2724   26744 1                        SETIFLGS
0327                                13,2725   52014 0                SET     GOTO        INHIBIT BACKWARDS INTEGRATION
03275  REF   1                      13,2726   01466 1                        POODFLAG
0328   REF   1                      13,2727   26000 0                        STATEUP
0356                                13,2730   00003 1  600SECS       2DEC    60000
0356                                13,2731   25140 0
0404                                13,2732   77414 0  ENDINT        CLEAR   EXIT
0405   REF   2  LAST  588           13,2733   01672 0                        STATEFLG
0408   REF  97  LAST 1313           13,2734   0 5402 1                TC      PHASCHNG
0409                                13,2735   20032 1                OCT     20032
0410   REF   2  LAST  230           01,2033             2P3SPT1    =       2.3SPOT
0411                                13,2736   0 0006 1               EXTEND
0412   REF   3  LAST  662           13,2737   3 2731 0               DCA     600SECS
0413   REF   5  LAST 1218           13,2740   0 5332 0               TC      LONGCALL
0414   REF   6  LAST  275           E3,1554                          EBANK=  RRECTHIS
0415   REF   3  LAST  231           13,2741   02702 0                2CADR   STATEINT
0415                                13,2742   26063 0
0416   REF  89  LAST 1037           13,2743   0 5205 0               TC      ENDOFJOB
0426                                13,2744   43014 0  SETIFLGS      SET     CLEAR
0427   REF   3  LAST 1314           13,2745   01472 1                        STATEFLG
0428   REF  14  LAST  922           13,2746   01673 1                        INTYPFLG
0429                                13,2747   43014 0                CLEAR   CLEAR
0430   REF  11  LAST  633           13,2750   01676 1                        DIMOFLAG
04301  REF   3  LAST  614           13,2751   01675 1                        D60R9FLG
04302                               13,2752   77616 0                RVQ
04303                               13,2753   77776 1  NOINT         EXIT
04304  REF  98  LAST 1314           13,2754   0 5402 1               TC      PHASCHNG
04305                               13,2755   00002 0                OCT     2

04306  REF  63  LAST 1066           13,2756   0 5561 0               TC      DOWNFLAG
04307  REF   3  LAST 1313           13,2757   00221 0                ADRES   QUITFLAG

04308  REF  90  LAST 1314           13,2760   0 5205 0               TC      ENDOFJOB

RC431  ATOPCSM TRANSFERS RRECT TO RRECT +41 TO RRECTCSM TO RRECTCSM +41

RC432  CALLING SEQUENCE
RC433     L   CALL
RC434     L+1       ATOPCSM

RC435  NORMAL EXIT AT L+2

0436                                13,2761   47020 0  ATOPCSM       STQ     RTB
0437   REF  23  LAST 1292           13,2762   00051 0                        S2
0438   REF   3  LAST 1260           13,2763   26774 1                        MOVEACSM
```

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```
0439                                13,2764   45014 0                SET     CALL
0440   REF  27  LAST  762           13,2765   04063 0                        CMOONFLG
0441   REF   3  LAST 1260           13,2766   20240 0                        SVDWN1
0442                                13,2767   43014 0                BON     CLRGO
0443   REF  14  LAST  923           13,2770   00303 1                        MOONFLAG
0444   REF  24  LAST 1314           13,2771   00051 0                        S2
0445   REF  28  LAST 1315           13,2772   04223 0                        CMOONFLG
0446   REF  25  LAST 1315           13,2773   00051 0                        S2
0447   REF   1                      13,2774   0 3140 1   MOVEACSM TC      SETBANK
0448   REF   2  LAST   89           13,2775   55'500 1     +1     TS      DIFEQCNT       INITIALIZE INDEX
0449   REF   3  LAST 1315           13,2776   51'500 0            INDEX   DIFEQCNT
0450   REF   5  LAST 1277           13,2777   3 1502 1            CA      RRECT
0451   REF   4  LAST 1315           13,3000   51'500 0            INDEX   DIFEQCNT
0452   REF   9  LAST 1313           13,3001   55'554 0            TS      RRECTCSM
0453   REF   5  LAST 1315           13,3002   11'500 1            CCS     DIFEQCNT       IS TRANSFER COMPLETE
0454   REF   4  LAST 1314           13,3003   1 2775 1            TCF     MOVEACSM +1    NO-LOOP
0455   REF  64  LAST 1286           13,3004   0 6030 1            TC      DANZIG         COMPLETE- RETURN

R0456  PTOACSM TRANSFERS RRECTCSM TO RRECTCSM +41 TO RRECT TO RRECT +41

R0457  CALLING SEQUENCE
R0458     L   CALL
R0459             PTOACSM

R0460  NORMAL EXIT AT L+2
0461                                13,3005   43034 1   PTOACSM  RTB     BON
0462   REF   2  LAST 1259           13,3006   27023 0                    MOVEPCSM
0463   REF  29  LAST 1315           13,3007   04303 0                    CMOONFLG
0464   REF   1                      13,3010   27016 0                    SETMOON
0465                                13,3011   66214 0   CLRMOON  CLEAR   SSP
0466   REF  15  LAST 1315           13,3012   00263 0                    MOONFLAG
0467   REF   4  LAST 1259           13,3013   02151 0                    PBODY
0468                                13,3014   00000 1                    0
0469                                13,3015   77616 0            RVQ
0470                                13,3016   66214 0   SETMOON  SET     SSP
0471   REF  16  LAST 1315           13,3017   00063 1                    MOONFLAG
0472   REF   5  LAST 1315           13,3020   02151 0                    PBODY
0473                                13,3021   00002 0                    2
0474                                13,3022   77616 0            RVQ
0475   REF   2  LAST 1315           13,3023   0 3140 1  MOVEPCSM TC      SETBANK
0476   REF   6  LAST 1315           13,3024   55'500 1    +1     TS      DIFEQCNT
0477   REF   7  LAST 1315           13,3025   51'500 0            INDEX   DIFEQCNT
0478   REF  10  LAST 1315           13,3026   3 1554 1            CA      RRECTCSM
0479   REF   8  LAST 1315           13,3027   51'500 0            INDEX   DIFEQCNT
0480   REF   6  LAST 1315           13,3030   55'502 0            TS      RRECT
0481   REF   9  LAST 1315           13,3031   11'500 1            CCS     DIFEQCNT
0482   REF   3  LAST 1315           13,3032   1 3024 0            TCF     MOVEPCSM +1
0483   REF  65  LAST 1315           13,3033   0 6030 1            TC      DANZIG
```

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R0484 ATOPLEM TRANSFERS RRECT TO RRECT +41 TO RRECTLEM TO RRECTLEM +41

```
0485                              13,3034   47020 0  ATOPLEM  STQ     RTB
0486  REF  26  LAST 1315         13,3035   00051 0                   S2
0487  REF   2  LAST 1259         13,3036   27047 1                   MOVEALEM
0488                              13,3037   45014 0           SET     CALL
0489  REF   2  LAST   35         13,3040   04064 1                   LMOONFLG
0490  REF   3  LAST 1259         13,3041   20264 0                   SVDWN2
0491                              13,3042   43014 0           BON     CLRGO
0492  REF  17  LAST 1315         13,3043   00303 1                   MOONFLAG
0493  REF  27  LAST 1316         13,3044   00051 0                   S2
0494  REF   3  LAST 1316         13,3045   04224 1                   LMOONFLG
0495  REF  28  LAST 1316         13,3046   00051 0                   S2
0496  REF   3  LAST 1315         13,3047   0 3140 1  MOVEALEM TC     SETBANK
0497  REF  10  LAST 1315         13,3050   55'500 1    +1     TS      DIFEQCNT
0498  REF  11  LAST 1316         13,3051   51'500 0           INDEX   DIFEQCNT
0499  REF   7  LAST 1315         13,3052   3 1502 1           CA      RRECT
0500  REF  12  LAST 1316         13,3053   51'500 0           INDEX   DIFEQCNT
0501  REF   2  LAST   90         13,3054   55'626 0           TS      RRECTLEM
0502  REF  13  LAST 1316         13,3055   11'500 1           CCS     DIFEQCNT
0503  REF   3  LAST 1316         13,3056   1 3050 0           TCF     MOVEALEM +1
0504  REF  66  LAST 1315         13,3057   0 6030 1           TC      DANZIG
```

R0505 PTOALEM TRANSFERS RRECTLEM TO RRECTLEM +41 TO RRECT TO RRECT +41

```
0506                              13,3060   47014 1  PTOALEM  BON     RTB
0507  REF   6  LAST  511         13,3061   04307 1                   SURFFLAG
0508  REF   1                     13,3062   27101 1                   USEPIOS
0509  REF   2  LAST 1258         13,3063   27070 0                   MOVEPLEM
0510                              13,3064   52014 0           BON     GOTO
0511  REF   4  LAST 1316         13,3065   04304 1                   LMOONFLG
0512  REF   2  LAST 1315         13,3066   27016 0                   SETMOON
0513  REF   1                     13,3067   27011 1                   CLRMOON
0514  REF   4  LAST 1316         13,3070   0 3140 1  MOVEPLEM TC     SETBANK
0515  REF  14  LAST 1316         13,3071   55'500 1    +1     TS      DIFEQCNT
0516  REF  15  LAST 1316         13,3072   51'500 0           INDEX   DIFEQCNT
0517  REF   3  LAST 1316         13,3073   3 1626 1           CA      RRECTLEM
0518  REF  16  LAST 1316         13,3074   51'500 0           INDEX   DIFEQCNT
0519  REF   8  LAST 1316         13,3075   55'502 0           TS      RRECT
0520  REF  17  LAST 1316         13,3076   11'500 1           CCS     DIFEQCNT
0521  REF   3  LAST 1316         13,3077   1 3071 0           TCF     MOVEPLEM +1
0522  REF  67  LAST 1316         13,3100   0 6030 1           TC      DANZIG
```

```
0523                              13,3101   77201 1  USEPIOS  SETPD   VLOAD
0524                              13,3102   00001 0                   0
0525  REF  10  LAST 1242         13,3103   02026 1                   RLS
0526                              13,3104   41525 0           PDDL    PUSH
0527  REF  42  LAST 1313         13,3105   00041 1                   TDEC1
```

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```
0528  REF  15  LAST  922   13,3106   15517 0          STODL   TET
0529  REF   1              13,3107   27756 0                  5/8
0530                       13,3110   77624 1          CALL
0531  REF   7  LAST 1238   13,3111   55345 0                  RP-TO-R
0532  REF  16  LAST 1281   13,3112   25535 0          STOVL   RCV
0533  REF   2  LAST   34   13,3113   11754 1                  ZUNIT
0534                       13,3114   14001 0          STODL   OD
0535  REF  16  LAST 1317   13,3115   01517 0                  TET
0536                       13,3116   14007 0          STODL   6D
0537  REF   2  LAST 1317   13,3117   27756 0                  5/8
0538                       13,3120   45014 0          SET     CALL            NEEDED FOR SETTING X1 ON EXIT
0538.1 REF  18  LAST 1316  13,3121   00063 1                  MOONFLAG
0539  REF   8  LAST 1317   13,3122   55345 0                  RP-TO-R
0540                       13,3123   74235 0          VXV     VXSC
0541  REF  17  LAST 1317   13,3124   01535 0                  RCV
0542  REF   1              13,3125   27137 1                  OMEGMOON
0543  REF  15  LAST 1282   13,3126   25543 1          STOVL   VCV
0544  REF  18  LAST 1238   13,3127   11762 1                  ZEROVEC
0545  REF   6  LAST 1259   13,3130   01521 0          STORE   TDELTAV
0546                       13,3131   67174 1          AXT,2   5XA,2
0547                       13,3132   00002 0                  2
0548  REF   6  LAST 1315   13,3133   02150 1                  PBODY
0549  REF   6  LAST 1259   13,3134   35527 1          STCALL  TNUV
0550  REF   1              13,3135   27252 1                  A-PCHK
0551                       13,3136   07112 1  OMEGMOON 2DEC*  2.66169947 E-8 B+23*
0551                       13,3137   06620 0
0552  REF   1              13,3140  3 3144 0  SETBANK  CAF     INTBANK
0553  REF  28  LAST 1232   13,3141  54 006 0           TS      BBANK
0554  REF   1              13,3142  3 3553 1           CAF     FORTYONE
0555  REF 275  LAST 1234   13,3143  0 0002 0           TC      Q
0556  REF  11  LAST 1315   E3,1554                     EBANK=  RRECTCSM
0557  REF   9  LAST  633   13,3144   26063 0  INTBANK  BBCON   INTEGRV
```

```
RC558   SPECIAL PURPOSE ENTRIES TO ORBITAL INTEGRATION. THESE ROUTINES PROVIDE ENTRANCES TO INTEGRATION WITH
RC560   APPROPRIATE SWITCHES SET OR CLEARED FOR THE DESIRED INTEGRATION.

RC561   CSMPREC AND LEMPREC PERFORM ORBIT INTEGRATION BY THE ENCKE METHOD TO THE TIME INDICATED IN TDEC1
RC563   ACCELERATIONS DUE TO OBLATENESS ARE INCLUDED. NO W-MATRIX INT. IS DONE.
RC564   THE PERMANENT STATE VECTOR IS NOT UPDATED.
RC565   CSMCONIC AND LEMCONIC PERFORM ORBIT INTEG. BY KEPLERS METHOD TO THE TIME INDICATED IN TDEC1
RC567   NO DISTURBING ACCELERATIONS ARE INCLUDED. IN THE PROGRAM FLOW THE GIVEN
RC568   STATE VECTOR IS RECTIFIED BEFORE SOLUTION OF KEPLERS EQUATION

RC569   THE ROUTINES ASSUME THAT THE CSM (LEM) STATE VECTOR IN P-MEM IS VALID.
RC570   SWITCHES SET PRIOR TO ENTRY TO THE MAIN INTEG. PROG ARE AS FOLLOWS
RC571                  CSMPREC   CSMCONIC   LEMPREC   LEMCONIC
RC572   VINTFLAG       SET       SET        CLEAR     CLEAR
RC573   INTYPFLG       CLEAR     SET        CLEAR     SET
RC574   DIMOFLAG       CLEAR     CLEAR      CLEAR     CLEAR
```

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```
RC575   CALLING SEQUENCE
RC576      L-X  STORE TDEC1
RC577      L    CALL       (STCALL TDEC1)
RC578      L+1             CSMPREC (CSMCONIC, LEMPREC, LEMCONIC)

RC579    NORMAL EXIT TO L+2


RC580   SUBROUTINES CALLED
RC581     INTEGRVI
RC582     PRECOUT FOR CSMPREC AND LEMPREC
RC583     CONICOUT  FOR CSMCONIC AND LEMCONIC


RC584   OUTPUT - SEE PAGE 2 OF THIS LOG SECTION
RC585   INPUT
RC586    TDEC1   TIME TO INTEGRATE TO . CSECS B-28
 C587                                13,3145   45020 1  CSMPREC  STQ     CALL
 C588   REF  79  LAST 1303           13,3146   00046 0                   X1
 C589   REF  22  LAST 1314           13,3147   27516 0                   INTSTALL
 C590                                13,3150   43130 1           SXA,1   SET
 C591   REF   2  LAST   93           13,3151   02213 0                   IRETURN
 C592   REF   9  LAST  588           13,3152   01474 1                   VINTFLAG
 C593                                13,3153   43014 0  IFLAGP   SET     CLEAR
 C594   REF   3  LAST  228           13,3154   01467 0                   PRECIFLG
 C595   REF  12  LAST 1314           13,3155   01676 1                   DIMOFLAG
 C596                                13,3156   77614 1           CLRGO
C5961   REF  15  LAST 1314           13,3157   01633 0                   INTYPFLG
C5962   REF   1                      13,3160   27240 1                   INTEGRVI
 C597                                13,3161   45020 1  LEMPREC  STQ     CALL
 C598   REF  80  LAST 1318           13,3162   00046 0                   X1
 C599   REF  23  LAST 1318           13,3163   27516 0                   INTSTALL
 C600                                13,3164   43130 1           SXA,1   CLRGO
 C601   REF   3  LAST 1318           13,3165   02213 0                   IRETURN
 C602   REF  10  LAST 1318           13,3166   01634 1                   VINTFLAG
 C603   REF   1                      13,3167   27153 0                   IFLAGP

 C604                                13,3170   45020 1  CSMCONIC STQ     CALL
 C605   REF  81  LAST 1318           13,3171   00046 0                   X1
 C606   REF  24  LAST 1318           13,3172   27516 0                   INTSTALL
 C607                                13,3173   43130 1           SXA,1   SET
 C608   REF   4  LAST 1318           13,3174   02213 0                   IRETURN
 C609   REF  11  LAST 1318           13,3175   01474 1                   VINTFLAG
 C610                                13,3176   43014 0  IFLAGC   CLEAR   SETGO
 C611   REF  13  LAST 1318           13,3177   01676 1                   DIMOFLAG
 C612   REF  16  LAST 1318           13,3200   01433 1                   INTYPFLG
 C613   REF   2  LAST 1318           13,3201   27240 1                   INTEGRVI
 C614                                13,3202   45020 1  LEMCONIC STQ     CALL
 C615   REF  82  LAST 1318           13,3203   00046 0                   X1
```

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```
0616   REF  25  LAST 1318   13,3204   27516 0                 INTSTALL
0617                        13,3205   43130 1          SXA,1  CLRGO
0618   REF   5  LAST 1318   13,3206   02213 0                 IRETURN
0619   REF  12  LAST 1318   13,3207   01634 1                 VINTFLAG
0620   REF   1              13,3210   27176 1                 IFLAGC

0621                        13,3211   66214 0  INTEGRVS SET   SSP
0622   REF   4  LAST 1318   13,3212   01467 0                 PRECIFLG
0623   REF   7  LAST 1317   13,3213   02151 0                 PBODY
0624                        13,3214   00000 1                 0
0625                        13,3215   66214 0          BOF    SSP
0626   REF  19  LAST 1317   13,3216   00343 0                 MOONFLAG
0627                        13,3217   27222 0                 +3
0628   REF   8  LAST 1319   13,3220   02151 0                 PBODY
06281                       13,3221   00002 0                 2
0629                        13,3222   77220 1          STQ    VLOAD
0630   REF   6  LAST 1319   13,3223   02213 0                 IRETURN
0631   REF  19  LAST 1317   13,3224   11762 1                 ZEROVEC
0632   REF   7  LAST 1317   13,3225   01521 0          STORE  TDELTAV
0633   REF   7  LAST 1317   13,3226   35527 1          STCALL TNUV
0634   REF   2  LAST 1259   13,3227   23420 0                 RECTIFY
0635                        13,3230   43014 0          CLEAR  SET
0636   REF  14  LAST 1318   13,3231   01676 1                 DIMOFLAG
0637   REF   1              13,3232   04062 1                 NEWIFLG
06371                       13,3233   77614 1          SETGO
06372  REF   1              13,3234   04020 1                 RPQFLAG
0638   REF   1              13,3235   22320 0                 ALOADED
R0639  INTEGRV IS AN ENTRY TO ORBIT INTEGRATION WHICH PERMITS THE CALLER ,
R0640  NORMALLY THE NAVIGATION PROGRAM ,TO SET THE INTEG. FLAGS. THE ROUTINE
R0641  IS ENTERED AT INTEGRV1 BY CSMPREC ET.AL. AND AT ALOADED BY INTEGRVS.
R0642  THE ROUTINE SETS UP A-MEMORY IF ENTERED AT INTEGRV,1 AND SETS THE INTEG.
R0643  PROGRAM FOR PRECISION OR CONIC

R0644  THE CALLER MUST FIRST CALL INTSTALL TO CHECK IF INTEG. IS IN USE BEFORE
R0645  SETTING ANY FLAGS.
R0646  THE FLAGS WHICH SHOULD BE SET OR CLEARED ARE
R0647    VINTFLAG    (IGNORED WHEN ENTERED FROM INTEGRVS)
R0648    INTYPFLG
R0649    DIMOFLAG
R0650    D6OR9FLG
R0651  CALLING SEQUENCE
R0652    L-X    CALL
R0653    L-Y           INTSTALL
R0654    L-1    SET OR CLEAR ALL FOUR FLAGS. ALSO CAN SET STATEFLG IF DESIRED
R0655           AND DIMOFLAG IS CLEAR.
R0656    L      CALL
R0657    L+1           INTEGRV
R0658  INITIALIZATION
R0659    FLAGS AS ABOVE
R0660    STORE TIME TO INTEGRATE TO IN TDEC1
```

L INTEGRATION INITIALIZATION

```
R0661   OUTPUT
R0662     RATT    AS
R0663     VATT       DEFINED
R0664     TAT                BEFORE


 0665                          13,3236   77620 0  INTEGRV  STQ
 0666   REF    7  LAST 1319    13,3237   02213 0                   IRETURN
 0667                          13,3240   43014 0  INTEGRV1 SET      SET
 0668   REF    2  LAST 1319    13,3241   04060 0                   RPQFLAG
 0669   REF    2  LAST 1319    13,3242   04062 1                   NEWIFLG
 0670                          13,3243   77731 1  INTEGRV2 SSP
 0671   REF    9  LAST 1259    13,3244   00053 1                   QPRET
 0672   REF    2  LAST 1319    13,3245   22320 0                   ALOADED
 0673                          13,3246   52014 0           BON     GOTO
 0674   REF   13  LAST 1319    13,3247   01714 1                   VINTFLAG
 0675   REF    2  LAST  274    13,3250   27005 1                   PTOACSM
 0676   REF    1               13,3251   27060 1                   PTOALEM
 0676S  REF    1               11,2000                    SETLOC  INTINIT1
 0676T                         11,2320                    BANK
 0676U  REF    1                                          COUNT*  $$/INTIN
 0677                          11,2320   77745 1  ALOADED  DLOAD
 0678   REF   43  LAST 1316    11,2321   00041 1                   TDEC1
 0679   REF    2  LAST   77    11,2322   00745 1           STORE   TDEC
 0680                          11,2323   52014 0           BOFF    GOTO
 0681   REF   17  LAST 1318    11,2324   01753 1                   INTYPFLG
 0682   REF    1               11,2325   27364 0                   TESTLOOP
 0683   REF    1               11,2326   27350 1                   RVCON
 0683S  REF    3  LAST 1313    13,2000                    SETLOC  INTINIT
 0683T                         13,3252                    BANK
 0683U  REF    3 LAST 1313 TO 1320:   232   262*          COUNT*  $$/INTIN
 0684                          13,3252   45014 0  A-PCHK    BOF     CALL
 0685   REF    1               13,3253   00342 1                   MIDFLAG
 0686   REF    1               13,3254   27263 0                   ANDOUT          CONT MAKE ORIGIN CHANGE CHECK
 0687   REF    1               13,3255   23317 0                   CHKSWTCH
 0688                          13,3256   45044 0           BPL     CALL
 0689   REF    2  LAST 1320    13,3257   27263 0                   ANDOUT          NO ORIGIN CHANGE
 0690   REF    1               13,3260   23360 0                   ORIGCHNG        MAKE THE SWITCH
 0690S                         13,3261   77754 1           LXA,2                   SET X2 FOR MOON OR EARTH SCALING
 0690T  REF    9  LAST 1319    13,3262   02150 1                   PBODY
 0691                          13,3263   77414 0  ANDOUT   BOFCLR  EXIT
 0692   REF    4  LAST 1314    13,3264   01652 1                   STATEFLG
 0693   REF    1               13,3265   27304 0                   RECTOUT
 0694   REF   99  LAST 1314    13,3266   0 5402 1          TC      PHASCHNG
 0695                          13,3267   04022 0           OCT     04022
 0696   REF   68  LAST 1257    13,3270   0 5547 1          TC      UPFLAG          PHASE CHANGE HAS OCCURRED BETWEEN
 0697   REF    3  LAST 1257    13,3271   00230 0           ADRES   REINTFLG        INTSTALL AND INTWAKE
 0698   REF  234  LAST 1313    13,3272   0 6006 1          TC      INTPRET
 0699                          13,3273   77731 1           SSP
 0700   REF   10  LAST 1320    13,3274   00053 1                   QPRET
```

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```
0701   REF   1                 13,3275   27302 0                 PHEXIT
0702                           13,3276   52014 0          BON    GOTO
0703   REF  14  LAST 1320      13,3277   01714 1                 VINTFLAG
0704   REF   2  LAST   34      13,3300   26761 0                 ATOPCSM
0705   REF   2  LAST   34      13,3301   27034 0                 ATOPLEM
0706                           13,3302   77624 1  PHEXIT  CALL
0707   REF  26  LAST 1259      13,3303   22327 1                 GRP2PC
0708                           13,3304   45001 1  RECTOUT SETPD  CALL
0709                           13,3305   00001 0                 0
0710   REF   3  LAST 1319      13,3306   23420 0                 RECTIFY
0711                           13,3307   53775 1          VLOAD  VSL*
0712   REF   9  LAST 1316      13,3310   01503 0                 RRECT
0713                           13,3311   57576 1                 0,2
0714                           13,3312   53715 1          PDVL   VSL*          RATT TO PDO
0715   REF   6  LAST 1282      13,3313   01511 0                 VRECT
0716                           13,3314   57576 1                 0,2
0717                           13,3315   63325 0          PDDL   PDVL          VATT TO PD6    TAT TO PD12
0718   REF  17  LAST 1317      13,3316   01517 0                 TET
0719   REF  10  LAST 1321      13,3317   01503 0                 RRECT
0720                           13,3320   64715 0          PDVL   PDDL*
0721   REF   7  LAST 1321      13,3321   01511 0                 VRECT
0722   REF   2  LAST  491      13,3322   50037 0                 MUEARTH,2
0723                           13,3323   76006 0          PUSH   AXT,1
0724                           13,3324   77765 0          DEC    -10
0725                           13,3325   76014 0          BON    AXT,1
0726   REF  20  LAST 1319      13,3326   00303 1                 MOONFLAG
0727                           13,3327   27331 0                 +2
0728                           13,3330   77775 1          DEC    -2
0729                           13,3331   40001 1  INTEXIT SETPD  BOV
0730                           13,3332   00001 0                 0
0731                           13,3333   27334 0                 +1
07311                          13,3334   43014 0          CLEAR  CLEAR
07312  REF   1                 13,3335   04675 1                 MIDAVFLG
07313  REF   5  LAST 1320      13,3336   01672 0                 STATEFLG
0732                           13,3337   43014 0          CLEAR  CLEAR
0733   REF   2  LAST  301      13,3340   04676 1                 AVEMIDSW       ALLOW UPDATE OF DOWNLINK STATE VECTOR
0734   REF   5  LAST 1319      13,3341   01667 1                 PRECIFLG
0735                           13,3342   77535 1          SLOAD  EXIT
0736   REF   8  LAST 1320      13,3343   02214 1                 IRETURN
0737   REF 647  LAST 1298      13,3344 3 0154 1          CA     MPAC
0738   REF  35  LAST 1286      13,3345   50 120 1        INDEX  FIXLOC
0739   REF  11  LAST 1320      13,3346   54 052 1        TS     QPRET
0740   REF   3  LAST 1259      13,3347   0 3527 1        TC     INTWAKE
R0741  RVCON SETS UP ORBIT INTEGRATION TO DO A CONIC SOLUTION FOR POSITION AND
R0742  VELOCITY FOR THE INTERVAL (TET-TDEC)

0743                           13,3350   45345 1  RVCON  DLOAD  DSU
0744   REF   3  LAST 1320      13,3351   00745 1                 TDEC
0745   REF  18  LAST 1321      13,3352   01517 0                 TET
0746   REF  10  LAST 1280      13,3353   36303 1          STCALL TAU.
```

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```
0747   REF   4  LAST 1321   13,3354   23420 0            RECTIFY
0748                        13,3355   77624 1     CALL
0749   REF   1              13,3356   22336 1            KEPPREP
0750                        13,3357   43345 1     DLOAD  CAD
0751   REF   6  LAST 1282   13,3360   01551 1            TC
0752   REF  19  LAST 1321   13,3361   01517 0            TET
0753   REF  20  LAST 1322   13,3362   35517 1     STCALL TET
0754   REF   2  LAST 1320   13,3363   27304 0            RECTOUT
```

```
P0755                TESTLOOP

 0756                          13,3364  43014 0  TESTLOOP BOF     CLRGO
 0757  REF   4 LAST 1314      13,3365  04752 0                   QUITFLAG
 0758                          13,3366  27371 1                   +3
 0759  REF   6 LAST 1321      13,3367  01632 1                   STATEFLG
 0760  REF   1                13,3370  27331 0                   INTEXIT        STOP INTEGRATION
 0761                          13,3371  73001 1  +3       SETPD   LXA,2
 0762                          13,3372  00013 0                   10D
 0763  REF  10 LAST 1320      13,3373  02150 1                   PBODY
 0764                          13,3374  51575 1           VLOAD   ABVAL
 0765  REF  18 LAST 1317      13,3375  01535 0                   RCV
 0766                          13,3376  43006 0           PUSH    CLEAR          RC TO 10D
 0767  REF   2 LAST 1320      13,3377  00262 1                   MIDFLAG
 0768                          13,3400  50023 0           DSU*    BMN            MIDFLAG=0 IF R G.T. RMP
 0769  REF   1                13,3401  66600 1                   RME,2
 0770                          13,3402  27405 0                   +3
 0771                          13,3403  77614 1           SET
 0772  REF   3 LAST 1323      13,3404  00062 0                   MIDFLAG
 0773                          13,3405  41345 0  NORFINAL DLOAD   DMP
 0774                          13,3406  00013 0                   10D
 0775                          13,3407  00043 0                   34D
 0776                          13,3410  55762 1           SR1R    DDV*
 0777  REF   3 LAST 1321      13,3411  50037 0                   MUEARTH,2
 0778                          13,3412  41366 1           SQRT    DMP
 0779  REF   1                13,3413  23751 0                   .3D
 0780                          13,3414  40442 1           SR3     SR4            DT  IS TRUNCATED TO A MULTIPLE
 0781                          13,3415  54345 1           DLOAD   SL
 0782  REF 648 LAST 1321      13,3416  00155 0                   MPAC
 0783                          13,3417  20220 0                   15D                 OF 128 CSECS.
 0784                          13,3420  40006 0           PUSH    BOV
 0785  REF   1                13,3421  27446 1                   MAXDT
 0786                          13,3422  50021 1           BDSU    BMN
 0787  REF   1                13,3423  27515 0                   DT/2MAX
 0788  REF   2 LAST 1323      13,3424  27446 1                   MAXDT
 0789                          13,3425  45345 1  DT/2COMP DLOAD   DSU
 0790  REF   4 LAST 1321      13,3426  00745 1                   TDEC
 0791  REF  21 LAST 1322      13,3427  01517 0                   TET
 0792                          13,3430  54234 0           RTB     SL
 0793  REF   3 LAST  769      13,3431  45636 0                   SGNAGREE
 0794                          13,3432  20211 1                   8D
 0795  REF   2 LAST   94      13,3433  02305 0           STORE   DT/2           B-19
 0796                          13,3434  51400 1           BOV     ABS
 0797  REF   1                13,3435  27452 1                   GETMAXDT
 0798                          13,3436  50025 0           DSU     BMN            IS TIME TO INTEG. TO GR THAN MAXTIME
 0799                          13,3437  00015 0                   12D
 0800  REF   1                13,3440  27456 0                   POOHCHK
 0801                          13,3441  75345 1  USEMAXDT DLOAD   SIGN
 0802                          13,3442  00015 0                   12D
 0803  REF   3 LAST 1323      13,3443  02305 0                   DT/2
```

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```
0804   REF   4  LAST 1323   13,3444   36305 1            STCALL DT/2
0805   REF   2  LAST 1323   13,3445   27456 0                   POOHCHK
0806                        13,3446   65345 0  MAXDT     DLOAD  PDDL          EXCHANGE DT/2MAX WITH COMPUTED MAX.
0807   REF   2  LAST 1323   13,3447   27515 0                   DT/2MAX
0808                        13,3450   77650 1            GOTO
0809   REF   1              13,3451   27425 1                   DT/2COMP
0810                        13,3452   77634 0  GETMAXDT  RTB
0811   REF  15  LAST  880   13,3453   45761 0                   SIGNMPAC
0812   REF   5  LAST 1324   13,3454   36305 1            STCALL DT/2
0813   REF   1              13,3455   27441 0                   USEMAXDT
0814                        13,3456   51545 1  POOHCHK   DLOAD  ABS
0815   REF   6  LAST 1324   13,3457   02305 0                   DT/2
0816                        13,3460   50025 0            DSU    BMN
0817   REF   1              13,3461   27513 0                   DT/2MIN
0818   REF   2  LAST 1317   13,3462   27252 1                   A-PCHK
0819                        13,3463   43014 0            BOFF   BON
0820   REF   2  LAST 1314   13,3464   01746 0                   PCOFLAG        IS BACKWARDS INTEGRATION INHIBITED
0821   REF   1              13,3465   23237 0                   TIMESTEP       NO
0822   REF   6  LAST 1321   13,3466   01707 0                   PRECIFLG       WAS THIS CALL VIA CSM(LEM)PREC
0823   REF   2  LAST 1324   13,3467   23237 0                   TIMESTEP       YES
0827                        13,3470   45345 1            DLOAD  DSU
0828   REF   7  LAST 1324   13,3471   02305 0                   DT/2
0829                        13,3472   00015 0                   12D
0830                        13,3473   43040 1            BMN    BOFCLR
0831   REF   3  LAST 1324   13,3474   27252 1                   A-PCHK
0832   REF   3  LAST 1320   13,3475   04242 1                   NEWIFLG
0833   REF   3  LAST 1324   13,3476   23237 0                   TIMESTEP
0834                        13,3477   45345 1            DLOAD  DSU
0835   REF   5  LAST 1323   13,3500   00745 1                   TDEC
0836   REF  22  LAST 1323   13,3501   01517 0                   TET
0837                        13,3502   77640 0            BMN                   NO BACKWARD INTEGRATION
0838   REF   2  LAST 1323   13,3503   27331 0                   INTEXIT
0839                        13,3504   40525 1            PDDL   SR4
0840   REF   8  LAST 1324   13,3505   02305 0                   DT/2           IS 4(DT) LS(TDEC - TET)
0841                        13,3506   44322 1            SR2R   BDSU           NO
0842                        13,3507   52040 1            BMN    GOTO
0843   REF   3  LAST 1324   13,3510   27331 0                   INTEXIT
0844   REF   4  LAST 1324   13,3511   23237 0                   TIMESTEP
0845                        13,3512   00000 1  DT/2MIN   2DEC   3 B-20
0845                        13,3513   01400 1
0846                        13,3514   14152 1  DT/2MAX   2DEC   4000 E2 B-20
0846                        13,3515   00000 1
0849                        13,3516   77776 1  INTSTALL  EXIT
0850   REF  17  LAST  747   13,3517   3 0106 0    +1     CA     FLGWRD10
0851   REF  12  LAST 1208   13,3520   7 4346 0            MASK   PRIO30
0853                        13,3521   0 0006 1            EXTEND
0854   REF   1              13,3522   1 3561 1            BZF    OKTOGRAB       YES
0856   REF   1              13,3523   3 3565 1            CAF    WAKESTAL
0857   REF   2  LAST  428   13,3524   0 5163 0            TC     JOBSLEEP
0858                        13,3525    77776 1  INTWAKED  EXIT
```

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```
0859   REF   1                 13,3526  1 3547 0             TCF     INTWAKE1

0860   REF  18  LAST 1324      13,3527  4 0106 1  INTWAKE    CS      FLGWRD10        IS THIS INTSTALLED ROUTINE TO BE
0861   REF   1                 13,3530  7 4754 1             MASK    REINTBIT              RESTARTED
0862   REF 334  LAST 1229      13,3531  10 000 0             CCS     A
0863   REF   2  LAST 1325      13,3532  0 3547 1             TC      INTWAKE1        NO

0864   REF  36  LAST 1321      13,3533  50 120 1             INDEX   FIXLOC
0865   REF  12  LAST 1321      13,3534  3 0052 0             CA      QPRET
0866   REF   1                 13,3535  55'261 1             TS      TBASE2          YES, DONT RESTART WITH SOMEONE ELSES Q

0867   REF 100  LAST 1320      13,3536  0 5402 1             TC      PHASCHNG
0868                           13,3537   04022 0             OCT     04022

0869   REF   2  LAST 1325      13,3540  3 1261 0             CA      TBASE2
0870   REF  37  LAST 1325      13,3541  50 120 1             INDEX   FIXLOC
0871   REF  13  LAST 1325      13,3542  54 052 1             TS      QPRET

0872   REF   2  LAST 1325      13,3543  3 4754 0             CAF     REINTBIT
0873   REF  19  LAST 1325      13,3544  7 0106 1             MASK    FLGWRD10
0874                           13,3545  0 0006 1             EXTEND
0875   REF   1                 13,3546  1 3563 0             BZF     GOBAC           DONT INTWAKE IF WE CAME HERE VIA RESTART

0880   REF   2  LAST 1324      13,3547  3 3565 1  INTWAKE1   CAF     WAKESTAL
0881   REF   5  LAST  428      13,3550  0 5167 1             TC      JOBWAKE
0882   REF  20  LAST 1216      13,3551  10 064 1             CCS     LOCCTR
0883   REF   3  LAST 1325      13,3552  1 3547 0             TCF     INTWAKE1
0884                           13,3553   00051 0  FORTYONE   DEC     41
0885   REF  13  LAST 1324      13,3554  4 4346 0             CS      PRIO30
0886   REF  20  LAST 1325      13,3555  7 0106 1             MASK    FLGWRD10
0887   REF  21  LAST 1325      13,3556  54 106 1             TS      FLGWRD10        RELEASE STALL AREA
0889                           13,3557  0 0003 1             RELINT
0890   REF   2  LAST 1325      13,3560  1 3563 0             TCF     GOBAC

0892   REF   4  LAST  201      13,3561  3 4753 1  OKTOGRAB   CAF     INTFLBIT
0893   REF  22  LAST 1325      13,3562  26 106 1             ADS     FLGWRD10
0894   REF 235  LAST 1320      13,3563  0 6006 1  GOBAC      TC      INTPRET
0895                           13,3564   77616 0             RVQ
0900   REF  26  LAST 1319      13,3565   27517 1  WAKESTAL   CADR    INTSTALL +1
```

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```
P0913   AVETOMID

R0914   THIS ROUTINE PERFORMS THE TRANSITION FROM A THRUSTING PHASE TO THE COAST
R0915   PHASE BY INITIALIZING THIS VEHICLES PERMANENT STATE VECTOR WITH THE
R0916   VALUES LEFT BY THE AVERAGEG ROUTINE IN RN,VN,PIPTIME.

R0917   BEFORE THIS IS DONE THE W-MATRIX, IF ITS  VALID (ORWFLAG OR RENDWFLG IS
R0918   SET) IS INTEGRATED FORWARD TO PIPTIME WITH THE PRE-THRUST STATE VECTOR.

R0919   IN ADDITION, THE OTHER VEHICLE IS INTEGRATED (PERMANENT) TO PIPTIME.

R0920   FINALLY IRKMKCNT IS ZEROED


 0921   REF   1                35,2000                        SETLOC  INTINIT2
 0922                          35,3677                        BANK

 0923   REF   1                                               COUNT*  $$/INTIN
 0924                          35,3677   43020 1  AVETOMID    STQ     BON
 0925   REF  14  LAST 1259     35,3700   02310 1              EGRESS
 0926   REF   9  LAST  628     35,3701   02716 0              RENDWFLG
 0927   REF   1                35,3702   73753 1              INT/W           W-MATRIX VALID ,GO INTEGRATE IT
 0928                          35,3703   77614 1  BON
 0929   REF  13  LAST  641     35,3704   01711 1              ORBWFLAG
 0930   REF   2  LAST 1326     35,3705   73753 1              INT/W           W-MATRIX VALID ,GO INTEGRATE IT

 0946                          35,3706   45174 1  SETCOAST    AXT,2   CALL    NOW MOVE PROPERLY SCALED RN,VN AND
 0947                          35,3707   00002 0              2               PIPTIME TO INTEGRATION ERASABLES.
 0948   REF  27  LAST 1325     35,3710   27516 0              INTSTALL
 0949                          35,3711   77014 1  BON         AXT,2
 0950   REF   3  LAST  547     35,3712   00315 0              AMOONFLG
 0951                          35,3713   73715 0              +2
 0952                          35,3714   00000 1              0
 0953                          35,3715   53775 1  VLOAD       VSR*
 0954   REF  17  LAST  841     35,3716   01030 0              RN
 0955                          35,3717   57176 0              0,2
 0956   REF  11  LAST 1321     35,3720   01503 0  STORE       RRECT
 0957   REF  19  LAST 1323     35,3721   15535 0  STODL       RCV
 0958   REF  18  LAST 1068     35,3722   01044 0              PIPTIME
 0959   REF  23  LAST 1324     35,3723   25517 0  STOVL       TET
 0960   REF  18  LAST  895     35,3724   01036 0              VN
 0961                          35,3725   45057 1  VSR*        CALL
 0962                          35,3726   57176 0              0,2
 0963   REF   2  LAST  515     35,3727   23434 0              MINIRECT        FINISH SETTING UP STATE VECTOR
 0964                          35,3730   77634 0  RTB
 0965   REF   1                35,3731   26774 1              MOVATHIS        PUT TEMP STATE VECTOR INTO PERMANENT
 0968                          35,3732   43014 0  SET         BON
 0969   REF  30  LAST 1315     35,3733   04063 0              CMOONFLG
 0970   REF   4  LAST 1326     35,3734   00315 0              AMOONFLG
 0971                          35,3735   73740 0              +3
```

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```
0972                          35,3736  77614 1          CLEAR
0973  REF  31  LAST 1326     35,3737  04263 1                   CMOONFLG

0974                          35,3740  71214 0          BON      DLOAD          NOW DO LM
0975  REF   7  LAST 1316     35,3741  04307 1                   SURFFLAG
0976  REF   2  LAST 1259     35,3742  75735 1                   FAZABS         NO COASTING LM
0977  REF  19  LAST 1326     35,3743  01044 0                   PIPTIME
0978  REF  44  LAST 1320     35,3744  34041 0          STCALL   TDEC1
0979  REF   3  LAST 1314     35,3745  26744 1                   SETIFLGS
0980                          35,3746  45014 0          CLEAR    CALL
0981  REF  15  LAST 1321     35,3747  01674 0                   VINTFLAG
0982  REF  10  LAST 1317     35,3750  27236 0                   INTEGRV
0985                          35,3751  77650 1          GOTO
0986  REF  15  LAST 1326     35,3752  02310 1                   EGRESS
0987                          35,3753  45145 0  INT/W   DLOAD   CALL
0988  REF  20  LAST 1327     35,3754  01044 0                   PIPTIME        INTEGRATE W THRU BURN
0989  REF  28  LAST 1326     35,3755  27516 0                   INTSTALL
0990                          35,3756  43014 0          SET      SET
0991  REF  15  LAST 1319     35,3757  01476 0                   DIMOFLAG       DO W-MATRIX
0992  REF   3  LAST 1321     35,3760  04476 0                   AVEMIDSW       SO WONT CLOBBER RN,VN,PIPTIME
0993                          35,3761  43014 0          CLEAR    SET
0994  REF   4  LAST 1314     35,3762  01675 1                   D6OR9FLG
0995  REF  16  LAST 1327     35,3763  01474 1                   VINTFLAG
0996  REF  45  LAST 1327     35,3764  34041 0          STCALL   TDEC1
0997  REF  11  LAST 1327     35,3765  27236 0                   INTEGRV
0998                          35,3766  77650 1          GOTO
0999  REF   1                 35,3767  73706 1                   SETCOAST
```

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P1000 MIDTOAV1

R1001 THIS ROUTINE INTEGRATES (PRECISION) TO THE TIME SPECIFIED IN TDEC1.
R1002 IF, AT THE END OF AN INTEGRATION TIME STEP, CURRENT TIME PLUS A DELTA
R1003 TIME (SEE TIMEDELT.....BASED ON THE COMPUTATUON TIME FOR ONE TIME STEP)
R1004 IS GREATER THAN THE DESIRED TIME, ALARM 1703 IS SET AND THE INTEGRATION
R1005 IS DONE AS IT IS FOR MIDTOAV2.
R1006 RETURN IS IN BASIC TO THE RETURN ADDRESS PLUS ONE.

R1007 IF THE INTEGRATION IS FINISHED TO THE DESIRED TIME, RETURN IS IN BASIC
R1008 TO THE RETURN ADDRESS

R1009 IN EITHER CASE , BEFCRE RETURNING, THE EXTRAPOLATED STATE VECTOR IS TRAN
R1010 FERRED FROM R,VATT TC R,VN1-PIPTIME1 IS SET TO THE FINISHING INTEGRA-
R1011 TION TIME AND MPAC IS SET TO THE DELTA TIME---
R1012 TAT MINUS CURRENT TIME.

R1013 MIDTOAV2

R1014 THIS ROUTINE INTEGRATES THE CSM STATE VECTOR TO CURRENT TIME PLUS
R1015 INCREMENTS OF TIMEDELT SUCH THAT THE DIFFERENCE BETWEEN CURRENT TIME
R1016 AND THE STATE VECTOR TIME AT THE END OF THE LAST STEP IS AT LEAST 5.6
R1017 SECS.
R1018 NC INPUTS ARE REQUIRED OF THE CALLER. RETURN IS IN BASIC TO THE RETURN
R1019 ADDRESS WITH THE ABOVE TRANSFERS TO R,VN1-PIPTIME1-AND MPAC DONE

```
1020   REF   4  LAST 1320   13,2000                        SETLOC  INTINIT
1021                        13,3566                        BANK
10215  REF   1                                            COUNT*  $$/R41
1022   REF   1                 0773                       EBANK=  IRETURN1
1023                        13,3566   45020 1  MIDTOAV2   STQ     CALL
1024   REF   2  LAST 1328   13,3567   00773 1              TRANSFER IRETURN1
1025   REF  29  LAST 1327   13,3570   27516 0              INTSTALL
1026                        13,3571   43145 0              DLOAD   CLEAR
1027   REF   1              13,3572   13771 1              TIMEDELT
1028   REF   1              13,3573   04674 0              MIDIFLAG
1029   REF   1              13,3574   37466 1              STCALL  T-TO-ADD
1030   REF   1              13,3575   27612 1              TRANSFER ENTMID2

1031                        13,3576   45020 1  MIDTOAV1   STQ     CALL
1032   REF   3  LAST 1328   13,3577   00773 1              TRANSFER IRETURN1
1033   REF  30  LAST 1328   13,3600   27516 0              INTSTALL
1034                        13,3601   47014 1              SET     RTB
1035   REF   2  LAST 1328   13,3602   04474 1              TRANSFER MIDIFLAG
1036   REF  27  LAST 1313   13,3603   51751 0              LOADTIME
1037                        13,3604   44215 1              DAD     BDSU          INITIAL CHECK.IS TDEC1 IN THE FUTURE.
1038   REF   2  LAST 1328   13,3605   13771 1              TIMEDELT
1039   REF  46  LAST 1327   13,3606   00041 1              TDEC1
1040                        13,3607   45044 0              BPL     CALL
```

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```
1041   REF   1                 13,3610   27616 0                    ENTMID1
1042   REF   1                 13,3611   13756 1                    NOTIME          NO SET ALARM. SWITCH TO MIDTOAV2

1043                           13,3612   43234 0  ENTMID2  RTB       DAD
1044   REF  28  LAST 1328      13,3613   51751 0                     LOADTIME
1045   REF   2  LAST 1328      13,3614   03466 0                     T-TO-ADD
1046   REF  47  LAST 1328      13,3615   00041 1           STORE     TDEC1

1047                           13,3616   45014 0  ENTMID1  CLEAR     CALL
1048   REF  16  LAST 1327      13,3617   01676 1                     DIMOFLAG        NO W-MATRIX
1049   REF   1                 13,3620   26034 1                     THISVINT
1050                           13,3621   43014 0           CLEAR     SET
1051   REF  18  LAST 1320      13,3622   01673 1                     INTYPFLG
1052   REF   2  LAST 1321      13,3623   04475 0                     MIDAVFLG        LET INTEG. KNOW THE CALL IS FOR MIDTOAV.
1053                           13,3624   77624 1           CALL
1054   REF  12  LAST 1327      13,3625   27236 0                     INTEGRV          GO INTEGRATE
10541                          13,3626   66134 1           SXA,2     SXA,1
105415 REF  16  LAST  840      13,3627   03746 1                     RTX2
10542  REF  14  LAST  716      13,3630   03745 1                     RTX1
105425                         13,3631   67214 1           CLEAR     SLOAD
10543  REF   5  LAST 1326      13,3632   00275 1                     AMOONFLG
105435 REF  17  LAST 1329      13,3633   03747 0                     RTX2
10544                          13,3634   43054 1           BZE       SET
105445                         13,3635   27637 0                     +2
10545  REF   6  LAST 1329      13,3636   00075 0                     AMOONFLG
1055                           13,3637   77775 1           VLOAD
1056   REF  35  LAST  940      13,3640   00001 0                     RATT
1057   REF   7  LAST  841      13,3641   25071 0           STOVL     RN1
1058   REF  26  LAST  923      13,3642   00007 0                     VATT
1059   REF   4  LAST  841      13,3643   15077 0           STODL     VN1
1060   REF  10  LAST  940      13,3644   00015 0                     TAT
1061   REF   9  LAST  837      13,3645   01105 1           STORE     PIPTIME1
1071                           13,3646   77776 1           EXIT

1072                           13,3647   0 0004 0          INHINT
1073                           13,3650   0 0006 1          EXTEND
1074   REF  34  LAST 1097      13,3651   4 0025 1          DCS       TIME2
1075   REF 649  LAST 1323      13,3652   20 155 1          DAS       MPAC
1076   REF   5  LAST 1157      13,3653   0 7226 0          TC        TPAGREE

1077   REF   4  LAST 1328      13,3654   3 0773 1          CA        IRETURN1
1078   REF   7  LAST  572      13,3655   0 4660 0          TC        BANKJUMP
1079                           13,3656    47014 1 CKMID2   BOF       RTB
1080   REF   3  LAST 1328      13,3657    04754 0                    MIDIFLAG
1081   REF   1                 13,3660    27675 0                    MID2
1082   REF  29  LAST 1329      13,3661    51751 0                    LOADTIME
1083                           13,3662    44215 1          DAD       BDSU
1084   REF   3  LAST 1328      13,3663    13771 1                    TIMEDELT
1085   REF   6  LAST 1324      13,3664    00745 1                    TDEC
1086                           13,3665    45044 0          BPL       CALL
```

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```
1087   REF   2  LAST 1320   13,3666   27364 0                    TESTLOOP        YES
1088   REF   2  LAST 1329   13,3667   13756 1                    NOTIME

1089                        13,3670   43234 0  TIMEINC  RTB      DAD
1090   REF  30  LAST 1329   13,3671   51751 0                    LOADTIME
1091   REF   3  LAST 1329   13,3672   03466 0                    T-TO-ADD
1092   REF   7  LAST 1329   13,3673   34745 0           STCALL   TDEC
1093   REF   3  LAST 1330   13,3674   27364 0                    TESTLOOP

1094                        13,3675   45345 1  MID2     DLOAD    DSU
1095   REF   8  LAST 1330   13,3676   00745 1                    TDEC
1096   REF  24  LAST 1326   13,3677   01517 0                    TET
1097                        13,3700   45246 0           ABS      DSU
1098   REF   1              13,3701   13755 1                    3CSECS
1099                        13,3702   77644 1           BPL
1100   REF   1              13,3703   27670 0                    TIMEINC

1101                        13,3704   44234 1           RTB      BDSU            SEE IF 5.6 SECS. AVAILABLE TO CALLER.
1102   REF  31  LAST 1330   13,3705   51751 0                    LOADTIME
1103   REF  25  LAST 1330   13,3706   01517 0                    TET
1104                        13,3707   51025 1           DSU      BPL
1105   REF   1              13,3710   13773 0                    5.6SECS
1106   REF   4  LAST 1324   13,3711   27252 1                    A-PCHK          YES,GET OUT.

1107                        13,3712   43345 1           DLOAD    DAD             NO,ADD TIMEDELT TO T-TO-ADD AND TRY
1108   REF   4  LAST 1330   13,3713   03466 0                    T-TO-ADD        AGAIN.
1109   REF   4  LAST 1329   13,3714   13771 1                    TIMEDELT
1110   REF   5  LAST 1330   13,3715   37466 1           STCALL   T-TO-ADD
1111   REF   2  LAST 1330   13,3716   27670 0                    TIMEINC
A11114

111141 REF   1              05,2000                     SETLOC   INTINIT3
111142                      05,3754                     BANK

111143 REF   1                                          COUNT*   $$/R41
11115                       05,3754   00000 1  3CSECS   2DEC     3
11115                       05,3755   00003 1

1112                        05,3756   77414 0  NOTIME   CLEAR    EXIT            TOO LATE
1113   REF   4  LAST 1329   05,3757   04674 0                    MIDIFLAG
1114   REF   5  LAST 1329   05,3760   24 773 1           INCR     IRETURN1        SET ERROR EXIT  (CALLOC +2)
1115   REF  32  LAST 1191   05,3761   0 5671 1           TC       ALARM           INSUFFICIENT TIME FOR INTEGRATION --
1116                        05,3762   01703 1           OCT      1703               TIG WILL BE SLIPPED...
1117   REF 236  LAST 1325   05,3763   0 6006 1           TC       INTPRET
1118                        05,3764   77745 1           DLOAD
1119   REF   5  LAST 1330   05,3765   13771 1                    TIMEDELT
1120   REF   6  LAST 1330   05,3766   03466 0           STORE    T-TO-ADD
1121                        05,3767   77616 0           RVQ

1123                        05,3770   00000 1  TIMEDELT 2DEC     1250
1123                        05,3771   02342 0
```

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```
1124                        05,3772   00000 1  5.6SECS  2DEC    560
1124                        05,3773   01060 0
1126  REF   1               27,2000                    SETLOC  UPDATE2
1127                        27,3072                    BANK
1129  REF   1                                          COUNT*  $$/INTIN

1131  REF  12  LAST  790    E3,1706                    EBANK=  TEPHEM
1134  REF 237  LAST 1330    27,3072   0 6006 1 INTWAKEU TC      INTPRET

1135                        27,3073   53135 0          SLOAD   BZE             IS THIS A CSM/LEM STATE VECTOR UPDATE
1136  REF   4  LAST  194    27,3074   01502 1                  UPSVFLAG        REQUEST. IF NOT GO TO INTWAKUP.
1137  REF   1               27,3075   57141 1                  INTWAKUP

1138                        27,3076   77775 1          VLOAD
1139  REF  12  LAST 1326    27,3077   01503 0                  RRECT           MOVE RRECT(6) AND VRECT(6) INTO
1140  REF  20  LAST 1326    27,3100   25535 0          STOVL   RCV                  RCV(6)   AND VCV(6)   RESPECTIVELY.
1141  REF   8  LAST 1321    27,3101   01511 0                  VRECT           NOW GO TO 'RECTIFY +13D' TO
1142                        27,3102   77624 1          CALL                    STORE VRECT INTO VCV  AND ZERO OUT
1143  REF   1               27,3103   23435 1                  TINIRECT        TDELTAV(6),TNUV(6),TC(2) AND XKEP(2)
1144                        27,3104   51535 0          SLOAD   ABS             COMPARE ABSOLUTE VALUE OF 'UPSVFLAG'
1145  REF   5  LAST 1331    27,3105   01502 1                  UPSVFLAG        TO 'UPDATE MOON STATE VECTOR CODE'
1146                        27,3106   53025 0          DSU     BZE             TO DETERMINE WHETHER THE STATE VECTOR TO
1147  REF   1               27,3107   17150 0                  UPMNSVCD        BE UPDATED IS IN THE EARTH OR LUNAR
1148  REF   1               27,3110   57115 0                  INTWAKEM        SPHERE OF INFLUENCE.........
1149                        27,3111   43174 1          AXT,2   CLRGO           EARTH SPHERE OF INFLUENCE.
1150                        27,3112   00000 1          DEC     0
1151  REF  21  LAST 1321    27,3113   00223 1                  MOONFLAG
1152  REF   1               27,3114   57120 0                  INTWAKEC
1153                        27,3115   43174 1 INTWAKEM AXT,2   SET             LUNAR SPHERE OF INFLUENCE.
1154                        27,3116   00002 0          DEC     2
1155  REF  22  LAST 1331    27,3117   00063 1                  MOONFLAG
1156                        27,3120   50135 0 INTWAKEC SLOAD   BMN             COMMON CODING AFTER X2 INITIALIZED AND
A1157                                                                        MOONFLAG SET(OR CLEARED).
1158  REF   6  LAST 1331    27,3121   01502 1                  UPSVFLAG        IS THIS A REQUEST FOR A LEM OR CSM
1159  REF   1               27,3122   57130 1                  INTWAKLM         STATE VECTOR UPDATE.....
1160                        27,3123   77624 1          CALL                    UPDATE CSM STATE VECTOR
1161  REF   3  LAST 1321    27,3124   26761 0                  ATOPCSM

1162                        27,3125   52014 0          CLEAR   GOTO
1163  REF  14  LAST 1326    27,3126   01671 0                  CRBWFLAG
1164  REF   1               27,3127   57132 0                  INTWAKEX

1165                        27,3130   77624 1 INTWAKLM CALL                    UPDATE  LM STATE VECTOR
1166  REF   3  LAST 1321    27,3131   27034 0                  ATOPLEM

1167                        27,3132   77414 0 INTWAKEX CLEAR   EXIT
1168  REF  10  LAST 1326    27,3133   02676 1                  RENDWFLG

11681 REF 247  LAST 1256    27,3134   3 4772 1         CAF     ZERO
11682                       27,3135   0 0006 1         EXTEND
```

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```
11683  REF   2  LAST  194    27,3136  01 077 0                WRITE  CHAN77          ZERO CHANNEL 77
1169   REF   7  LAST 1331    27,3137  55'501 0                TS     UPSVFLAG
1170   REF 238  LAST 1331    27,3140  0 6006 1                TC     INTPRET
1171                          27,3141   77624 1  INTWAKUP     CALL
1172   REF   4  LAST  648    27,3142   27525 0                       INTWAKE0        RELEASE :GRAB: OF ORBIT INTEG
1173                          27,3143   77776 1                EXIT
1174   REF 101  LAST 1325    27,3144  0 5402 1                TC     PHASCHNG
1175                          27,3145   04026 1                OCT    04026
1176   REF   1                27,3146  0 3706 0                TC     UPOUT +1
1177                          27,3147   00002 0  UPMNSVCD     OCT    2
1178                          27,3150   00000 1                OCT    0
11785  REF   1                11,2000                         SETLOC ORBITAL
11786                         11,2327                         BANK
11787  REF   1                                                COUNT* $$/ORBIT
1179                          11,2327   77420 1  GRP2PC       STQ    EXIT
1180   REF   3  LAST  126     11,2330   03536 1                       GRP2SVQ
1181   REF 102  LAST 1332     11,2331  0 5402 1                TC     PHASCHNG
1182                          11,2332   04022 0                OCT    04022
1183   REF 239  LAST 1332     11,2333  0 6006 1                TC     INTPRET
1184                          11,2334   77650 1                GOTO
1185   REF   4  LAST 1332     11,2335   03536 1                       GRP2SVQ
```

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```
R0001            DELETE
 0003  REF   2  LAST 1332   11,2000                    SETLOC  ORBITAL
 0004                      11,2336                    BANK
 0005  REF   2 LAST 1332 TO 1333:    7     7*        COUNT*  $$/ORBIT
R0006            DELETE
 0007                      11,2336   40354 1  KEPPREP  LXA,2   SETPD
 0008  REF  11  LAST 1323  11,2337   02150 1           PBODY
 0009                      11,2340   00001 0           0
 0010                      11,2341   75543 1           DLOAD*  SQRT          SQRT(MU) (+18 OR +15)  0D        PL  2D
 0011  REF   4  LAST 1323  11,2342   50037 0           MUEARTH,2
 0012                      11,2343   53515 0           PDVL    UNIT                                     PL  8D
 0013  REF  21  LAST 1331  11,2344   01535 0           RCV
 0014                      11,2345   60325 0           PDDL    NORM          NORM R (+29 OR +27 - N1) 2D      PL  4D
 0015                      11,2346   00045 0           36D
 0016  REF  83  LAST 1318  11,2347   00047 1           X1
 0017                      11,2350   77715 1           PDVL
 0018                      11,2351   65241 0           DOT     PDDL          F*SQRT(MU)(+7 OR+5) 4D       PL  6D
 0019  REF  16  LAST 1317  11,2352   01543 1           VCV
 0020  REF  11  LAST 1321  11,2353   02303 0           TAU.          (+28)
 0021                      11,2354   60225 1           DSU     NORM
 0022  REF   7  LAST 1322  11,2355   01551 1           TC
 0023  REF  41  LAST 1258  11,2356   00051 0           S1
 0024                      11,2357   77742 0           SR1
 0025                      11,2360   65271 0           DDV     PDDL
 0026                      11,2361   00003 1           2D
 0027                      11,2362   41405 0           DMP     PUSH          FS(+6 +N1-N2) 6D             PL  8D
 0028                      11,2363   00005 1           4D
 0029                      11,2364   65316 0           DSQ     PDDL          (FS)SQ(+12 +2(N1-N2)) 8D     PL 10D
 0030                      11,2365   00005 1           4D
 0031                      11,2366   64716 0           DSQ     PDDL*         SSQ/MU(-20R +2(N1-N2)) 10D     PL 12D
 0032  REF   5  LAST 1333  11,2367   50037 0           MUEARTH,2
 0033                      11,2370   40442 1           SR3     SR4
 0034                      11,2371   47515 0           PDVL    VSQ           PREALIGN MU (+43 OR +37) 12D  PL 14D
 0035  REF  17  LAST 1333  11,2372   01543 1           VCV
 0036                      11,2373   44205 0           DMP     BDSU                                     PL 12D
 0037                      11,2374   00045 0           36D
 0038                      11,2375   41271 0           DDV     DMP                                      PL 10D
 0039                      11,2376   00003 1           2D            -(1/R-ALPHA)(+12 +3N1-2N2)
 0040                      11,2377   53605 1           DMP     SL*
 0041  REF   1             11,2400   23771 1           DP2/3
 0042                      11,2401   20176 0           0 -3,1        10L(1/R-ALPHA)(+13 +2(N1-N2))
 0043                      11,2402   43260 1           XSU,1   DAD           2(FS)SQ - ETCETRA        PL 8D
 0044  REF  42  LAST 1333  11,2403   00050 1           S1            X1 = N2-N1
 0045                      11,2404   45257 0           SL*     DSU           -FS+2(FS)SQ ETC (+6 +N1-N2)  PL  6D
 0046                      11,2405   20211 1           8D,1
 0047                      11,2406   41205 0           DMP     DMP
 0048                      11,2407   00001 0           0
 0049                      11,2410   00005 1           4D
 0050                      11,2411   53657 0           SL*     SL*
 0051                      11,2412   20211 1           8D,1
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```
0052                          11,2413  20201 0                0,1          S(-FS(1-2FS)-1/6...)(+17 OR +16)
0053                          11,2414  65215 1        DAD     PDDL                                      PL  6D
0054  REF   2  LAST   89      11,2415  01553 0                XKEP
0055                          11,2416  53605 1        DMP     SL*          S(+17 OR +16)
0056                          11,2417  00001 0                0D
0057                          11,2420  20202 0                1,1
0058                          11,2421  43204 0        BOVB    DAD
0059  REF  10  LAST 1258      11,2422  57544 0                TCDANZIG
0060                          11,2423  77626 0        STADR
0061  REF   3  LAST 1278      11,2424  75500 0        STORE   XKEPNEW
0062                          11,2425  74020 0        STQ     AXC,1
0063  REF   3  LAST 1282      11,2426  02267 0                KEPRTN
0064                          11,2427  00012 1        DEC     10
0065                          11,2430  74014 1        BON     AXC,1
0066  REF  23  LAST 1331      11,2431  00303 1                MOONFLAG
0067  REF   1                 11,2432  24077 1                KEPLERN
0068                          11,2433  00002 0        DEC     2
0069                          11,2434  77650 1        GOTO
0070  REF   2  LAST 1334      11,2435  24077 1                KEPLERN
```

```
0071                                11,2436  66350 1  FBR3    LXA,1   SSP
0072  REF  18  LAST 1316           11,2437  01500 0           DIFEQCNT
0073  REF  43  LAST 1333           11,2440  00051 0           S1
0074                                11,2441  77762 1           DEC     -13
0075                                11,2442  54345 1           DLOAD   SR
0076  REF   9  LAST 1324           11,2443  02305 0           DT/2
0077                                11,2444  20612 0           9D
0078                                11,2445  61500 0           TIX,1   ROUND
0079                                11,2446  22447 0           +1
0080                                11,2447  43206 1           PUSH    DAD
0081  REF   8  LAST 1333           11,2450  01551 1           TC
0082  REF  12  LAST 1333           11,2451  16303 0           STODL   TAU.
0083                                11,2452  77615 0           DAD
0084  REF  26  LAST 1330           11,2453  01517 0           TET
0085  REF  27  LAST 1335           11,2454  35517 1           STCALL  TET
0086  REF   2  LAST 1322           11,2455  22336 1           KEPPREP
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P0087 AGC ROUTINE TO COMPUTE ACCELERATION COMPONENTS.

0088				11,2456	73150 1	ACCOMP	LXA,1	LXA,2
0089	REF	12	LAST 1333	11,2457	02150 1			PBODY
0090	REF	13	LAST 1336	11,2460	02150 1			PBODY
0091				11,2461	77775 1		VLOAD	
0092	REF	20	LAST 1319	11,2462	11762 1			ZEROVEC
0093	REF	2	LAST 93	11,2463	26202 0		STOVL	FV
0094	REF	31	LAST 1239	11,2464	02152 0			ALPHAV
0095				11,2465	53257 1		VSL*	VAD
0096				11,2466	57605 0			0 -7,2
0097	REF	22	LAST 1333	11,2467	01535 0			RCV
0098	REF	2	LAST 93	11,2470	02160 1		STORE	BETAV
0099				11,2471	65014 1		BOF	XCHX,2
0100	REF	17	LAST 1329	11,2472	01756 1			DIMOFLAG
0101				11,2473	22500 1			+5
0102	REF	19	LAST 1335	11,2474	01500 0			DIFEQCNT
0103	REF	6	LAST 93	11,2475	12216 1		STORE	VECTAB,2
0104				11,2476	77724 0		XCHX,2	
0105	REF	20	LAST 1336	11,2477	01500 0			DIFEQCNT
0106				11,2500	53575 0		VLOAD	UNIT
0107	REF	32	LAST 1336	11,2501	02152 0			ALPHAV
0108	REF	33	LAST 1336	11,2502	16152 0		STODL	ALPHAV
0109				11,2503	00045 0			36D
0110	REF	4	LAST 1237	11,2504	02301 1		STORE	ALPHAM
0111				11,2505	77624 1		CALL	
0112	REF	1		11,2506	22602 0			GAMCOMP
0113				11,2507	66175 1		VLOAD	SXA,1
0114	REF	3	LAST 1336	11,2510	02160 1			BETAV
0115	REF	29	LAST 1316	11,2511	00051 0			S2
0116	REF	34	LAST 1336	11,2512	16152 0		STODL	ALPHAV
0117	REF	2	LAST 93	11,2513	02210 0			BETAM
0118	REF	5	LAST 1336	11,2514	02301 1		STORE	ALPHAM
0119				11,2515	71214 0		BOF	DLOAD
0120	REF	4	LAST 1323	11,2516	00342 1			MIDFLAG
0121	REF	1		11,2517	22754 1			OBLATE
0122	REF	28	LAST 1335	11,2520	01517 0			TET
0123				11,2521	77624 1		CALL	
0124	REF	3	LAST 766	11,2522	54136 1			LSPOS
0125				11,2523	72174 0		AXT,2	LXA,1
0126				11,2524	00002 0			2
0127	REF	30	LAST 1336	11,2525	00051 0			S2
0128				11,2526	77614 1		BOF	
0129	REF	24	LAST 1334	11,2527	00343 0			MOONFLAG
0130				11,2530	22533 1			+3
0131				11,2531	77076 0		VCOMP	AXT,2
0132				11,2532	00000 1			0
0133	REF	4	LAST 1336	11,2533	02160 1		STORE	BETAV
0134	REF	3	LAST 93	11,2534	26262 0		STOVL	RPQV

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0135                          11,2535  00003 1                 2D
0136  REF   2  LAST   93      11,2536  02271 1          STORE  RPSV
0140                          11,2537  77214 0          BOF    VLOAD
0141  REF  18  LAST 1336      11,2540  01756 1                 DIMOFLAG
0142  REF   1                 11,2541  22554 0                 GETRPSV
0143  REF  35  LAST 1336      11,2542  02152 0                 ALPHAV
0144                          11,2543  53761 1          VXSC   VSR*
0145  REF   6  LAST 1336      11,2544  02301 1                 ALPHAM
0146                          11,2545  57175 0                 1,2
0147                          11,2546  65051 0          VSU    XCHX,2
0148  REF   5  LAST 1336      11,2547  02160 1                 BETAV
0149  REF  21  LAST 1336      11,2550  01500 0                 DIFEQCNT
0150  REF   7  LAST 1336      11,2551  12224 0          STORE  VECTAB +6,2
0155                          11,2552  77724 0          XCHX,2
0156  REF  22  LAST 1337      11,2553  01500 0                 DIFEQCNT
0157                          11,2554  62175 0  GETRPSV  VLOAD  INCR,1
0158  REF   4  LAST 1336      11,2555  02262 0                 RPQV
0159                          11,2556  00004 0                 4
0160                          11,2557  43014 0          CLEAR  BOF
0161  REF   3  LAST 1320      11,2560  04260 1                 RPQFLAG
0162  REF  25  LAST 1336      11,2561  00343 0                 MOONFLAG
0163                          11,2562  22567 0                 +5
0164                          11,2563  53261 1          VSR    VAD
0165                          11,2564  20612 0                 9D
0166  REF   3  LAST 1337      11,2565  02271 1                 RPSV
0167  REF   4  LAST 1337      11,2566  02271 1          STORE  RPSV
0168                          11,2567  77624 1          CALL
0169  REF   2  LAST 1336      11,2570  22602 0                 GAMCOMP
0170                          11,2571  62174 1          AXT,2  INCR,1
0171                          11,2572  00004 0                 4
0172                          11,2573  00004 0                 4
0173                          11,2574  77775 1          VLOAD
0174  REF   5  LAST 1337      11,2575  02271 1                 RPSV
0175  REF   6  LAST 1337      11,2576  36160 0          STCALL BETAV
0176  REF   3  LAST 1337      11,2577  22602 0                 GAMCOMP
0177                          11,2600  77650 1          GOTO
0178  REF   2  LAST 1336      11,2601  22754 1                 OBLATE
0179                          11,2602  74575 0  GAMCOMP  VLOAD  VSR1
0180  REF   7  LAST 1337      11,2603  02160 1                 BETAV
0181                          11,2604  40236 1          VSQ    SETPD
0182                          11,2605  00001 0                 0
0183                          11,2606  61501 1          NORM   ROUND
0184                          11,2607  00040 0                 31D
0185                          11,2610  60325 0          PDDL   NORM            NORMED B SQUARED TO PD LIST
0186  REF   7  LAST 1337      11,2611  02301 1                 ALPHAM          NORMALIZE (LESS ONE) LENGTH OF ALPHA
0187                          11,2612  00041 1                 32D             SAVING NORM SCALE FACTOR IN X1
0188                          11,2613  63342 1          SR1    PDVL
0189  REF   8  LAST 1337      11,2614  02160 1                 BETAV           C(PDL+2) = ALMOST NORMED ALPHA
0190                          11,2615  77656 1          UNIT
0191  REF   9  LAST 1337      11,2616  16160 1          STODL  BETAV
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0192                        11,2617  00045 0          36D
0193  REF  3  LAST 1336    11,2620  02210 0  STORE   BETAM
0194                        11,2621  55301 0  NORM    BDDV      FORM NORMALIZED QUOTIENT ALPHAM/BETAM
0195                        11,2622  00042 1          33D
0196                        11,2623  41562 0  SR1R    PUSH      C(PDL+2) = ALMOST NORMALIZED RHO.
0197                        11,2624  77743 1  DLOAD*
0198  REF  1                11,2625  27732 1          ASCALE,1
0199  REF  44 LAST 1335     11,2626  00051 0  STORE   S1
0200                        11,2627  57124 1  XCHX,2  XAD,2
0201  REF  45 LAST 1338     11,2630  00050 1          S1
0202                        11,2631  00040 0          32D
0203                        11,2632  71264 1  XSU,2    DLOAD
0204                        11,2633  00041 1          33D
0205                        11,2634  00003 1          2D
0206                        11,2635  65057 0  SR*      XCHX,2
0207                        11,2636  57177 1          0 -1,2
0208  REF  46 LAST 1338     11,2637  00050 1          S1
0209                        11,2640  74406 0  PUSH    SR1R      RHO/4 TO 4D
0210                        11,2641  50315 0  PDVL    DOT
0211  REF  36 LAST 1337     11,2642  02152 0          ALPHAV
0212  REF  10 LAST 1337     11,2643  02160 1          BETAV
0213                        11,2644  44372 1  SL1R    BDSU      (RHO/4) - 2(ALPHAV/2.BETAV/2)
0214                        11,2645  57206 1  PUSH    DMPR      TO PDL+6
0215                        11,2646  00005 1          4
0216                        11,2647  77752 1  SL1
0217  REF  1                11,2650  43206 1  PUSH    DAD
0218                        11,2651  33412 0          DQUARTER
0219                        11,2652  75406 1  PUSH    SQRT
0220                        11,2653  41475 1  DMPR    PUSH
0221                        11,2654  00013 0          10D
0222  REF  2  LAST 1338     11,2655  43352 1  SL1     DAD
0223                        11,2656  33412 0          DQUARTER
0224                        11,2657  43325 1  PDDL    DAD       (1/4)+2((Q+1)/4)    TO PD+14D
0225  REF  1                11,2660  00013 0          10D
0226                        11,2661  11760 0          HALFDP
0227                        11,2662  72475 1  DMPR    SL1
0228                        11,2663  00011 1          8D
0229  REF  1                11,2664  56215 1  DAD     DDV
0230                        11,2665  23747 1          THREE/8
0231                        11,2666  00017 1          14D
0232                        11,2667  74275 1  DMPR    VXSC
0233  REF  11 LAST 1338     11,2670  00007 0          6
0234                        11,2671  02160 1          BETAV                    -
0235  REF  37 LAST 1338     11,2672  64515 1  PDVL    VSR3      (G/2)(C(PD+4))B/2 TO PD+16D
0236                        11,2673  02152 0          ALPHAV
0237                        11,2674  41455 0  VAD     PUSH      A12 + C(PD+16D) TO PD+16D
0238                        11,2675  41345 0  DLOAD   DMP
0239                        11,2676  00001 0          0
0240                        11,2677  00015 0          12D       -
                            11,2700  61501 1  NORM    ROUND
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0241                          11,2701  00037 0                 30D
0242                          11,2702  40665 0          BDDV   DMP*
0243                          11,2703  00003 1                 2
0244   REF   6  LAST 1333    11,2704  50037 0                 MUEARTH,2
0245                          11,2705  74276 1          DCOMP  VXSC
0246                          11,2706  57124 1          XCHX,2 XAD,2
0247   REF  47  LAST 1338    11,2707  00050 1                 S1
0248   REF  31  LAST 1336    11,2710  00051 0                 S2
0249                          11,2711  55064 0          XSU,2  XSU,2
0250                          11,2712  00036 1                 30D
0251                          11,2713  00037 0                 31D
02513                         11,2714  77600 1          BOV                    CLEAR OVIND
02516                         11,2715  22716 1                 +1
0252                          11,2716  65057 0          VSR*   XCHX,2
0253                          11,2717  57177 1                 0 -1,2
0254   REF  48  LAST 1339    11,2720  00050 1                 S1
0255                          11,2721  77655 1          VAD
0256   REF   3  LAST 1336    11,2722  02202 0                 FV
0257   REF   4  LAST 1339    11,2723  02202 0          STORE  FV
02580S                        11,2724  43400 1          BOV    RVQ             RETURN IF NO OVERFLOW
02581                         11,2725  22726 1                 +1
02581S                        11,2726  51575 1  GOBAQUE VLOAD  ABVAL
02581S REF   8  LAST 1319     11,2727  01521 0                 TDELTAV
02582                         11,2730  77654 0          BZE
02582S REF   1                11,2731  22751 1                 INT-ABRT
02583                         11,2732  54345 1          DLOAD  SR
02582  REF   2  LAST   93     11,2733  02212 1                 H
02582S                        11,2734  20612 0                 SD
02583                         11,2735  44206 0          PUSH   BDSU
02583S REF   9  LAST 1335     11,2736  01551 1                 TC
02584  REF  13  LAST 1335     11,2737  16303 0          STODL  TAU
02584S REF  29  LAST 1336     11,2740  01517 0                 TET
02585                         11,2741  45425 0          DSU    STADR
02585S REF  30  LAST 1339     11,2742  42260 0          STCALL TET
02586  REF   3  LAST 1335     11,2743  22336 1                 KEPPREP
02586S                        11,2744  77624 1          CALL
02587  REF   5  LAST 1322     11,2745  23420 0                 RECTIFY
02587S                        11,2746  77614 1          SETGO
02588  REF   4  LAST 1337     11,2747  04020 1                 RPQFLAG
02588S REF   4  LAST 1330     11,2750  27364 0                 TESTLOOP

02588S                        11,2751  77776 1  INT-ABRT EXIT
02588S REF   8  LAST 1304     11,2752  0 5726 1          TC     POODOO
02589                         11,2753  20430 1          OCT    20430           SUB-SURFACE STATE VECTOR
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P0259  THE OBLATE ROUTINE COMPUTES THE ACCELERATION DUE TO OBLATENESS. IT USES THE UNIT OF THE VEHICLE
R0261  POSITION VECTOR FOUND IN ALPHAV AND THE DISTANCE TO THE CENTER IN ALPHAM. THIS IS ADDED TO THE SUM OF THE
R0263  DISTURBING ACCELERATIONS IN FV AND THE PROPER DIFEQ STAGE IS CALLED VIA X1.
 0265                          11,2754  71354 0  OBLATE   LXA,2   DLOAD
 0266  REF  14  LAST 1336     11,2755  02150 1            PBODY
 0267  REF   8  LAST 1337     11,2756  02301 1            ALPHAM
 0268                          11,2757  44601 0           SETPD   DSU*
 0269                          11,2760  00001 0                   0
 0270  REF   1                 11,2761  50007 0                   RDE,2
 0271                          11,2762  43044 0           BPL     BOF              GET URPV
 0272  REF   1                 11,2763  23212 1                   NBRANCH
 0273  REF  26  LAST 1337     11,2764  00343 0                   MOONFLAG
 0274  REF   1                 11,2765  23221 1                   COSPHIE
 0275                          11,2766  65375 0           VLOAD   PDDL
 0276  REF  38  LAST 1338     11,2767  02152 0                   ALPHAV
 0277  REF  31  LAST 1339     11,2770  01517 0                   TET
 0278                          11,2771  45125 0           PDDL    CALL
 0279  REF   1                 11,2772  23745 0                   3/5
 0280  REF   4  LAST 1236     11,2773  55370 0                   R-TO-RP
 0284  REF   1                 11,2774  24017 1           STOVL   URPV             RP/R  B-I IN PLANETARY COORDINATES
 0285  REF   3  LAST 1317     11,2775  11754 1                   ZUNIT
 0286                          11,2776  45006 0           PUSH    CALL             ZUNIT B-I IN PLANETARY COORDL AT 00D
 0287  REF   1                 11,2777  23227 1                   MATRIX
 0288                          11,3000  77715 1           PDVL                     UZ    B-2 IN INERT COORD      AT 00D
 0289  REF   7  LAST 1239     11,3001  11760 0                   XUNIT
 0290                          11,3002  45006 0           PUSH    CALL             XUNIT B-1 IN PLANETARY COORD. AT 06D
 0291  REF   2  LAST 1340     11,3003  23227 1                   MATRIX
 0292                          11,3004  77772 0           VSL1
 0293                          11,3005  24041 1           STOVL   32D              UX    B-1 IN INERT. COORD     AT 32D
 0294                          11,3006  77772 0           VSL1,
 0295  REF   1                 11,3007  14025 0  COMTERM  STODL   UZ               UZ  B-1 IN INERTIAL COORD      AT 20D
 0296  REF   1                 11,3010  00023 0                   COSPHI/2         '      Z-COMPONENT OF URPV
 0297                          11,3011  65275 1           DMPR    PDDL             P   B-6   ,  3COSPHI/64        AT 00D
 0298  REF   1                 11,3012  23755 1                   3/32              2
 0299  REF   2  LAST 1340     11,3013  00023 0                   COSPHI/2
 0300                          11,3014  57316 1           DSQ     DMPR
 0301  REF   1                 11,3015  23757 0                   15/16            '                          2
 0302                          11,3016  41425 1           DSU     PUSH             P   B-5   ,(1/2)(15COSPHI -3)   AT 02D
 0303  REF   1                 11,3017  23753 1                   3/64              3
 0304                          11,3020  41275 1           DMPR    DMP
 0305  REF   3  LAST 1340     11,3021  00023 0                   COSPHI/2
 0306  REF   1                 11,3022  23763 1                   7/12
 0307                          11,3023  65372 1           SL1R    PDDL
 0308                          11,3024  00001 0                   0D
 0309                          11,3025  44275 1           DMPR    BDSU
 0310  REF   1                 11,3026  23771 1                   2/3              '                '     '
 0311                          11,3027  57206 1           PUSH    DMPR             P   B-7,(1/3)(7COSPHI P  -4P )  AT 04D
 0312  REF   4  LAST 1340     11,3030  00023 0                   COSPHI/2          4                      3    2
 0313                          11,3031  65275 1           DMPR    PDDL
 0314  REF   1                 11,3032  23765 1                   9/16
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0315                          11,3033  00003 1          2D
0316                          11,3034  44275 1   DMPR   BDSU      P   B-10,(1/4)(9COSPHI P  -5P )
0317  REF   1                 11,3035  23767 0          5/128     5                    4   3
0318                          11,3036  56203 0   DMP*   DDV
0319  REF   1                 11,3037  50033 1          J4REQ/J3,2      B- , (J RP/J R)P
0320  REF   9  LAST 1340      11,3040  02301 1          ALPHAM                4   3   5
0321                          11,3041  56615 0   DAD    DMPR*
0322                          11,3042  00005 1          4D                        2   2
0323  REF   1                 11,3043  50027 1          2J3RE/J2,2      B  ,(2J RP /J2 R )P  +(2J RP/J2R)P
0324                          11,3044  43271 1   DDV    DAD                   4       5   3       4
0325  REF  10  LAST 1341      11,3045  02301 1          ALPHAM          -         2   2
0326                          11,3046  00003 1          2D                (R/R)(J RP P /R + 2J RP P /  + J P )
0327                          11,3047  77761 1   VXSC                        4   5       3   4 2   2 3
0328  REF  39  LAST 1340      11,3050  02152 0          ALPHAV                4       2
0329  REF   1                 11,3051  14033 1   STODL  TVEC      B-6,(SUM((J /R )P   (COSPHI))UR)
0330                          11,3052  70403 1   DMP*   SR1                   I=2   I     I+1
0331  REF   2  LAST 1341      11,3053  50033 1          J4REQ/J3,2
0332                          11,3054  43271 1   DDV    DAD               (J RP/J R)P
0333  REF  11  LAST 1341      11,3055  02301 1          ALPHAM                4   3   4
0334                          11,3056  50473 1   DMPR*  SR3                     2   2
0335  REF   2  LAST 1341      11,3057  50027 1          2J3RE/J2,2          (2J RP /J R )P  +(2J RP/J R)P
0336                          11,3060  43271 1   DDV    DAD                   4   2   4   3   2   3
0337  REF  12  LAST 1341      11,3061  02301 1          ALPHAM
0338                          11,3062  76561 1   VXSC   VSL1                  4
0339  REF   2  LAST 1340      11,3063  00025 0          UZ                      B-6  SUM(P(COSPHI))UZ
0340                          11,3064  77645 0   BVSU                          I=2  I
0341  REF   2  LAST 1341      11,3065  00033 1          TVEC              4                 I-2
0342  REF   3  LAST 1341      11,3066  14033 1   STODL  TVEC      SUM((MU J (RP/R)   )(P   (COSPHI)UR -
0343  REF  13  LAST 1341      11,3067  02301 1          ALPHAM    I=2       I                   I+2
0344                          11,3070  63501 0   NORM   DSQ                         P (COSPHI)UZ))  B-6 AT 20D
0345  REF  84  LAST 1333      11,3071  00047 1          X1                          I
0346                          11,3072  60316 0   DSQ    NORM
0347  REF  49  LAST 1339      11,3073  00051 0          S1                    4
0348                          11,3074  54606 0   PUSH   BDDV*       NORMALIZED  R                        AT 00D
0349  REF   1                 11,3075  50023 0          J2REQSQ,2
0350                          11,3076  40161 0   VXSC   BOV
0351  REF   4  LAST 1341      11,3077  00033 1          TVEC
0352                          11,3100  23101 0          +1                B+38 FOR EARTH , B+42 FOR MOON
0353                          11,3101  56070 0   XAD,1  XAD,1
0354  REF  85  LAST 1341      11,3102  00046 0          X1
0355  REF  86  LAST 1341      11,3103  00046 0          X1
0356                          11,3104  53670 0   XAD,1  VSL*
0357  REF  50  LAST 1341      11,3105  00050 1          S1
0358                          11,3106  20153 1          0 -22D,1
0359                          11,3107  40055 0   VAD    BOV
0360  REF   5  LAST 1339      11,3110  02202 0          FV
0361  REF   1                 11,3111  22726 1          GOBAQUE
0362  REF   6  LAST 1341      11,3112  16202 0   STODL  FV                B+16 FOR EARTH , B+20 FOR MOON
0363  REF   2  LAST 1340      11,3113  00017 1          URPV              B-1  X-COMPONENT OF POSITION  IN
0364                          11,3114  41414 0   BOF    PUSH                    PLANETORY COORD.        AT 02D
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0365  REF  27  LAST 1340   11,3115  00343 0            MOONFLAG
0366  REF   2  LAST 1340   11,3116  23212 1            NBRANCH          2
0367                       11,3117  65316 0  DSQ       PDDL     B-2     X                                  AT 04D
0368  REF   3  LAST 1341   11,3120  00021 1            URPV +2  B-1     Y-COMPONENT
0369                       11,3121  45316 1  DSQ       DSU
0370                       11,3122  74205 0  DMP       VXSC
0371  REF   3  LAST 1317   11,3123  27756 0            5/8                2  2 -
0372  REF  40  LAST 1341   11,3124  02152 0            ALPHAV   B-6     5(Y -X )UR      2  2 -
0373                       11,3125  65332 0  VSL3      PDDL     B-3                  5(Y -X )UR            AT 02D
0374                       11,3126  53361 0  VXSC      VAD
0375                       11,3127  00041 1            32D                2  2 -   2          -
0376                       11,3130  47315 0  PDVL      VXV              (5(Y.-X )UR/R ) +(2X/R)UX           AT 02D
0377                       11,3131  00041 1            32D              B-1   UX
0378  REF   3  LAST 1341   11,3132  00025 0            UZ               B-2   -UY =(UX * UZ)
0379                       11,3133  74372 1  VSL1      VXSC             B-3   -(2Y/R)UY
0380  REF   4  LAST 1342   11,3134  00021 1            URPV +2                  2  2 -   2          -
0381                       11,3135  41455 0  VAD       PUSH             B-3 (5(X -Y )UR/R )+(2X/R)UX -(
0382                       11,3136  77745 1  DLOAD                              -
0383  REF   5  LAST 1340   11,3137  00023 0            COSPHI/2               2Y/R)UY                       AT 02D
0384                       11,3140  41516 0  DSQ       PUSH             B-2 (Z.COMPONENT)                   AT 08D
0385                       11,3141  65205 0  DMP       PDDL                          2
0386  REF   4  LAST 1342   11,3142  27756 0            5/8              B-5   5COSPHI/2                     AT 08D
0387                       11,3143  43302 1  SR2       DAD
0388                       11,3144  00011 1            08D
0389                       11,3145  41221 0  BDSU      DMP                                  2
0390  REF   7  LAST 1301   11,3146  33416 1            DI/32            B-5   (1 - 7COSPHI )
0391  REF   5  LAST 1342   11,3147  00017 1            URPV
0392                       11,3150  74205 0  DMP       VXSC
0393  REF   5  LAST 1342   11,3151  27756 0            5/8
0394  REF  41  LAST 1342   11,3152  02152 0            ALPHAV                               2 -
0395                       11,3153  65272 0  VSL5      PDDL     B-5 (5X/R)(1-7COSPHI )UR            AT 08D
0396                       11,3154  74225 1  DSU       VXSC
0397  REF   8  LAST 1342   11,3155  33416 1            DI/32
0398                       11,3156  00041 1            32D
0399                       11,3157  53372 1  VSL1      VAD                                  2 -           -
0400                       11,3160  41325 0  PDDL      DMP      B-5 (5X/R)(1-7COSPHI )UR +(5COSPHI
0401  REF   6  LAST 1342   11,3161  00017 1            URPV               -
0402  REF   7  LAST 1342   11,3162  00023 0            URPV +4  -1)UX                                       AT 08D
0403                       11,3163  74205 0  DMP       VXSC
0404  REF   6  LAST 1342   11,3164  27756 0            5/8      B-5     5X Y
0405  REF   4  LAST 1342   11,3165  00025 0            UZ                 M M
0406                       11,3166  53352 0  VSL2      VAD                                  2 -                 2
0407                       11,3167  60325 0  PDDL      NORM     B-5 (5X/R)(1-7COSPHI )UR +(5COSPHI
0408  REF  14  LAST 1341   11,3170  02301 1            ALPHAM             -          2 -
0409  REF  37  LAST 1285   11,3171  00050 1            X2       -1)UX +(10XZ/R )UZ                          AT 08D
0410                       11,3172  67206 1  PUSH      SLOAD
0411  REF   2  LAST   91   11,3173  01770 0            E32C31RM
0412                       11,3174  74271 0  DDV       VXSC
0413                       11,3175  63257 1  VSL*      PDVL
0414                       11,3176  57601 1            0 -3,2
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0415                          11,3177  67206 1            PUSH   SLOAD
0416  REF   2  LAST   91      11,3200  01767 0                   E3J22R2M
0417                          11,3201  53361 0            VXSC   VAD
0418                          11,3202  70257 0            VSL*   V/SC
0419                          11,3203  20146 0                   0 -27D,1          B+16 OR B+20 (J    + C   )
0420                          11,3204  40055 0            VAD    BOV                              22    31
0421  REF   7  LAST 1341     11,3205  02202 0                   FV
0422  REF   2  LAST 1341     11,3206  22726 1                   GOBAQUE
0423  REF   8  LAST 1343     11,3207  02202 0            STORE  FV
0424                          11,3210  77754 1            LXA,2
0425  REF  15  LAST 1340     11,3211  02150 1                   PBODY
0426                          11,3212  72135 0  NBRANCH   SLOAD  LXA,1
0427  REF  23  LAST 1337     11,3213  01501 1                   DIFEQCNT
0428  REF 650  LAST 1329     11,3214  00154 1                   MPAC
0429                          11,3215  73205 1            DMP    CGOTO
0430  REF   1                11,3216  27760 0                   -1/12
0431  REF 651  LAST 1343     11,3217  00155 0                   MPAC
0432  REF   1                11,3220  23234 0                   DIFEQTAB
0433                          11,3221  77745 1  COSPHIE   DLOAD
0434  REF  42  LAST 1342     11,3222  02156 1                   ALPHAV +4
0435  REF   6  LAST 1342     11,3223  24023 0            STOVL  COSPHI/2
0436  REF   4  LAST 1340     11,3224  11754 1                   ZUNIT
0437                          11,3225  77650 1            GOTO
0438  REF   1                11,3226  23007 1                   CCMTERM

0439                          11,3227  57435 1  MATRIX   VXV    VCOMP
0440  REF   3  LAST 1245     11,3230  02012 0                   504LM             ROUTINE TRANSLATES FROM PLANETARY
0441                          11,3231  77655 1            VAD                      TO INERTIAL COORDINATES
0442                          11,3232  43505 0            VXM    RVQ
0443  REF   8  LAST 1248     11,3233  00025 0                   MMATRIX

0444  REF   1                11,3234  23445 0  DIFEQTAB CADR   DIFEQ+0
0445  REF   1                11,3235  23451 0           CADR   DIFEQ+1
0446  REF   1                11,3236  23462 0           CADR   DIFEQ+2

0447                          11,3237  45014 0  TIMESTEP BOF    CALL
0448  REF   5  LAST 1336     11,3240  00342 1                   MIDFLAG
0449  REF   1                11,3241  23245 0                   RECTEST           SKIP ORIGIN CHANGE LOGIC
0450  REF   2  LAST 1320     11,3242  23317 0                   CHKSWTCH
0451                          11,3243  77640 0           BMN
0452  REF   1                11,3244  23354 1                   DOSWITCH

0453                          11,3245  51575 1  RECTEST  VLOAD  ABVAL             RECTIFY IF
0454  REF   9  LAST 1339     11,3246  01521 0                   TDELTAV
0455                          11,3247  77600 1           BOV
0456  REF   1                11,3250  23273 0                   CALLRECT
0457                          11,3251  51025 1           DSU    BPL                  1) EITHER TDELTAV OR TNUV EQUALS OR
0458  REF   2  LAST   34     11,3252  23761 0                   3/4                     EXCEEDS 3/4 IN MAGNITUDE
0459  REF   2  LAST 1343     11,3253  23273 0                   CALLRECT
0460                          11,3254  53615 0           DAD    SL*                                  OR
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0461  REF   3  LAST 1343   11,3255  23761 0                  3/4
0462                       11,3256  57605 0                  0 -7,2          2) ABVAL(TDELTAV) EQUALS OR EXCEEDS
0463                       11,3257  45271 1          DDV     DSU                .01(ABVAL(RCV))
0464                       11,3260  00013 0                  1DD
0465  REF   1              11,3261  27762 1                  RECRATIO
0466                       11,3262  77244 0          BPL     VLOAD
0467  REF   3  LAST 1343   11,3263  23273 0                  CALLRECT
0468  REF   8  LAST 1319   11,3264  01527 0                  TNUV
0469                       11,3265  45246 0          ABVAL   DSU
0470  REF   4  LAST 1344   11,3266  23761 0                  3/4
0471                       11,3267  77600 1          BOV
0472  REF   4  LAST 1344   11,3270  23273 0                  CALLRECT
0473                       11,3271  77640 0          BMN
0474  REF   1              11,3272  23275 0                  INTGRATE
0475                       11,3273  77624 1  CALLRECT CALL
0476  REF   6  LAST 1339   11,3274  23420 0                  RECTIFY
0477                       11,3275  77775 1  INTGRATE VLOAD
0478  REF   9  LAST 1344   11,3276  01527 0                  TNUV
0479  REF   2  LAST   77   11,3277  24763 0          STOVL   VV
0480  REF  10  LAST 1343   11,3300  01521 0                  TDELTAV
0481  REF   2  LAST   77   11,3301  00755 0          STORE   VV
0482                       11,3302  77614 1          CLEAR
0483  REF   1              11,3303  00261 1                  JSWITCH
0484                       11,3304  66375 0  DIFEQQ  VLOAD   SSP
0485  REF   3  LAST 1344   11,3305  00755 0                  VV
0486  REF  24  LAST 1343   11,3306  01501 1                  DIFEQCNT
0487                       11,3307  00000 1                  0
0488  REF  43  LAST 1343   11,3310  16152 0          STODL   ALPHAV
0489  REF   3  LAST 1240   11,3311  11762 1                  DPZERO
0490  REF   3  LAST 1339   11,3312  02212 1          STORE   H               START H AT ZERO. GOES 0(DELT/2)DELT.
0491                       11,3313  52014 0          BON     GOTO
0492  REF   2  LAST 1344   11,3314  00301 0                  JSWITCH
0493  REF   1              11,3315  23664 1                  DOW..
0494  REF   1              11,3316  22456 0                  ACCOMP
0495                       11,3317  43020 1  CHKSWTCH STQ     BOF
0496  REF   3  LAST   93   11,3320  02267 0                  ORIGEX
0497  REF   5  LAST 1339   11,3321  04340 1                  RPQFLAG
0498  REF   1              11,3322  23332 1                  RPQOK           MOON POSITION IS AVAILABLE
0499                       11,3323  45145 0          DLOAD   CALL
0500  REF  32  LAST 1340   11,3324  01517 0                  TET
0501  REF   3  LAST  940   11,3325  54141 1                  LUNPOS          GET MOON POSITION
0502                       11,3326  57414 1          BOF     VCOMP
0503  REF  28  LAST 1342   11,3327  00343 0                  MOONFLAG
0504                       11,3330  23331 1                  +1
0505  REF   5  LAST 1337   11,3331  02262 0          STORE   RPQV
0506                       11,3332  77354 0  RPQOK   LXA,2   VLOAD           RESTORE X2 AFTER USING LUNPOS
0507  REF  16  LAST 1343   11,3333  02150 1                  PBODY
0508  REF  11  LAST 1344   11,3334  01521 0                  TDELTAV         -
0509                       11,3335  53257 1          VSL*    VAD             |RQC|-RSPHERE WHEN OUTSIDE THE SPHERE.
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0510                          11,3336  57605 0                  0 -7,2          -  -           -
0511  REF  23  LAST 1336      11,3337  01535 0                  RCV             R = RDEVIATION + RCONIC
0512                          11,3340  51414 1          BOF     ABVAL
0513  REF  29  LAST 1344      11,3341  00343 0                  MOONFLAG
0514  REF   1                 11,3342  23347 0                  EARSPH
0515                          11,3343  44302 0          SR2     BDSU            INSIDE
0516  REF   1                 11,3344  27764 1                  RSPHERE
0517                          11,3345  77650 1          GOTO
0518  REF   4  LAST 1344      11,3346  02267 0                  ORIGEX
0519                          11,3347  51451 0  EARSPH  VSU     ABVAL           OUTSIDE
0520  REF   6  LAST 1344      11,3350  02262 0                  RPQV
0521                          11,3351  52025 1          DSU     GOTO
0522  REF   2  LAST 1345      11,3352  27764 1                  RSPHERE
0523  REF   5  LAST 1345      11,3353  02267 0                  ORIGEX
0524                          11,3354  77624 1  DOSWITCH CALL
0525  REF   2  LAST 1320      11,3355  23360 0                  ORIGCHNG
0526                          11,3356  77650 1          GOTO
0527  REF   2  LAST 1344      11,3357  23275 0                  INTGRATE
0528                          11,3360  45020 1  ORIGCHNG STQ     CALL
0529  REF   6  LAST 1345      11,3361  02267 0                  ORIGEX
0530  REF   7  LAST 1344      11,3362  23420 0                  RECTIFY
0531                          11,3363  53775 1          VLOAD   VSL*
0532  REF  24  LAST 1345      11,3364  01535 0                  RCV
0533                          11,3365  57576 1                  0,2
0534                          11,3366  53651 0          VSU     VSL*
0535  REF   7  LAST 1345      11,3367  02262 0                  RPQV
0536                          11,3370  57574 0                  2,2
0537  REF  13  LAST 1331      11,3371  01503 0          STORE   RRECT
0538  REF  25  LAST 1345      11,3372  15535 0          STODL   RCV
0539  REF  33  LAST 1344      11,3373  01517 0                  TET
0540                          11,3374  77624 1          CALL
0541  REF   1                 11,3375  54144 1                  LUNVEC
0542                          11,3376  57414 1          BOF     VCOMP
0543  REF  30  LAST 1345      11,3377  00343 0                  MOONFLAG
0544                          11,3400  23401 0                  +1
0545                          11,3401  53715 1          PDVL    VSL*
0546  REF  18  LAST 1333      11,3402  01543 1                  VCV
0547                          11,3403  57576 1                  0,2
0548                          11,3404  77651 0          VSU
0549                          11,3405  77657 0          VSL*
0550                          11,3406  57574 0                  0 +2,2
0551  REF   9  LAST 1331      11,3407  01511 0          STORE   VRECT
0552  REF  19  LAST 1345      11,3410  01543 1          STORE   VCV
0553                          11,3411  67154 0          LXA,2   SXA,2
0554  REF   7  LAST 1345      11,3412  02267 0                  ORIGEX
0555  REF  14  LAST 1325      11,3413  00052 0                  QPRET
0556                          11,3414  52014 0          BON     GOTO
0557  REF  31  LAST 1345      11,3415  00303 1                  MOONFLAG
0558  REF   2  LAST 1316      11,3416  27011 1                  CLRMOON
0559  REF   3  LAST 1316      11,3417  27016 0                  SETMOON
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P0560 THE RECTIFY SUBROUTINE IS CALLED BY THE INTEGRATION PROGRAM AND OCCASIONALLY BY THE MEASUREMENT INCORPORATION
R0562 ROUTINES TO ESTABLISH A NEW CONIC.

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0563                                11,3420  77354 0  RECTIFY  LXA,2   VLOAD
0564  REF  17  LAST 1344           11,3421  02150 1             PBODY
0565  REF  12  LAST 1344           11,3422  01521 0             TDELTAV
0566                                11,3423  53257 1           VSL*   VAD
0567                                11,3424  57605 0                  0 -7,2
0568  REF  26  LAST 1345           11,3425  01535 0                  RCV
0569  REF  14  LAST 1345           11,3426  01503 0           STORE  RRECT
0570  REF  27  LAST 1346           11,3427  25535 0           STOVL  RCV
0571  REF  10  LAST 1344           11,3430  01527 0                  TNUV
0572                                11,3431  53257 1           VSL*   VAD
0573                                11,3432  57602 1                  0 -4,2
0574  REF  20  LAST 1345           11,3433  01543 1                  VCV
0575  REF  10  LAST 1345           11,3434  01511 0  MINIRECT STORE  VRECT
0576  REF  21  LAST 1346           11,3435  25543 1  TINIRECT STOVL  VCV
0577  REF  21  LAST 1336           11,3436  11762 1                  ZEROVEC
0578  REF  13  LAST 1346           11,3437  01521 0           STORE  TDELTAV
0579  REF  11  LAST 1346           11,3440  15527 0           STODL  TNUV
0580  REF  22  LAST 1346           11,3441  11762 1                  ZEROVEC
0581  REF  10  LAST 1339           11,3442  01551 1           STORE  TC
0582  REF   3  LAST 1334           11,3443  01553 0           STORE  XKEP
0583                                11,3444  77616 0                  RVQ
```

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P0584   THE THREE DIFEQ ROUTINES - DIFEQ+0, DIFEQ+12, AND DIFEQ+24 - ARE ENTEREDTO PROCESS THE CONTRIBUTIONS AT THE
R0586   BEGINNING, MIDDLE, AND END OF THE TIMESTEP, RESPECTIVELY. THE UPDATING IS DONE BY THE NYSTROM METHOD.
 0588                              11,3445   64575 1  DIFEQ+0  VLOAD   VSR3
 0589   REF   9  LAST 1343        11,3446   02202 0             FV
 0590   REF   2  LAST   93        11,3447   36166 0           STCALL  PHIV
 0591   REF   1                   11,3450   23625 1                   DIFEQCOM
 0592                              11,3451   74575 0  DIFEQ+1  VLOAD   VSR1
 0593   REF  10  LAST 1347        11,3452   02202 0             FV
 0594                              11,3453   53206 0           PUSH    VAD
 0595   REF   3  LAST 1347        11,3454   02166 1                   PHIV
 0596   REF   2  LAST   93        11,3455   26174 1           STOVL   PSIV
 0597                              11,3456   53362 0           VSR1    VAD
 0598   REF   4  LAST 1347        11,3457   02166 1                   PHIV
 0599   REF   5  LAST 1347        11,3460   36166 0           STCALL  PHIV
 0600   REF   2  LAST 1347        11,3461   23625 1                   DIFEQCOM
 0601                              11,3462   57345 1  DIFEQ+2  DLOAD   DMPR
 0602   REF   4  LAST 1344        11,3463   02212 1                   H
 0603   REF   2  LAST 1333        11,3464   23771 1                   DP2/3
 0604                              11,3465   74206 0           PUSH    VXSC
 0605   REF   6  LAST 1347        11,3466   02166 1                   PHIV
 0606                              11,3467   53372 1           VSL1    VAD
 0607   REF   3  LAST 1344        11,3470   00763 0             ZV
 0608                              11,3471   53361 0           VXSC    VAD
 0609   REF   5  LAST 1347        11,3472   02212 1             H
 0610   REF   4  LAST 1344        11,3473   00755 0             YV
 0611   REF   5  LAST 1347        11,3474   24755 0           STOVL   YV
 0612   REF  11  LAST 1347        11,3475   02202 0             FV
 0613                              11,3476   53322 1           VSR3    VAD
 0614   REF   3  LAST 1347        11,3477   02174 1                   PSIV
 0615                              11,3500   76561 1           VXSC    VSL1
 0616                              11,3501   77655 1           VAD
 0617   REF   4  LAST 1347        11,3502   00763 0             ZV
 0618   REF   5  LAST 1347        11,3503   00763 0           STORE   ZV
 0619                              11,3504   45014 0           BOFF    CALL
 0620   REF   3  LAST 1344        11,3505   00341 1                   JSWITCH
 0621   REF   1                   11,3506   23556 0                   ENDSTATE
 0622   REF  27  LAST 1321        11,3507   22327 1                   GRP2PC
 0623                              11,3510   77354 0           LXA,2   VLOAD
 0624   REF   1                   11,3511   00770 1                   COLREG
 0625   REF   6  LAST 1347        11,3512   00763 0             ZV
 0626                              11,3513   77732 1           VSL3                ADJUST W-POSITION FOR STORAGE
 0627   REF  59  LAST 1258        11,3514   12467 1           STORE   W +54D,2
 0628                              11,3515   77775 1           VLOAD
 0629   REF   6  LAST 1347        11,3516   00755 0             YV
 0630                              11,3517   40132 0           VSL3    BOV
 0631   REF   1                   11,3520   23650 0                   WMATEND
 0632   REF  60  LAST 1347        11,3521   12401 1           STORE   W,2

 0633                              11,3522   77624 1           CALL
 0634   REF  28  LAST 1347        11,3523   22327 1                   GRP2PC
```

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```
0635                          11,3524  66354 0          LXA,2  SSP
0636  REF   2  LAST 1347     11,3525  00770 1                 COLREG
0637  REF  32  LAST 1339     11,3526  00052 0                 S2
0638                          11,3527  00000 1                 0
0639                          11,3530  67114 1          INCR,2 SXA,2
0640                          11,3531  00006 1                 6
0641  REF   7  LAST 1347     11,3532  00754 1                 YV
0642                          11,3533  45104 0          TIX,2  CALL
0643  REF   1                 11,3534  23621 0                 RELOADSV
0644  REF  29  LAST 1347     11,3535  22327 1                 GRP2PC
0645                          11,3536  67154 0          LXA,2  SXA,2
0646  REF   8  LAST 1348     11,3537  00754 1                 YV
0647  REF   3  LAST 1348     11,3540  00770 1                 COLREG

0648                          11,3541  77624 1  NEXTCOL CALL
0649  REF  30  LAST 1348     11,3542  22327 1                 GRP2PC
0650                          11,3543  76754 0          LXA,2  VLOAD*
0651  REF   4  LAST 1348     11,3544  00770 1                 COLREG
0652  REF  61  LAST 1347     11,3545  75376 1                 W,2
0653                          11,3546  77722 0          VSR3                ADJUST W-POSITION FOR INTEGRATION
0654  REF   9  LAST 1348     11,3547  00755 0          STORE  YV
0655                          11,3550  76173 0          VLOAD* AXT,1
0656  REF  62  LAST 1348     11,3551  75310 1                 W +54D,2
0657                          11,3552  00000 1                 0
0658                          11,3553  77722 0          VSR3                ADJUST W-VELOCITY FOR INTEGRATION
0659  REF   7  LAST 1347     11,3554  34763 1          STCALL ZV
0660  REF   1                 11,3555  23304 1                 DIFEQQ

0661                          11,3556  77200 0  ENDSTATE BOV    VLOAD
0662  REF   3  LAST 1343     11,3557  22726 1                 GOBAQUE
0663  REF   8  LAST 1348     11,3560  00763 0                 ZV
0664  REF  12  LAST 1346     11,3561  25527 0          STOVL  TNUV
0665  REF  10  LAST 1348     11,3562  00755 0                 YV
0666  REF  14  LAST 1346     11,3563  01521 0          STORE  TDELTAV
0667                          11,3564  43014 0          BON    BOFF
0668  REF   3  LAST 1329     11,3565  04715 0                 MIDAVFLG
0669  REF   1                 11,3566  27656 1                 CKMID2              CHECK FOR MID2 BEFORE GOING TO TIMEINC
0670  REF  19  LAST 1337     11,3567  01756 1                 DIMOFLAG
0671  REF   5  LAST 1339     11,3570  27364 0                 TESTLOOP
0672                          11,3571  77776 1          EXIT
0673  REF 103  LAST 1332     11,3572  0 5402 1          TC     PHASCHNG
0674                          11,3573  04022 0          OCT    04022               PHASE I
0675  REF  69  LAST 1320     11,3574  0 5547 1          TC     UPFLAG              PHASE CHANGE HAS OCCURRED BETWEEN
0676  REF   4  LAST 1320     11,3575  00230 0          ADRES  REINTFLG            INTSTALL AND INTWAKE
0677  REF 240  LAST 1332     11,3576  0 6006 1          TC     INTPRET
0678                          11,3577  77731 1          SSP
0679  REF  15  LAST 1345     11,3600  00053 1                 QPRET
0680  REF   1                 11,3601  23606 0                 AMOVED
0681                          11,3602  52014 0          BON    GOTO
0682  REF  17  LAST 1327     11,3603  01714 1                 VINTFLAG
```

```
0683   REF   4  LAST 1331   11,3604   26761 0                    ATOPCSM
0684   REF   4  LAST 1331   11,3605   27034 0                    ATOPLEM
0685                        11,3606   66214 0  AMOVED   SET     SSP
0686   REF   4  LAST 1347   11,3607   00061 0                    JSWITCH
0687   REF   5  LAST 1348   11,3610   00771 0                    COLREG
0688                        11,3611   77741 0           DEC      -30
0689                        11,3612   66214 0           BOFF     SSP
0690   REF   5  LAST 1327   11,3613   01755 1                    D6OR9FLG
0691   REF   1              11,3614   23541 0                    NEXTCOL
0692   REF   6  LAST 1349   11,3615   00771 0                    COLREG
0693                        11,3616   77717 0           DEC      -48
0694                        11,3617   77650 1           GOTO
0695   REF   2  LAST 1349   11,3620   23541 0                    NEXTCOL


0696                        11,3621   77745 1  RELOADSV DLOAD                RELOAD TEMPORARY STATE VECTOR
0697   REF   9  LAST 1330   11,3622   00745 1                    TDEC       FROM PERMANENT IN CASE OF
0698   REF  48  LAST 1329   11,3623   34041 0           STCALL   TDEC1
0699   REF   1              11,3624   27243 1                    INTEGRV2   BY STARTING AT INTEGRV2.
0700                        11,3625   43345 1  DIFEQCOM DLOAD    DAD        INCREMENT H AND DIFEQCNT.
0701   REF  10  LAST 1335   11,3626   02305 0                    DT/2
0702   REF   6  LAST 1347   11,3627   02212 1                    H
0703                        11,3630   66110 1           INCR,1   SXA,1
0704                        11,3631   77763 0           DEC      -12
0705   REF  25  LAST 1344   11,3632   01500 0                    DIFEQCNT   DIFEQCNT SET FOR NEXT ENTRY.
0706   REF   7  LAST 1349   11,3633   02212 1           STORE    H
0707                        11,3634   74561 0           VXSC     VSR1
0708   REF  12  LAST 1347   11,3635   02202 0                    PV
0709                        11,3636   74255 0           VAD      VXSC
0710   REF   9  LAST 1348   11,3637   00763 0                    ZV
0711   REF   8  LAST 1349   11,3640   02212 1                    H
0712                        11,3641   77655 1           VAD
0713   REF  11  LAST 1348   11,3642   00755 0                    VV
0714   REF  44  LAST 1344   11,3643   02152 0           STORE    ALPHAV
0715                        11,3644   52014 0           BON      GOTO
0716   REF   5  LAST 1349   11,3645   00301 0                    JSWITCH
0717   REF   2  LAST 1344   11,3646   23664 1                    DOW..
0718   REF   1              11,3647   22436 0                    FBR3


0719                        11,3650   43014 0  WMATEND  CLEAR    CLEAR
0720   REF  20  LAST 1348   11,3651   01676 1                    DIM FLAG   DONT INTEGRATE W THIS TIME
0721   REF  15  LAST 1331   11,3652   01671 0                    ORBWFLAG   INVALIDATE W
0722                        11,3653   77614 1           CLEAR
0723   REF  11  LAST 1331   11,3654   02676 1                    RENDWFLG
0724                        11,3655   77414 0           SET      EXIT
0725   REF   7  LAST 1323   11,3656   01472 1                    STATEFLG   PICK UP STATE VECTOR UPDATE
0726   REF  33  LAST 1330   11,3657   0 5671 1          TC       ALARM
0727                        11,3660   00421 0           OCT      421
0728   REF 241  LAST 1348   11,3661   0 6006 1          TC       INTPRET
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C729                        11,3662   77650 1          GOTO
C730   REF   6  LAST 1348   11,3663   27364 0                TESTLOOP      FINISH INTEGRATING STATE VECTOR
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P0731   ORBITAL ROUTINE FOR EXTRAPOLATION OF THE W MATRIX. IT COMPUTES THE SECOND DERIVATIVE OF EACH COLUMN POSITION
R0733   VECTOR OF THE MATRIX AND CALLS THE NYSTROM INTEGRATION ROUTINES TO SOLVETHE DIFFERENTIAL EQUATIONS. THE PROGRAM
R0735   USES A TABLE OF VEHICLE POSITION VECTORS COMPUTED DURING THE INTEGRATION OF THE VEHICLES POSITION AND VELOCITY.
 0737                          11,3664  70754 0  DOW..    LXA,2  DLOAD*
 0738   REF  18  LAST 1346     11,3665  02150 1           PBODY
 0739   REF   7  LAST 1339     11,3666  50037 0           MUEARTH,2
 0740   REF   4  LAST 1338     11,3667  36210 1           STCALL BETAM
 0741   REF   1                11,3670  23712 1           DOW..1
 0742   REF  13  LAST 1349     11,3671  02202 0           STORE  FV
 0743                          11,3672  62014 0           BOF    INCR,1
 0744   REF   6  LAST 1343     11,3673  00342 1           MIDFLAG
 0745   REF   3  LAST 1342     11,3674  23212 1           NBRANCH
 0746                          11,3675  77771 0           DEC    -6
 0747                          11,3676  70744 1           LXC,2  DLOAD*
 0748   REF  19  LAST 1351     11,3677  02150 1           PBODY
 0749   REF   8  LAST 1351     11,3700  50041 1           MUEARTH -2,2
 0750   REF   5  LAST 1351     11,3701  36210 1           STCALL BETAM
 0751   REF   2  LAST 1351     11,3702  23712 1           DOW..1
 0752                          11,3703  50414 0           BON    VSR6
 0753   REF  32  LAST 1345     11,3704  00303 1           MOONFLAG
 0754                          11,3705  23706 1           +1
 0755                          11,3706  77655 1           VAD
 0756   REF  14  LAST 1351     11,3707  02202 0           FV
 0757   REF  15  LAST 1351     11,3710  36202 1           STCALL FV
 0758   REF   4  LAST 1351     11,3711  23212 1           NBRANCH
 0759                          11,3712  60575 0  DOW..1    VLOAD  VSR4
 0760   REF  45  LAST 1349     11,3713  02152 0           ALPHAV
 0761                          11,3714  53513 0           PDVL*  UNIT
 0762   REF   8  LAST 1337     11,3715  02216 0           VECTAB,1
 0763                          11,3716  46315 1           PDVL   VPROJ
 0764   REF  46  LAST 1351     11,3717  02152 0           ALPHAV
 0765                          11,3720  52361 1           VXSC   VSU
 0766   REF   5  LAST 1344     11,3721  23761 0           3/4
 0767                          11,3722  60325 0           PDDL   NORM
 0768                          11,3723  00045 0           36D
 0769   REF  33  LAST 1348     11,3724  00052 0           S2
 0770                          11,3725  63406 0           PUSH   DSQ
 0771                          11,3726  77605 1           DMP
 0772                          11,3727  65301 0           NORM   PDDL
 0773                          11,3730  00043 0           34D
 0774   REF   6  LAST 1351     11,3731  02210 0           BETAM
 0775                          11,3732  56342 1           SR1    DDV
 0776                          11,3733  77761 1           VXSC
 0777                          11,3734  57154 0           LXA,2  XAD,2
 0778   REF  34  LAST 1351     11,3735  00051 0           S2
 0779   REF  35  LAST 1351     11,3736  00051 0           S2
 0780                          11,3737  57074 0           XAD,2  XAD,2
 0781   REF  36  LAST 1351     11,3740  00051 0           S2
 0782                          11,3741  00042 1           34D
 0783                          11,3742  43457 0           VSL*   RVQ
```

L ORBITAL INTEGRATION

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0784                        11,3743   57606 0                  0 -8D,2
0785  REF   1               11,2000                SETLOC ORBITAL1
0786                        11,3744                BANK

0786  REF   3 LAST 1333 TO 1352:  774   781*       COUNT* $$/ORBIT
0787                        11,3744   04631 1  3/5   2DEC   .6 B-2
0787                        11,3745   23146 0
0788                        11,3746   14000 1  THREE/8 2DEC  .375
0788                        11,3747   00000 1
0789                        11,3750   02314 0  .3D    2DEC   .3 B-2
0789                        11,3751   31463 1
0790                        11,3752   01400 1  3/64   2DEC   3 B-6
0790                        11,3753   00000 1
0791  REF   7  LAST 1301    15,3411            DP1/4  =      D1/4          1 B-2
0792  REF   2  LAST 1302    15,3411            DQUARTER EQUALS DP1/4
0794                        11,3754   03000 1  3/32   2DEC   3 B-5
0794                        11,3755   00000 1
0795                        11,3756   36000 1  15/16  2DEC   15. B -4
0795                        11,3757   00000 1
0796                        11,3760   30000 1  3/4    2DEC   3.0 B -2
0796                        11,3761   00000 1
0797                        11,3762   22525 0  7/12   2DEC   .5833333333
0797                        11,3763   12525 0
0798                        11,3764   22000 1  9/16   2DEC   9 B -4
0798                        11,3765   00000 1
0799                        11,3766   01200 1  5/128  2DEC   5 B-7
0799                        11,3767   00000 1
0800  REF  23  LAST 1346    04,3761            DPZERO EQUALS ZEROVEC
0801                        11,3770   25252 0  DP2/3  2DEC   .6666666667
0801                        11,3771   25253 1
0802  REF   3  LAST 1347    11,3770            2/3    EQUALS DP2/3
R0804 LM504 IS TEMPORARY
0806  REF   1               13,2000                SETLOC ORBITAL2
0807                        13,3717                BANK
0807  REF   1                                      COUNT* $$/ORBIT
R0808 IT IS VITAL THAT THE FOLLOWING CONSTANTS NOT BE SHUFFLED
0809                        13,3717   77764 1              DEC    -11
0810                        13,3720   77775 1              DEC    -2
0811                        13,3721   77766 0              DEC    -9
0812                        13,3722   77771 0              DEC    -6
0813                        13,3723   77775 1              DEC    -2
0814                        13,3724   77775 1              DEC    -2
0815                        13,3725   00000 1              DEC    0
0816                        13,3726   77763 0              DEC    -12
0817                        13,3727   77766 0              DEC    -9
0818                        13,3730   77773 1              DEC    -4
0819                        13,3731   77770 1  ASCALE      DEC    -7
0820                        13,3732   77771 0              DEC    -6
0821                        13,3733   27446 1              2DEC*  1.32715445 E16 B-54*     S
0821                        13,3734   14620 0
```

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0822                    13,3735  16471 1          2DEC*  4.9027780 E8 B-30*      M
0822                    13,3736  01352 1
0823                    13,3737  22437 1 MUEARTH  2DEC*  3.986032 E10 B-36*
0823                    13,3740  16067 1
0824                    13,3741  00000 1          2DEC   0
0824                    13,3742  00000 1
0825                    13,3743  02302 1 J4REQ/J3 2DEC*  .4991607391 E7 B-26*
0825                    13,3744  24736 0
0826                    13,3745  77651 0          2DEC   -176236.02 B-25
0826                    13,3746  76237 0
0827                    13,3747  77776 1 2J3RE/J2 2DEC*  -.1355426363 E5 B-27*
0827                    13,3750  53032 0
0828                    13,3751  10407 0          2DEC*  .3067493316 E18 B-60*
0828                    13,3752  05344 1
0829                    13,3753  13710 0 J2REQSQ  2DEC*  1.75501139 E21 B-72*
0829                    13,3754  35320 0
0830                    13,3755  24000 1 5/8      2DEC   5 B-3
0830                    13,3756  00000 1
0831                    13,3757  74631 0 -1/12    2DEC   -.1
0831                    13,3760  63145 1
0832 REF  9 LAST 1351   13,3735           MUM      =      MUEARTH -2
0833                    13,3761  00243 1 RECRATIO 2DEC   .01
0833                    13,3762  32703 1
0834                    13,3763  03654 0 RSPHERE  2DEC   64373.76 E3 B-29
0834                    13,3764  21000 1
0835                    13,3765  03654 0 RDM      2DEC   16093.44 E3 B-27
0835                    13,3766  21000 1
0836                    13,3767  04627 0 RDE      2DEC   80467.20 E3 B-29
0836                    13,3770  25200 1
0837                      0000           RATT     EQUALS 0D
0838                      0006           VATT     EQUALS 6D
0839                      0014           TAT      EQUALS 12D
0840                      0016           RATT1    EQUALS 14D
0841                      0024           VATT1    EQUALS 20D
0842                      0032           MU(P)    EQUALS 26D
0843                      0040           TDEC1    EQUALS 32D
0844                      0016           URPV     EQUALS 14D
0845 REF  8 LAST 1342     0022           COSPHI/Z EQUALS URPV +4
0846                      0024           UZ       EQUALS 20D
0847                      0032           TVEC     EQUALS 26D
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L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 1 E0 S3

```
0002  REF   1                23,2000                    SETLOC INFLIGHT
0003                         23,3240                    BANK

0004  REF  31  LAST  822     E5,1671                    EBANK= XSM

R0005  CALCGTA COMPUTES THE GYRO TORQUE ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0007  THE INPUT IS THE DESIRED STABLE MEMBER COORDINATES REFERRED TO PRESENT STABLE MEMBER COORDINATES. THE THREE
R0009  HALF-UNIT VECTORS ARE STORED AT XDC, YDC, AND ZDC.

R0010  THE OUTPUTS ARE THE THREE GYRO TORQUING ANGLES TO BE APPLIED TO THE Y, Z, AND X GYROS AND ARE STORED DP AT IGC,
R0012  MGC, AND OGC RESPECTIVELY.

0013  REF   1                                           COUNT* $$/INFLT
0014                         23,3240    71220 1  CALCGTA ITA    DLOAD      PUSHDOWN  00-03,16D-27D,34D-37D
0015  REF  37  LAST 1351     23,3241    00051 0          S2     XDC = (XD1 XD2 XD3)
0016  REF   6  LAST  776     23,3242    02714 1          XDC    YDC = (YD1 YD2 YD3)
0017                         23,3243    65325 0          PDDL   ZDC = (ZD1 ZD2 ZD3)
0018  REF  30  LAST 1250     23,3244    15336 0          HI6ZEROS
0019  REF   7  LAST 1354     23,3245    02720 0          XDC +4
0020                         23,3246    55476 1          DCOMP  VDEF
0021                         23,3247    77656 1          UNIT
0022  REF   1                23,3250    14027 1          STODL  ZPRIME      ZP = UNIT(-XD3 0 XD1) = (ZP1 ZP2 ZP3)
0023  REF   2  LAST 1354     23,3251    00027 1                 ZPRIME

0024                         23,3252    77742 0          SR1
0025  REF  12  LAST 1240     23,3253    14023 0          STODL  SINTH       SIN(IGC) = ZP1
0026  REF   3  LAST 1354     23,3254    00033 1                 ZPRIME +4
0027                         23,3255    77742 0          SR1
0028  REF  11  LAST 1240     23,3256    34021 0          STCALL COSTH       COS(IGC) = ZP3
0029  REF   7  LAST  892     23,3257    47311 1                 ARCTRIG

0030  REF   5  LAST  538     23,3260    16762 0          STODL  IGC         Y GYRO TORQUING ANGLE   FRACTION OF REV.
0031  REF   8  LAST 1354     23,3261    02716 0                 XDC +2
0032                         23,3262    77742 0          SR1
0033  REF  13  LAST 1354     23,3263    14023 0          STODL  SINTH       SIN(MGC) = XD2
0034  REF   4  LAST 1354     23,3264    00027 1                 ZPRIME

0035                         23,3265    65205 0          DMP    PDDL
0036  REF   9  LAST 1354     23,3266    02720 0                 XDC +4      PDDO = (ZP1)(XD3)
0037  REF   5  LAST 1354     23,3267    00033 1                 ZPRIME +4

0038                         23,3270    45205 1          DMP    DSU
0039  REF  10  LAST 1354     23,3271    02714 1                 XDC         MPAC = (ZP3)(XD1)
0040                         23,3272    77626 0          STADR
0041  REF  12  LAST 1354     23,3273    43756 1          STCALL COSTH       COS(MGC) = MPAC - PDDO
0042  REF   8  LAST 1354     23,3274    47311 1                 ARCTRIG

0043  REF   4  LAST  538     23,3275    26764 0          STOVL  MGC         Z GYRO TORQUING ANGLE   FRACTION OF REV.
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L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 2 E5 S3

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0044   REF   6  LAST 1354   23,3276   00027 1            ZPRIME
0045                        23,3277   77641 1     DOT
0046   REF   5  LAST  747   23,3300   02730 1            ZDC
0047   REF  13  LAST 1354   23,3301   24021 1     STOVL  COSTH          COS(OGC) = ZP . ZDC
0048   REF   7  LAST 1355   23,3302   00027 1            ZPRIME
0049                        23,3303   77641 1     DOT
0050   REF   5  LAST  747   23,3304   02722 1            YDC
0051   REF  14  LAST 1354   23,3305   34023 1     STCALL SINTH          SIN(OGC) = ZP . YDC
0052   REF   9  LAST 1354   23,3306   47311 1            ARCTRIG

0053   REF  19  LAST  756   23,3307   36760 0     STCALL OGC            X GYRO TORQUING ANGLE   FRACTION OF REV.
0054   REF  38  LAST 1354   23,3310   00051 0            S2
```

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 3 E5 S3

R0055 ARCTRIG COMPUTES AN ANGLE GIVEN THE SINE AND COSINE OF THIS ANGLE.

R0056 THE INPUTS ARE SIN/4 AND COS/4 STORED DP AT SINTH AND COSTH.

R0057 THE OUTPUT IS THE CALCULATED ANGLE BETWEEN +.5 AND -.5 REVOLUTIONS AND STORED AT THETA. THE OUTPUT IS ALSO
R0059 AVAILABLE AT MPAC.

```
0060                          23,3311  51545 1  ARCTRIG  DLOAD   ABS          PUSHDOWN  16D-21D
0061  REF  15  LAST 1355      23,3312  00023 0           SINTH
0062                          23,3313  50025 0           DSU     BMN
0063  REF   1                 23,3314  07525 1           QTSN45  ABS(SIN/4) - SIN(45)/4
0064  REF   1                 23,3315  47324 1           TRIG1   IF (-45,45) OR (135,-135)

0065                          23,3316  72545 0           DLOAD   SL1          (45,135) OR (-135,-45)
0066  REF  14  LAST 1355      23,3317  00021 1           COSTH
0067                          23,3320  75326 1           ACOS    SIGN
0068  REF  16  LAST 1356      23,3321  00023 0           SINTH
0069  REF   7  LAST 1240      23,3322  00025 0           STORE   THETA        X = ARCCOS(COS) WITH SIGN(SIN)
0070                          23,3323  77616 0           RVQ

0071                          23,3324  72545 0  TRIG1    DLOAD   SL1          (-45,45) OR (135,-135)
0072  REF  17  LAST 1356      23,3325  00023 0           SINTH
0073                          23,3326  77736 0           ASIN
0074  REF   8  LAST 1356      23,3327  14025 0           STODL   THETA        X = ARCSIN(SIN) WITH SIGN(SIN)
0075  REF  15  LAST 1356      23,3330  00021 1           COSTH
0076                          23,3331  77640 0           BMN
0077  REF   1                 23,3332  47335 1           TRIG2   IF (135,-135)

0078                          23,3333  43545 1           DLOAD   RVQ
0079  REF   9  LAST 1356      23,3334  00025 0           THETA   X = ARCSIN(SIN)    (-45,45)

0080                          23,3335  75345 1  TRIG2    DLOAD   SIGN         (135,-135)
0081  REF  12  LAST 1249      23,3336  15334 1           HIDPHALF
0082  REF  18  LAST 1356      23,3337  00023 0           SINTH
0083                          23,3340  77625 0           DSU
0084  REF  10  LAST 1356      23,3341  00025 0           THETA
0085  REF  11  LAST 1356      23,3342  00025 0           STORE   THETA        X = .5 WITH SIGN(SIN) - ARCSIN(SIN)
0086                          23,3343  77616 0           RVQ                          (+) - (+) OR (-) - (-)
```

R0087 SMNB, NBSM, AND AXISROT, WHICH USED TO APPEAR HERE, HAVE BEEN
R0088 COMBINED IN A ROUTINE CALLED AX*SR*T, WHICH APPEARS AMONG THE POWERED
R0089 FLIGHT SUBROUTINES.

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 5 E5 S3

R0090 CALCGA COMPUTES THE CDU DRIVING ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0092 THE INPUTS ARE 1) THE NAVIGATION BASE COORDINATES REFERRED TO ANY COORDINATE SYSTEM. THE THREE HALF-UNIT
R0094 VECTORS ARE STORED AT XNB,YNB, AND ZNB. 2) THE DESIRED STABLE MEMBER COORDINATES REFERRED TO THE SAME
R0096 COORDINATE SYSTEM ARE STORED AT XSM, YSM, AND ZSM.

R0097 THE OUTPUTS ARE THE THREE CDU DRIVING ANGLES AND ARE STORED SP AT THETAD, THETAD +1, AND THETAD +2.

```
0099                          23,3344  77601 0  CALCGA   SETPD                PUSHDOWN  0D-0S, 16D-21D, 34D-37D
0100                          23,3345  00001 0                 0
0101                          23,3346  47375 0           VLOAD  VXV
0102  REF  11  LAST  822     23,3347  02714 1                  XNB             XNB = OGA (OUTER GIMBAL AXIS)
0103  REF   6  LAST  822     23,3350  02700 1                  YSM             YSM = IGA (INNER GIMBAL AXIS)
0104                          23,3351  41456 0           UNIT   PUSH            PDO = UNIT(OGA X IGA) = MGA

0105                          23,3352  44041 1           DOT    ITA
0106  REF   7  LAST  822     23,3353  02730 1                  ZNB
0107  REF  39  LAST 1355     23,3354  00051 0                  S2
0108  REF  16  LAST 1356     23,3355  24021 1           STOVL  COSTH           COS(OG) = MGA . ZNB
0109                          23,3356  00001 0                 0
0110                          23,3357  77641 1           DOT
0111  REF   7  LAST  822     23,3360  02722 1                  YNB
0112  REF  19  LAST 1356     23,3361  34023 1           STCALL SINTH           SIN(OG) = MGA . YNB
0113  REF  10  LAST 1355     23,3362  47311 1                  ARCTRIG
0114  REF  20  LAST 1355     23,3363  26760 1           STOVL  OGC
0115                          23,3364  00001 0                 0

0116                          23,3365  50235 0           VXV    DOT             PROVISION FOR MG ANGLE OF 90 DEGREES
0117  REF  12  LAST 1358     23,3366  02714 1                  XNB
0118  REF   7  LAST 1358     23,3367  02700 1                  YSM
0119                          23,3370  77752 1           SL1
0120  REF  17  LAST 1358     23,3371  24021 1           STOVL  COSTH           COS(MG) = IGA . (MGA X OGA)
0121  REF   8  LAST 1358     23,3372  02700 1                  YSM
0122                          23,3373  77641 1           DOT
0123  REF  13  LAST 1358     23,3374  02714 1                  XNB
0124  REF  20  LAST 1358     23,3375  34023 1           STCALL SINTH           SIN(MG) = IGA . OGA
0125  REF  11  LAST 1358     23,3376  47311 1                  ARCTRIG
0126  REF   5  LAST 1354     23,3377  02764 0           STORE  MGC

0127                          23,3400  45246 0           ABS    DSU
0128  REF   2  LAST  603     23,3401  07527 0                  .166...
0129                          23,3402  77644 1           BPL
0130  REF   1                 23,3403  47422 0                  GIMLOCK1        IF ANGLE GREATER THAN 60 DEGREES

0131                          23,3404  50375 0  CALCGA1  VLOAD  DOT
0132  REF   7  LAST  822     23,3405  02706 1                  ZSM
0133                          23,3406  00001 0                 0
0134  REF  18  LAST 1358     23,3407  24021 1           STOVL  COSTH           COS(IG) = ZSM . MGA
0135  REF  32  LAST 1354     23,3410  02672 0                  XSM
```

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 6 E5 S3

```
0136                          23,3411   45441 1            DOT     STADR
0137   REF  21  LAST 1358    23,3412   43754 0            STCALL  SINTH          SIN(IG) = XSM . MGA
0138   REF  12  LAST 1358    23,3413   47311 1                    ARCTRIG

0139   REF   6  LAST 1354    23,3414   26762 0            STOVL   IGC
0140   REF  21  LAST 1358    23,3415   02760 1                    OGC
0141                          23,3416   77634 0            RTB
0142   REF   6  LAST  607    23,3417   45644 0                    V1STO2S
0143   REF  23  LAST  774    23,3420   35310 0            STCALL  THETAD
0144   REF  40  LAST 1358    23,3421   00051 0                    S2

0145                          23,3422   77776 1  GIMLOCK1  EXIT
0146   REF  34  LAST 1349    23,3423   0 5671 1           TC      ALARM
0147                          23,3424   00401 1            OCT     00401
0148   REF  70  LAST 1348    23,3425   0 5547 1           TC      UPFLAG       GIMBAL LOCK HAS OCCURED
0149   REF   2  LAST  428    23,3426   00056 1            ADRES   GLOKFAIL

0150   REF 242  LAST 1349    23,3427   0 6006 1           TC      INTPRET
0151                          23,3430   77650 1            GOTO
0152   REF   1               23,3431   47404 1                    CALCGA1
```

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 7 E5 S3

R0153 AXISGEN COMPUTES THE COORDINATES OF ONE COORDINATE SYSTEM REFERRED TO ANOTHER COORDINATE SYSTEM.

R0155 THE INPUTS ARE 1) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM A STORED AT STARAD. 2) THE STAR2 VECTOR
R0157 REFERRED TO COORDINATE SYSTEM A STORED AT STARAD +6. 3) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM B STORED
R0159 AT LOCATION 6 OF THE VAC AREA. 4) THE STAR2 VECTOR REFERRED TO COORDINATE SYSTEM B STORED AT LOCATION 12D OF
R0161 THE VAC AREA.

R0162 THE OUTPUT DEFINES COORDINATE SYSTEM A REFERRED TO COORDINATE SYSTEM B. THE THREE HALF-UNIT VECTORS ARE STORED
R0164 AT LOCATIONS XDC, XDC +6, XDC +12D, AND STARAD, STARAD +6, STARAD +12D.

```
0165                          23,3432  66370 0  AXISGEN  AXT,1   SSP              PUSHDOWN  00-30D,34D-37D
0166  REF  11  LAST  787     23,3433  02743 0                    STARAD +6
0167  REF  51  LAST 1341     23,3434  00051 0                    S1
0168  REF  12  LAST 1360     23,3435  02727 1                    STARAD -6

0169                          23,3436  77601 0           SETPD
0170                          23,3437  00001 0                    0
0171                          23,3440  46773 0  AXISGEN1 VLOAD*  VXV*              06D   UA = S1
0172  REF  13  LAST 1360     23,3441  02752 0                    STARAD +12D,1           STARAD +00D   UB = S1
0173  REF  14  LAST 1360     23,3442  02760 1                    STARAD +18D,1
0174                          23,3443  77656 1           UNIT                      12D   VA = UNIT(S1 X S2)
0175  REF  15  LAST 1360     23,3444  06760 0           STORE    STARAD +18D,1          STARAD +06D   VB = UNIT(S1 X S2)
0176                          23,3445  77773 1           VLOAD*
0177  REF  16  LAST 1360     23,3446  02752 0                    STARAD +12D,1

0178                          23,3447  76433 1           VXV*     VSL1
0179  REF  17  LAST 1360     23,3450  02760 1                    STARAD +18D,1    18D   WA = UA X VA
0180  REF  18  LAST 1360     23,3451  06766 0           STORE    STARAD +24D,1          STARAD +12D   WB = UB X VB

0181                          23,3452  77700 0           TIX,1
0182  REF   1                 23,3453  47440 1                    AXISGEN1

0183                          23,3454  66160 0           AXC,1    SXA,1
0184                          23,3455  00006 1                    6
0185                          23,3456  00036 1                    30D

0186                          23,3457  66370 0           AXT,1    SSP
0187                          23,3460  00022 1                    18D
0188  REF  52  LAST 1360      23,3461  00051 0                    S1
0189                          23,3462  00006 1                    6

0190                          23,3463  66374 1           AXT,2    SSP
0191                          23,3464  00006 1                    6
0192  REF  41  LAST 1359      23,3465  00052 0                    S2
0193                          23,3466  00002 0                    2

0194                          23,3467  76720 0  AXISGEN2 XCHX,1   VLOAD*
0195                          23,3470  00036 1                    30D                X1=-6 X2=+6   X1=-6 X2=+4   X1=-6 X2=+2
0196                          23,3471  00001 0                    0,1
```

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 8 E5 S3

```
0197                        23,3472  62757 0          VXSC*   PDVL*           J=(UA)(UB1)   J=(UA)(UB2)   J=(UA)(UB3)
0198  REF  19  LAST 1360    23,3473  75033 0                  STARAD +6,2
0199                        23,3474  00007 0                  6,1
0200                        23,3475  77757 1          VXSC*
0201  REF  20  LAST 1361    23,3476  75025 1                  STARAD +12D,2
0202                        23,3477  30031 0          STOVL*  24D             K=(VA)(VB1)   J=(VA)(VB2)   J=(VA)(VB3)
0203                        23,3500  00015 0                  12D,1

0204                        23,3501  53357 0          VXSC*   VAD
0205  REF  21  LAST 1361    23,3502  75017 0                  STARAD +18D,2   L=(WA)(WB1)   J=(WA)(WB2)   J=(WA)(WB3)
0206                        23,3503  76455 1          VAD     VSL1
0207                        23,3504  00031 0                  24D
0208                        23,3505  53520 0          XCHX,1  UNIT
0209                        23,3506  00036 1                  30D
0210  REF  11  LAST 1354    23,3507  06736 0          STORE   XDC +18D,1      XDC = L+J+K   YDC = L+J+K   ZDC = L+J+K

0211                        23,3510  77700 0          TIX,1
0212  REF   1               23,3511  47512 1                  AXISGEN3

0213                        23,3512  77704 1  AXISGEN3 TIX,2
0214  REF   1               23,3513  47467 1                  AXISGEN2

0215                        23,3514  77775 1          VLOAD
0216  REF  12  LAST 1361    23,3515  02714 1                  XDC
0217  REF  22  LAST 1361    23,3516  26736 1          STOVL   STARAD
0218  REF   6  LAST 1355    23,3517  02722 1                  YDC
0219  REF  23  LAST 1361    23,3520  26744 1          STOVL   STARAD +6
0220  REF   6  LAST 1355    23,3521  02730 1                  ZDC
0221  REF  24  LAST 1361    23,3522  02752 0          STORE   STARAD +12D

0222                        23,3523  77616 0          RVQ
```

```
0281                23,3524   05520 0  QTSN45   2DEC    .1768
0281                23,3525   26075 1
0282                23,3526   05252 1  .166...  2DEC    .1666666667
0282                23,3527   25253 1
```

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 10 E5 S3

L POWERED FLIGHT SUBROUTINES USER'S PAGE NO. 1 EC S3

```
0002   REF   1              23,2000                SETLOC POWFLITE
0003                        23,3530                BANK

0004   REF   1                0142                 EBANK= DEXDEX
0005   REF   1                                     COUNT* $$/POWFL

R0006       CDUTRIG, CDUTRIG1, CDUTRIG2, AND CD*TR*GS ALL COMPUTE THE SINES AND
R0007  COSINES OF THREE 2'S COMPLEMENT ANGLES AND PLACE THE RESULT, DOUBLE
R0008  PRECISION, IN THE SAME ORDER AS THE INPUTS, AT SINCDU AND COSCDU.   AN
R0009  ADDITIONAL OUTPUT IS THE 1'S COMPLEMENT ANGLES AT CDUSPOT.   THESE
R0010  ROUTINES GO OUT OF THEIR WAY TO LEAVE THE MPAC AREA AS THEY FIND IT,
R0011  EXCEPT FOR THE GENERALLY UNIMPORTANT MPAC +2.   THEY DIFFER ONLY IN
R0012  WHERE THEY GET THE ANGLES, AND IN METHOD OF CALLING.

R0013       CDUTRIG (AND CDUTRIG1, WHICH CAN BE CALLED IN BASIC) COMPUTE THE
R0014  SINES AND COSINES FROM THE CURRENT CONTENTS OF THE CDU REGISTERS.
R0015  THE CONTENTS OF CDUTEMP, ETC., ARE NOT TOUCHED SO THAT THEY MAY
R0016  CONTINUE TO FORM A CONSISTENT SET WITH THE LATEST PIPA READINGS.

R0017       CDUTRIG1 IS LIKE CDUTRIG EXCEPT THAT IT CAN BE CALLED IN BASIC.

R0018       CD*TR*GS FINDS CDU VALUES IN CDUSPOT RATHER THAN IN CDUTEMP.   THIS
R0019  ALLOWS USERS TO MAKE TRANSFORMATIONS USING ARBITRARY ANGLES, OR REAL
R0020  ANGLES IN AN ORDER OTHER THAN X Y Z.   A CALL TO THIS ROUTINE IS
R0021  NECESSARY IN PREPARATION FOR A CALL TO AX*SR*T IN EITHER OF ITS TWO
R0022  MODES (SMNB OR NBSM).   SINCE AX*SR*T EXPECTS TO FIND THE SINES AND
R0023  COSINES IN THE ORDER Y Z X THE ANGLES MUST HAVE BEEN PLACED IN CDUSPOT
R0024  IN THIS ORDER.   CD*TR*GS NEED NOT BE REPEATED WHEN AX*SR*T IS CALLED
R0025  MORE THAN ONCE, PROVIDED THE ANGLES HAVE NOT CHANGED.   NOTE THAT SINCE
R0026  IT CLOBBERS BUF2 (IN THE SINE AND COSINE ROUTINES) CD*TR*GS CANNOT BE
R0027  CALLED USING BANKCALL.   SORRY.

R0028       CD*TR*G IS LIKE CD*TR*GS EXCEPT THAT IT CAN BE CALLED IN
R0029  INTERPRETIVE.

0030                        23,3530   77776 1  CDUTRIG  EXIT
0031   REF   1              23,3531   0 3534 0           TC      CDUTRIGS
0032   REF 243  LAST 1359   23,3532   0 6006 1           TC      INTPRET
0033                        23,3533    77616 0           RVQ

0038   REF  28  LAST 1063   23,3534   3 0032 0  CDUTRIGS CA      CDUX
0039   REF   9  LAST  778   23,3535   55'175 1           TS      CDUSPOT +4
0040   REF  17  LAST 1063   23,3536   3 0033 1           CA      CDUY
0041   REF  10  LAST 1364   23,3537   55'171 0           TS      CDUSPOT
0042   REF  25  LAST 1063   23,3540   3 0034 0           CA      CDUZ
0043   REF  11  LAST 1364   23,3541   55'173 1           TS      CDUSPOT +2

0044                        23,3542   0 0006 1  CD*TR*GS EXTEND
0045   REF   3  LAST   71   23,3543   22 142 0           QXCH    TEM2
0046   REF  18  LAST 1182   23,3544   3 4766 1           CAF     FOUR
```

```
0047   REF  31  LAST 1152   23,3545  7 6211 1  TR*GL**P  MASK   SIX       MAKE IT EVEN AND SMALLER
0048   REF   3  LAST   72   23,3546  54 143 0            TS     TEM3
0049   REF   4  LAST 1365   23,3547  50 143 1            INDEX  TEM3
0050   REF  12  LAST 1364   23,3550  3 1171 1            CA     CDUSPOT
0051   REF 652  LAST 1343   23,3551  52 155 1            DXCH   MPAC      STORING 2'S COMP ANGLE, LOADING MPAC
0052   REF  52  LAST 1178   23,3552  52 127 1            DXCH   VBUF +4   STORING MPAC FOR LATER RESTORATION
0053   REF   1              23,3553  0 4733 1            TC     USPRCADR
0054   REF   9  LAST  891   23,3554   51754 0            CADR   CDULOGIC
0055                        23,3555  0 0006 1            EXTEND
0056   REF 653  LAST 1365   23,3556  3 0155 0            DCA    MPAC
0057   REF   5  LAST 1365   23,3557  50 143 1            INDEX  TEM3
0058   REF  13  LAST 1365   23,3560  53'172 0            DXCH   CDUSPOT   STORING 1'S COMPLEMENT ANGLE
0059   REF   2  LAST 1365   23,3561  0 4733 1            TC     USPRCADR
0060   REF   2  LAST 1119   23,3562   01514 0            CADR   COSINE
0061   REF 654  LAST 1365   23,3563  52 155 1            DXCH   MPAC
0062   REF   6  LAST 1365   23,3564  50 143 1            INDEX  TEM3
0063   REF   4  LAST   81   23,3565  53'150 0            DXCH   COSCDU    STORING COSINE
0064                        23,3566  0 0006 1            EXTEND
0065   REF   7  LAST 1365   23,3567  5 0143 1            INDEX  TEM3
0066   REF  14  LAST 1365   23,3570  3 1172 1            DCA    CDUSPOT   LOADING 1'S COMPLEMENT ANGLE
0067   REF   3  LAST 1365   23,3571  0 4733 1            TC     USPRCADR
0068   REF   2  LAST 1119   23,3572   01526 1            CADR   SINE +1   SINE +1 EXPECTS ARGUMENT IN A AND L
0069   REF  53  LAST 1365   23,3573  52 127 1            DXCH   VBUF +4   BRINGING UP PRIOR MPAC TO BE RESTORED
0070   REF 655  LAST 1365   23,3574  52 155 1            DXCH   MPAC
0071   REF   8  LAST 1365   23,3575  50 143 1            INDEX  TEM3
0072   REF   4  LAST   81   23,3576  53'142 0            DXCH   SINCDU
0073   REF   9  LAST 1365   23,3577  10 143 0            CCS    TEM3
0074   REF   1              23,3600  1 3545 1            TCF    TR*GL**P
0075   REF   4  LAST 1364   23,3601  0 0142 0            TC     TEM2
```

L POWERED FLIGHT SUBROUTINES USER'S PAGE NO. 3 E0 S3

P0076 **********

R0078 QUICTRIG, INTENDED FOR GUIDANCE CYCLE USE WHERE TIME IS CRITICAL, IS A MUCH FASTER VERSION OF CD*TR*GS.
R0080 QUICTRIG COMPUTES AND STORES THE SINES AND COSINES OF THE 2'S COMPLEMENT ANGLES AT CDUSPOT, CDUSPOT +2,
R0082 AND CDUSPOT +4. UNLIKE CD*TR*GS, QUICTRIG DOES NOT LEAVE THE 1'S COMPLEMENT VERSIONS OF THE ANGLES IN
R0084 CDUSPOT. QUICTRIG'S EXECUTION TIME IS 4.1 MS; THIS IS 10 TIMES AS FAST AS CD*TR*GS. QUICTRIG MAY BE
R0086 CALLED FROM INTERPRETIVE AS AN RTB OP-CODE, OR FROM BASIC VIA BANKCALL OR IBNKCALL.

0090				23,3602	0 0004 0	QUICTRIG	INHINT		INHINT SINCE DAP USES THE SAME TEMPS
00901				23,3603	0 0006 1		EXTEND		
00902	REF	17	LAST 1102	23,3604	22 061 0		QXCH	ITEMP1	
0091	REF	19	LAST 1364	23,3605	3 4766 1		CAF	FOUR	
0092	REF	32	LAST 1365	23,3606	7 6211 1	+4	MASK	SIX	
0093	REF	12	LAST 224	23,3607	54 062 1		TS	ITEMP2	
0094	REF	13	LAST 1366	23,3610	50 062 0		INDEX	ITEMP2	
0095	REF	15	LAST 1365	23,3611	3 1171 1		CA	CDUSPOT	
0096	REF	8	LAST 1073	23,3612	0 5061 0		TC	SPSIN	
0097				23,3613	0 0006 1		EXTEND		
0098	REF	61	LAST 1235	23,3614	7 4753 0		MP	BIT14	SCALE DOWN TO MATCH INTERPRETER OUTPUTS
0099	REF	14	LAST 1366	23,3615	50 062 0		INDEX	ITEMP2	
0100	REF	5	LAST 1365	23,3616	53'142 0		DXCH	SINCDU	
0101	REF	15	LAST 1366	23,3617	50 062 0		INDEX	ITEMP2	
0102	REF	16	LAST 1366	23,3620	3 1171 1		CA	CDUSPOT	
0103	REF	7	LAST 1073	23,3621	0 5060 1		TC	SPCOS	
0104				23,3622	0 0006 1		EXTEND		
0105	REF	62	LAST 1366	23,3623	7 4753 0		MP	BIT14	
0106	REF	16	LAST 1366	23,3624	50 062 0		INDEX	ITEMP2	
0107	REF	5	LAST 1365	23,3625	53'150 0		DXCH	COSCDU	
0108	REF	17	LAST 1366	23,3626	10 062 1		CCS	ITEMP2	
0109	REF	2	LAST 710	23,3627	1 3606 0		TCF	QUICTRIG +4	
01091	REF	18	LAST 1366	23,3630	3 0061 0		CA	ITEMP1	
0110				23,3631	0 0003 1		RELINT		
01101	REF	335	LAST 1325	23,3632	0 0000 1		TC	A	

```
RO111   ********************************************************************************************************

RO113       THESE INTERFACE ROUTINES MAKE IT POSSIBLE TO CALL AX*SR*T, ETC., IN
RO114   INTERPRETIVE.  LATER, WHERE POSSIBLE, THEY WILL BE ELIMINATED.

RO127       THESE INTERFACE ROUTINES ARE PERMANENT.  ALL RESTORE USER'S EBANK
RO128   SETTING.  ALL ARE STRICT INTERPRETIVE SUBROUTINES, CALLED USING "CALL",
RO129   RETURNING VIA QPRET.  ALL EXPECT AND RETURN THE VECTOR TO BE TRANSFOR-
RO130   MED INTERPRETER-STYLE IN MPAC; COMPONENTS AT MPAC, MPAC +3, AND MPAC +5.

RO131       TRG*SMNB AND TRG*NBSM BOTH EXPECT TO SEE THE 2'S COMPLEMENT ANGLES
RO132   AT CDUSPOT (ORDER Y Z X, AT CDUSPOT, CDUSPOT +2, AND CDUSPOT +4; ODD
RO133   LOCATIONS NEED NOT BE ZEROED).  TRG*NBSM DOES THE NB TO SM TRANSFOR-
RO134   MATION;  TRG*SMNB, VICE VERSA.

RO135       CDU*NBSM DOES ITS TRANSFORMATION USING THE PRESENT CONTENTS OF
RO136   THE CDU COUNTERS.  OTHERWISE IT IS LIKE TRG*NBSM.

RO1361      CDU*SMNB IS THE COMPLEMENT OF CDU*NBSM.

 0138                          23,3633   77776 1  *SMNB*    EXIT
 0139   REF   3  LAST 1175    23,3634   0 7466 1  C*MM*N1   TC      MPACVBUF        AX*SR*T EXPECTS VECTOR IN VBUF
 0140   REF  44  LAST 1204    23,3635   4 6214 1            CS      THREE           SIGNAL FOR SM TO NB TRANSFORMATION
 0141   REF   1               23,3636   0 3651 0  C*MM*N2   TC      AX*SR*T
 0142   REF 244  LAST 1364    23,3637   0 6006 1            TC      INTPRET
 0143                          23,3640    43575 1           VLOAD   RVQ
 0144   REF  54  LAST 1365    23,3641    00123 1                   VBUF

 0148                          23,3642    77776 1  TRG*NBSM  EXIT
 0149   REF   1               23,3643   0 3542 1            TC      CD*TR*GS
 0150   REF   4  LAST 1367    23,3644   0 7466 1  C*MM*N3   TC      MPACVBUF        FOR AX*SR*T
 0151   REF  45  LAST 1367    23,3645   3 6214 0            CA      THREE           SIGNAL FOR NB TO SM TRANSFORMATION
 0152   REF   1               23,3646   1 3636 0            TCF     C*MM*N2

RO153       *NBSM* AND *SMNB* EXPECT TO SEE THE SINES AND COSINES (AT SINCDU
RO154   AND COSCDU) RATHER THAN THE ANGLES THEMSELVES.  OTHERWISE THEY ARE
RO155   LIKE TRG*NBSM AND TRG*SMNB.

RO156       NOTE THAT JUST AS CD*TR*GS NEED BE CALLED ONLY ONCE FOR EACH SERIES
RO157   OF TRANSFORMATIONS USING THE SAME ANGLES, SO TOO ONLY ONE OF TRG*NBSM
RO158   AND TRG*SMNB NEED BE CALLED FOR EACH SERIES.  FOR SUBSEQUENT TRANSFOR-
RO159   MATIONS USE *NBSM* AND *SMNB*.

 0162                          23,3647    77776 1  *NBSM*    EXIT
 0163   REF   1               23,3650   1 3644 0            TCF     C*MM*N3

RO164       AX*SR*T COMBINES THE OLD SMNB AND NBSM.  FOR THE NB TO SM
RO165   TRANSFORMATION, ENTER WITH +3 IN A.  FOR SM TO NB, ENTER WITH -3.
RO166   THE VECTOR TO BE TRANSFORMED ARRIVES, AND IS RETURNED, IN VBUF.
```

L POWERED FLIGHT SUBROUTINES USER'S PAGE NO. 5 E0 S3

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R0167   AX*SR*T EXPECTS TO FIND THE SINES AND COSINES OF THE ANGLES OF ROTATION
R0168   AT SINCDU AND COSCDU, IN THE ORDER Y Z X.  A CALL TO CD*TR*GS, WITH
R0169   THE 2'S COMPLEMENT ANGLES (ORDER Y Z X) AT CDUSPOT, WILL TAKE CARE OF
R0170   THIS.  HERE IS A SAMPLE CALLING SEQUENCE:-

R0171                           TC      CDUTRIGS
R0172                           CS      THREE       ("CA  THREE" FOR NBSM)
R0173                           TC      AX*SR*T

R0174   THE CALL TO CD*TR*GS NEED NOT BE REPEATED, WHEN AX*SR*T IS CALLED MORE
R0175   THAN ONCE, UNLESS THE ANGLES HAVE CHANGED.

R0176       AX*SR*T IS GUARANTEED SAFE ONLY FOR VECTORS OF MAGNITUDE LESS THAN
R0177   UNITY.  A LOOK AT THE CASE IN WHICH A VECTOR OF GREATER MAGNITUDE
R0178   HAPPENS TO LIE ALONG AN AXIS OF THE SYSTEM TO WHICH IT IS TO BE TRANS-
R0179   FORMED CONVINCES ONE THAT THIS IS A RESTRICTION WHICH MUST BE ACCEPTED.

 0180   REF   2  LAST 1364   23,3651  54 142 1  AX*SR*T  TS      DEXDEX          WHERE IT BECOMES THE INDEX OF INDEXES
 0181                        23,3652  0 0006 1            EXTEND
 0182   REF   1              23,3653  22 145 1            QXCH    RTNSAVER

 0183   REF   3  LAST 1368   23,3654  10 142 1  R*TL**P   CCS     DEXDEX                  +3 --> 0      -3 --> 2
 0184   REF   4  LAST 1368   23,3655  4 0142 1            CS      DEXDEX          THUS:   +2 --> 1      -2 --> 1
 0185   REF  46  LAST 1367   23,3656  6 6214 0            AD      THREE                   +1 --> 2      -1 --> 0
 0186                        23,3657  0 0006 1            EXTEND
 0187   REF 336  LAST 1366   23,3660  5 0000 1            INDEX   A
 0188   REF   1              23,3661  3 3740 1            DCA     INDEXI
 0189   REF   1              23,3662  52 144 1            DXCH    DEXI

 0190   REF 148  LAST 1286   23,3663  3 4770 0            CA      ONE
 0191   REF 121  LAST 1219   23,3664  54 130 1            TS      BUF
 0192                        23,3665  0 0006 1            EXTEND
 0193   REF   2  LAST   72   23,3666  5 0143 1            INDEX   DEXI
 0194   REF  55  LAST 1367   23,3667  4 0123 0            DCS     VBUF
 0195   REF   1              23,3670  1 3672 0            TCF     LOOP1           REALLY BE A SUBTRACT, AND VICE VERSA

 0196   REF 122  LAST 1368   23,3671  52 131 0  LOOP2     DXCH    BUF             LOADING VECTOR COMPONENT, STORING INDEX

 0197   REF 656  LAST 1365   23,3672  52 155 1  LOOP1     DXCH    MPAC
 0198   REF   1              23,3673  3 3736 0            CA      SINESLOC
 0199   REF   3  LAST 1368   23,3674  6 0143 1            AD      DEXI
 0200   REF  78  LAST 1181   23,3675  54 116 0            TS      ADDRWD

 0201   REF  21  LAST 1190   23,3676  0 7056 0            TC      DMPSUB          MULTIPLY BY SIN(CDUANGLE)
 0202   REF   5  LAST 1368   23,3677  10 142 1            CCS     DEXDEX
 0203   REF 657  LAST 1368   23,3700  52 155 1            DXCH    MPAC            NBSM CASE
 0204                        23,3701  1 3704 0            TCF     +3
 0205                        23,3702  0 0006 1            EXTEND                  SMNB CASE
 0206   REF 658  LAST 1368   23,3703  4 0155 1            DCS     MPAC
 0207   REF   1              23,3704  52 134 0            DXCH    TERMITMP
```

L POWERED FLIGHT SUBROUTINES USER'S PAGE NO. 6 ED 53

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0208   REF  33  LAST 1366   23,3705  3 6211 0          CA      SIX       SINCDU AND COSCDU (EACH 6 WORDS) MUST
0209   REF  79  LAST 1368   23,3706  26 116 0          ADS     ADDRWD      BE CONSECUTIVE AND IN THAT ORDER

0210                        23,3707  0 0006 1          EXTEND
0211   REF 123  LAST 1368   23,3710  5 0130 0          INDEX   BUF
0212   REF   4  LAST 1368   23,3711  5 0143 1          INDEX   DEX1
0213   REF  56  LAST 1368   23,3712  3 0123 1          DCA     VBUF
0214   REF 659  LAST 1368   23,3713  52 155 1          DXCH    MPAC
0215   REF  22  LAST 1368   23,3714  0 7056 0          TC      DMPSUB    MULTIPLY BY COS(CDUANGLE)
0216   REF 660  LAST 1369   23,3715  52 155 1          DXCH    MPAC
0217   REF   2  LAST 1368   23,3716  20 134 0          DAS     TERMITMP
0218   REF   3  LAST 1369   23,3717  52 134 0          DXCH    TERMITMP
0219                        23,3720  20 001 1          DDOUBL
0220   REF 124  LAST 1369   23,3721  50 130 0          INDEX   BUF
0221   REF   5  LAST 1369   23,3722  50 143 1          INDEX   DEX1
0222   REF  57  LAST 1369   23,3723  52 123 0          DXCH    VBUF
0223   REF 125  LAST 1369   23,3724  52 131 0          DXCH    BUF       LOADING INDEX, STORING VECTOR COMPONENT

0224   REF 337  LAST 1368   23,3725  10 000 0          CCS     A         'CAUSE THAT'S WHERE THE INDEX NOW IS
0225   REF   1              23,3726  1 3671 0          TCF     LOOP2

0226                        23,3727  0 0006 1          EXTEND
0227   REF   6  LAST 1368   23,3730  26 142 1          DIM     DEXDEX    DECREMENT MAGNITUDE PRESERVING SIGN
0228   REF   7  LAST 1369   23,3731  10 142 1 TSTPOINT CCS     DEXDEX    ONLY THE BRANCHING FUNCTION IS USED
0229   REF   1              23,3732  1 3654 1          TCF     R*TL**P
0230   REF   2  LAST 1368   23,3733  0 0145 1          TC      RTNSAVER
0231   REF   2  LAST 1369   23,3734  1 3654 1          TCF     R*TL**P
0232   REF   3  LAST 1369   23,3735  0 0145 1          TC      RTNSAVER

0233   REF   6  LAST 1366   23,3736  01141 1 SINESLOC ADRES   SINCDU     FOR USE IN SETTING ADDRWD

0234                        23,3737  00004 0 INDEXI   DEC     4         **********   DON'T   **********
0235                        23,3740  00002 0          DEC     2         **********   TOUCH   **********
0236                        23,3741  00000 1          DEC     0         **********   THESE   **********
0237                        23,3742  00004 0          DEC     4         **********  CONSTANTS **********

R0238  ********************************************************************************************************************
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L POWERED FLIGHT SUBROUTINES USER'S PAGE NO. 7 E0 S3

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P0240   THIS SUBROUTINE COMPUTES INCREMENTAL CHANGES IN CDU(GIMBAL) ANGLES FROM INCREMENTAL CHANGES ABOUT SM AXES. IT
R0242   REQUIRES SM INCREMENTS AS A DP VECTOR SCALED AT ONE REVOLUTION(DTHETASM,+2,+4). SIN,COS(CDUY,Z,X) ARE IN
R0244   SINCDU,+2,+4 AND COSCDU,+2,+4 RESPECTIVELY,SCALED TO ONE HALF. CDU INCREENTS ARE PLACED IN DCDU,+2,+4 SCALED TO
R0246   ONE REVOLUTION.

R0247           *  COS(IGA)SEC(MGA)          0          -SIN(IGA)SEC(MGA) *
R0248           *                                                          *
R0249           * -COS(IGA)TAN(MGA)          1           SIN(IGA)TAN(MGA) *
R0250           *                                                          *
R0251           *       SIN(IGA)             0             COS(IGA)       *

 0253   REF   1                  23,2000                    SETLOC  POWFLIT1
 0254                            23,3743                    BANK
 0255 *REF   2 LAST 1364 TO 1370:   139   139*             COUNT*  $$/POWFL
 0255                            23,3743   41345 0  SMCDURES DLOAD  DMP
 0256   REF  15  LAST  599       23,3744   03212 0                  DTHETASM
 0257   REF   4  LAST  770       23,3745   01150 1                  COSCDUY

 0258                            23,3746   41325 0           PDDL   DMP
 0259   REF  16  LAST 1370       23,3747   03216 1                  DTHETASM +4
 0260   REF   4  LAST  770       23,3750   01142 1                  SINCDUY

 0261                            23,3751   77621 1           BDSU
 0262                            23,3752   77671 1           DDV
 0263   REF   7  LAST  970       23,3753   01152 0                  COSCDUZ
 0264   REF   7  LAST  602       23,3754   03204 1           STORE  DCDU

 0265                            23,3755   72405 0           DMP    SL1             SCALE
 0266   REF   4  LAST  770       23,3756   01144 1                  SINCDUZ
 0267                            23,3757   77621 1           BDSU

 0268   REF  17  LAST 1370       23,3760   03214 0                  DTHETASM +2
 0269   REF   8  LAST 1370       23,3761   17206 0           STODL  DCDU +2
 0270   REF  18  LAST 1370       23,3762   03212 0                  DTHETASM

 0271                            23,3763   65205 0           DMP    PDDL
 0272   REF   5  LAST 1370       23,3764   01142 1                  SINCDUY
 0273   REF  19  LAST 1370       23,3765   03216 1                  DTHETASM +4

 0274                            23,3766   43205 1           DMP    DAD
 0275   REF   5  LAST 1370       23,3767   01150 1                  COSCDUY
 0276                            23,3770   77752 1           SL1
 0277   REF   9  LAST 1370       23,3771   03210 1           STORE  DCDU +4
 0278                            23,3772   77616 0           RVQ
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R0001          THE TFF SUBROUTINES MAY BE USED IN EITHER EARTH OR MOON CENTERED COORDINATES. THE TFF ROUTINES NEVER
R0003  KNOW WHICH ORIGIN APPLIES. IT IS THE USER WHO KNOWS, AND WHO SUPPLIES  RONE, VONE AND 1/SQRT(MU)  AT THE
R0005  APPROPRIATE SCALE LEVEL FOR THE PROPER PRIMARY BODY.

R0006          EARTH ORIGIN          POSITION     -29      METERS
R0007                                VELOCITY     -7       METERS/CENTISECOND
R0009                                1/SQRT(MU)   +17      SQRT(CS SQ/METERS CUBED)

R0011          MOON ORIGIN           POSITION     -27      METERS
R0012                                VELOCITY     -5       METERS/CENTISECONDS
R0014                                1/SQRT(MU)   +14      SQRT(CS SQ/METERS CUBED)

R0016  ALL DATA PROVIDED TO AND RECEIVED FROM ANY TFF SUBROUTINE WILL BE AT ONE OF THE LEVELS ABOVE. IN ALL CASES,
R0018  THE FREE FALL TIME IS RETURNED IN CENTISECONDS AT (-28). PROGRAM  TFF/CONIC  WILL GENERATE VONE/RTMU  AND
R0020  LEAVE IT IN  VONE' AT (+10) IF EARTH ORIGIN AND (+9) IF MOON ORIGIN.
R0021          THE USER MUST STORE THE STATE VECTOR IN  RONE, VONE  AND MU IN  THE FORM 1/SQRT(MU) IN  TFF/RTMU
R0023  AT THE PROPER SCALE BEFORE CALLING  TFF/CONIC. SINCE  RONE, VONE  ARE IN THE EXTENDED VERB STORAGE AREA,
R0025  THE USER MUST ALSO LOCK OUT THE EXTENDED VERBS, AND RELEASE THEM WHEN FINISHED.
R0027          PROGRAMS     CALC/TFF  AND  CALC/TPER  ASSUME THAT THE TERMINAL RADIUS IS LESS THAN THE PRESENT
R0029  RADIUS. THIS RESTRICTION CAN BE REMOVED BY A  15 W CODING CHANGE, BUT AT PRESENT IT IS NOT DEEMED NECESSARY.
R0031
R0032          THE FOLLOWING ERASABLE QUANTITIES ARE USED BY THE TFF ROUTINES, AND ARE LOCATED IN THE PUSH LIST.
R0034

A0035                                BELOW    E:   IS USED FOR EARTH ORIGIN SCALE
A0036                                         M:   IS USED FOR MOON  ORIGIN SCALE

A0037                TFFSW    =    119D  BIT1   0 = CALCTFF          1 = CALCTPER
 0038   0012         TFFDELQ  =    10D          Q2-Q1                E: (-16)  M: (-15)
 0039   0014         RMAG1    =    12D          ABVAL(RN)  M         E: (-29)  M: (-27)
A0040                RPER     =    14D          PERIGEE RADIUS M     E: (-29)  M: (-27)
 0041   0016         TFFQ1    =    14D          R.V / SQRT(MUE)      E: (-16)  M: (-15)
A0042                SDELF/2                    SIN(THETA) /2
 0043   0016         CDELF/2  =    14D          COS(THETA) /2
A0044                RAPO     =    16D          APOGEE RADIUS  M     E: (-29)  M: (-27)
 0045   0020         NRTERM   =    16D          TERMINAL RADIUS M    E: (-29+NR)
A0046                                                                M: (-27+NR)
 0047   0022         RTERM    =    18D          TERMINAL RADIUS M    E: (-29)  M: (-27)
 0048   0024         TFFVSQ   =    20D          -(V SQUARED/MU)  1/M E: (20)   M: (18)
 0049   0026         TFF1/ALF =    22D          SEMI MAJ AXIS  M     E: (-22-2 NA)
A0050                                                                M: (-20-2 NA)
 0051   0030         TFFRTALF =    24D          SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0052   0032         TFFALFA  =    26D          ALFA  1/M   E: (26-NR)  M: (24-NR)
 0053   0034         TFFNP    =    28D          SEMI LATUS RECTUM  M E: (-38+2 NR)
A0054                                                                M: (-36+2 NR)
 0055   0036         TFF/RTMU =    30D          1/SQRT(MU)           E: (17)   M: (14)
 0056   0040         NRMAG    =    32D          PRESENT RADIUS  M    E: (-29+NR)
A0057                                                                M: (-27+NR)
 0058   0042         TFFX     =    34D
 0059   0044         TFFTEM   =    36D          TEMPORARY
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A0060                   REGISTERS S1, S2 ARE UNTOUCHED BY ANY TFF SUBROUTINE
A0061                   INDEX REGISTERS X1, X2 ARE USED BY ALL TFF SUBROUTINES. THEY ARE ESTAB-
A0062                   LISHED IN TFF/CONIC AND MUST BE PRESERVED BETWEEN CALLS TO SUBSEQUENT
A0063                   SUBROUTINES.
A0064                   -NR                     C(X1) = NORM COUNT OF RMAG
A0065                   -NA                     C(X2)= NORM COUNT OF SQRT(ABS(ALFA))
```

L TIME OF FREE FALL USER'S PAGE NO. 3 EO S3

P0066

R0067 SUBROUTINE NAME: TFFCONIC DATE: 01.29.67
R0069 MOD NO: 0 LOG SECTION: TIME OF FREE FALL
R0071 MOD BY: RR BAIRNSFATHER
R0072 MOD NO: 1 MOD BY: RR BAIRNSFATHER DATE: 11 APR 67
R0073 MOD NO: 2 MOD BY: RR BAIRNSFATHER DATE: 21 NOV 67 ADD MOON MU.
R0075 MOD NO: 3 MOD BY: RR BAIRNSFATHER DATE: 21 MAR 68 ACCEPT DIFFERENT EARTH/MOON SCALES
R0077 FUNCTIONAL DESCRIPTION: THIS SUBROUTINE IS CALLED TO COMPUTE THOSE CONIC PARAMETERS REQUIRED BY THE TFF
R0079 SUBROUTINES AND TO ESTABLISH THEM IN THE PUSH LIST AREA. THE PARAMETERS ARE LISTED UNDER OUTPUT.
R0081 THE EQUATIONS ARE
R0082
R0083 $\vec{H} = \vec{RN} * \vec{VN}$ ANGULAR MOMENTUM
R0085
R0086 $LCP = H \cdot H / MU$ SEMI LATUS RECTUM
R0088
R0089 $ALFA = 2/RN - VN \cdot VN / MU$ RECIPROCAL SEMI MAJ AXIS, SIGNED

R0091 AND ALFA IS POS FOR ELLIPTIC ORBITS
R0092 0 FOR PARABOLIC ORBITS
R0093 NEG FOR HYPERBOLIC ORBITS.
R0094 SUBROUTINE ALSO COMPUTES AND SAVES RMAG.
R0095 CALLING SEQUENCE:
R0096 TFFCONIC EXPECTS CALLER TO ENTER WITH CORRECT GRAVITATIONAL CONSTANT IN MPAC, IN THE FORM
R0098 1/SQRT(MU). PROGRAM WILL SAVE IN TFF/RTMU . THE SCALE IS DETERMINED BY WHETHER EARTH OR MOON
R0100 ORIGIN IS USED. THE CALLER MUST LOCK OUT THE EXTENDED VERBS BEFORE PROVIDING STATE VECTOR IN RONE,
R0102 VONE AT PROPER SCALE. THE EXTENDED VERBS MUST BE RESTORED WHEN THE CALLER IS FINISHED USING THE
R0104 TFF ROUTINES.
R0105 ENTRY POINT TFFCONMU EXPECTS THAT TFF/RTMU IS ALREADY LOADED.
R0107 TO SPECIFY MU: DLOAD CALL IF MU ALREADY STORED: CALL
R0109 YOURMU 1/RTMU E: (17) M: (14) TFFCONMU
R0111 TFFCONIC
R0112 PUSHLOC = PDL+0, ARBITRARY IF LEQ 18D

R0113 SUBROUTINES CALLED: NONE
R0114 NORMAL EXIT MODES: RVQ
R0115 ALARMS: NONE
R0116 OUTPUT: THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0117 RMAG1 E:(-29) M:(-27) M RN, PRESENT RADIUS LENGTH.
R0118 NRMAG E: (-29+NR) M RMAG, NORMALIZED
R0119 M: (-27+NR)
R0120 X1 -NR, NORM COUNT
R0121 TFFNP E: (-38+2NR) M LCP, SEMI LATUS RECTUM, WEIGHTED BY NR. FOR VGAMCALC
R0123 M: (-36+2NR)
R0124 TFF/RTMU E:(17) M:(14) 1/SQRT(MU)
R0125 TFFVSQ E:(20) M:(18) 1/M -(V SQ/MU): PRESENT VELOCITY,NORMLIZED. FOR VGAMCALC
R0127 TFFALFA E: (26-NR) 1/M ALFA, WEIGHTED BY NR
R0128 M: (24-NR)
R0129 TFFRTALF E: (10+NA) SQRT(ALFA), NORMALIZED
R0130 M: (9+NA)

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R0131            X2                          -NA, NORM COUNT
R0132            TFF1/ALF  E: (-22-2NA) SIGNED SEMI MAJ AXIS, WEIGHTED BY NA
R0133                      M: (-20-2NA)
R0134            PUSHLOC AT PDL+0
R0135            THE FOLLOWING  IS STORED IN GENERAL ERASABLE
R0136            VONE'  E:(10)  M:(9)   V/RT(MU), NORMALIZED VELOCITY
R0137  ERASABLE  INITIALIZATION REQUIRED:
R0138            RONE   E:(-29)  M:(-27)  M      STATE VECTOR          LEFT BY CALLER
R0140            VONE   E:(-7)   M:(-5)   M/CS   STATE VECTOR          LEFT BY CALLER
R0142            TFF/RTMU  E:(17)  M:(14)       1/RT(CS SQ/M CUBE)    IF ENTER VIA  TFFCONMU.
R0144  DEBRIS:   QPRET,    PDL+0 ... PDL+3
R0145

 0147  REF   1              27,2000                    SETLOC TOF-FF
 0148                       27,3151                    BANK

 0149  REF   1                                         COUNT* $$/TFF

 0150  REF   4  LAST  818   27,3151   00037 0  TFFCONIC STORE  TFF/RTMU     1/SQRT(MU)        E: (17)   M: (14)

 0151                       27,3152   53575 0  TFFCONMU VLOAD  UNIT        COME HERE WITH TFFRTMU LOADED.
 0152  REF  16  LAST  793   27,3153   02320 1                  RONE        SAVED RN.  M      E: (-29)  M: (-27)
 0153                       27,3154   77725 1                  PDDL        UR/2 TO PDL+0, +5
 0154                       27,3155   00045 0                  36D         MAGNITUDE
 0155  REF   1              27,3156   00015 0           STORE  RMAG1       M     E: (-29)   M: (-27)

 0156                       27,3157   77701 1           NORM
 0157  REF  87  LAST 1341   27,3160   00047 1                  X1          -NR
 0158  REF   4  LAST  819   27,3161   24041 1           STOVL  NRMAG       RMAG  M   E: (-29+NR)  M: (-27+NR)
 0159  REF  12  LAST  793   27,3162   02326 1                  VONE        SAVED VN.  M/CS   E: (-7)   M: (-5)
 0160                       27,3163   77761 1           VXSC
 0161  REF   5  LAST 1374   27,3164   00037 0                  TFF/RTMU    E: (17)   M: (14)
 0162  REF   2  LAST   96   27,3165   02362 1           STORE  VONE'       VN/SQRT(MU)   E: (10)   M: (9)

 0163                       27,3166   47361 0           VXSC   VXV
 0164  REF   5  LAST 1374   27,3167   00041 1                  NRMAG       E: (-29+NR)  M: (-27+NR)
A0165                                                                     UR/2 FROM PDL
 0166                       27,3170   47572 1           VSL1   VSQ         BEFORE:  E:(-19+NR)  M:(-18+NR)
 0167  REF   2  LAST  818   27,3171   14035 1           STODL  TFFNP       LC P  M   E:(-38+2NR)  M:(-36+2NR)
A0168                                                                     SAVE ALSO FOR VGAMCALC
 0169  REF   1              27,3172   15326 1                  TFF1/4
 0170                       27,3173   63271 0           DDV    PDVL        (2/RMAG)  1/M   E:(26-NR)   M:(24-NR)
 0171  REF   6  LAST 1374   27,3174   00041 1                  NRMAG       RMAG  M   E:(-29+NR)  M:(-27+NR)
 0172  REF   3  LAST 1374   27,3175   02362 1                  VONE'       SAVED VN.   E: (10)   M: (9)
 0173                       27,3176   57436 1           VSQ    DCOMP       KEEP MPAC+2 HONEST FOR SQRT.
 0174  REF   2  LAST  818   27,3177   00025 0           STORE  TFFVSQ      -(V SQ/MU)   E:(20)   M:(18)
A0175                                                                     SAVE FOR VGAMCALC
 0176                       27,3200   43257 0           SR*    DAD
 0177                       27,3201   20573 1                  0 -6,1      GET -VSQ/MU   E:(26-NR)   M:(24-NR)
```

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 0178                          27,3202  77626 0            STADR
AC179                                                     27/RMAG   FROM PDL+2
 0180  REF   1                 27,3203  77744 0            STORE  TFFALFA   ALFA  1/M   E:(26-NR)   M:(24-NR)
 0181                          27,3204  41457 1            SL*    PUSH      TEMP SAVE ALFA    E:(20)   M:(18)
 0182                          27,3205  20173 0                   0 -6,1
 0183                          27,3206  75446 0            ABS    SQRT      E:(10)   M:(9)
 0184                          27,3207  77701 1            NORM
 0185  REF  38  LAST 1342      27,3210  00050 1                   X2        X2 = -NA
 0186  REF   1                 27,3211  00031 0            STORE  TFFRTALF  SQRT( ABS(ALFA) )  E:(10+NA)   M:(9+NA)
 0187                          27,3212  75316 1            DSQ    SIGN      NOT SO ACCURATE, BUT OK
AC188                                                     ALFA FROM PDL+2   E:(20)   M:(18)
 0189                          27,3213  55254 1            BZE    BDDV      SET 1/ALFA =0, TO SHOW SMALL ALFA
 0190                          27,3214  57216 0                   +2
 0191  REF   2  LAST 1374      27,3215  15326 1                   TFF1/4
 0192  REF   1                 27,3216  00027 1  +2        STORE  TFF1/ALF  1/ALFA   E:(-22-2 NA)   M:(-20-2 NA)
 0193                          27,3217  77616 0  DUMPCNIC RVQ

AC194                                                                                    39 W
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P0195   SUBROUTINE NAME:     TFFRP/RA                                    DATE:  01.17.67
R0197   MOD NO:  0                                                       LOG SECTION:    TIME OF FREE FALL
R0199   MOD BY:  RR BAIRNSFATHER
R0200   MOD NO:  1            MOD BY:  RR BAIRNSFATHER      DATE:  11 APR 67
R0201   MOD NO:  2            MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68     ACCEPT DIFFERENT EARTH/MOON SCALES
R0203                                                                             ALSO IMPROVE ACCURACY OF RAPO.
R0205   FUNCTIONAL DESCRIPTION:        USED BY CALCTPER AND TFF DISPLAYS TO CALCULATE PERIGEE RADIUS AND ALSO
R0207           APOGEE RADIUS FOR A GENERAL CONIC.
R0208           PROGRAM GIVES PERIGEE RADIUS AS                 APOGEE RADIUS IS GIVEN BY
R0210                   RP = P /(1+E)                                   RA = (1+E) / ALFA
R0212           WHERE   2
R0213                   E  = 1 - P ALFA
R0214           IF RA IS NEGATIVE OR SHOWS DIVIDE OVERFLOW, THEN RA = POSMAX BECAUSE
R0216                   1. APOGEE RADIUS IS NOT MEANINGFUL FOR HYPERBOLA
R0217                   2. APOGEE RADIUS IS NOT DEFINED FOR PARABOLA
R0218                   3. APOGEE RADIUS EXCEEDS THE SCALING FOR ELLIPSE.
R0219           THIS SUBROUTINE REQUIRES THE SIGNED  RECIPROCAL SEMI MAJ AXIS,  ALFA,  AND SEMI LATUS RECTUM AS DATA.
R0221   CALLING SEQUENCE:  CALL
R0222                           TFFRP/RA
R0223           PUSHLOC = PDL+0, ARBITRARY IF LEQ 10D
R0224           C(MPAC) UNSPECIFIED

R0225   SUBROUTINES CALLED:  NONE
R0226   NORMAL EXIT MODE:    RVQ
R0227           IF ELLIPSE, WITHIN NORMAL SCALING, RAPO IS CORRECT.
R0228           OTHERWISE, RAPO = POSMAX.
R0229   ALARMS:  NONE
R0230   OUTPUT:  STORED IN PUSH LIST AREA. SCALE OF OUTPUT AGREES WITH DATA SUPPLIED TO  TFF/CONIC.
R0232           RPER   E:(-29)  M:(-27)  M     PERIGEE RADIUS              DESTROYED BY CALCTFF/CALCTPER, TFFTRIG.
R0234           RAPO   E:(-29)  M:(-27)  M     APOGEE  RADIUS              WILL BE DESTROYED BY CALCTFF/CALCTPER
R0236           PUSHLOC AT PDL+0
R0237   ERASABLE INITIALIZATION REQUIRED:
R0238           TFFALFA E:(26-NR)       M   1/SEMI MAJ AXIS              LEFT BY TFFCONIC
R0240                   M:(24-NR)
R0241           TFFNP  E: (-38+2NR)     M  LC P, SEMI LATUS RECTUM        LEFT BY TFFCONIC
R0243                  M: (-36+2NR)
R0244           X1                      -NR, NORM COUNT OF RMAG           LEFT BY TFFCONIC
R0246           X2                      -NA, NORM COUNT OF ALFA           LEFT BY TFFCONIC
R0248   DEBRIS:  QPRET,    PDL+0 ... PDL+1
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P0249
 0250                          0020          RAPO    =       16D     APOGEE RADIUS  M  E:(-29)  M:(-27)
 0251                          0016          RPER    =       14D     PERIGEE RADIUS  M  E:(-29)  M:(-27)
A0252
 0253                    27,3220  41345 0 TFFRP/RA DLOAD   DMP
 0254  REF  2 LAST 1375 27,3221  00033 1                  TFFALFA  ALFA  1/M  E:(26-NR)  M:(24-NR)
 0255  REF  3 LAST 1374 27,3222  00035 1                  TFFNP    LC P  M   E:(-38+2NR)  M:(-36+2NR)
 0256                    27,3223  57457 0         SR*     DCOMP    ALFA P (-12+NR)
 0257                    27,3224  20571 0                 0 -8D,1  ALFA P  (-4)
 0258                    27,3225  51415 0         DAD     ABS      (DCOMP GIVES VALID TP RESULT FOR SQRT)
A0259                                                               (ABS PROTECTS SQRT IF E IS VERY NEAR 0)
 0260  REF  6 LAST  938 27,3226  31771 1                  DP2(-4)
 0261                    27,3227  43366 0         SQRT    DAD      E SQ = (1- P ALFA)  (-4)
 0262  REF  3 LAST 1375 27,3230  15326 1                  TFF1/4
 0263                    27,3231  55206 0         PUSH    BDDV     (1+E)  (-2)  TO PDL+0
 0264  REF  4 LAST 1377 27,3232  00035 1                  TFFNP    LCP  M E:(-38+2NR)  M:(-36+2NR)
 0265                    27,3233  53657 0         SR*     SR*      (DOES SR THEN SL TO AVOID OVFL)
 0266                    27,3234  20601 1                 0,1      X1=-NR
 0267                    27,3235  20572 0                 0 -7,1   (EFFECTIVE SL)
 0268  REF  3 LAST  525 27,3236  14017 1         STODL   RPER     PERIGEE RADIUS  M   E:(-29)  M:(-27)
A0269                                                               (1+E)  (-2)   FROM PDL+0
 0270                    27,3237  41005 1         DMP     BOVB
 0271  REF  2 LAST 1375 27,3240  00027 1                  TFF1/ALF E:(-22-2NA)  M:(-20-2NA)
 0272  REF 11 LAST 1334 27,3241  57544 0                  TCDANZIG CLEAR OVFIND, IF ON.
 0273                    27,3242  53654 0         BZE     SL*
 0274  REF  1           27,3243  57252 0                  MAXRA    SET POSMAX, IF ALFA=0
 0275                    27,3244  57603 0                 0 -5,2   -5+NA
 0276                    27,3245  40057 1         SL*     BOV
 0277                    27,3246  57576 1                 0,2
 0278  REF  2 LAST 1377 27,3247  57252 0                  MAXRA    SET POSMAX IF OVFL.
 0279                    27,3250  77644 1         BPL              CONTINUE WITH VALID RAPO.
 0280                    27,3251  57254 0                 +3
 0281                    27,3252  77745 1 MAXRA   DLOAD            RAPO CALC IS NOT VALID. SET RAPO =
 0282  REF  6 LAST  889 27,3253  15344 0                  NEARONE  POSMAX AS A TAG.
 0283  REF  1           27,3254  00021 1 +3      STORE   RAPO     APOGEE RADIUS  M   E:(-29)  M:(-27)
 0284                    27,3255  77616 0 DUMPRPRA RVQ
A0285                                                                                    30 W
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P0286 SUBROUTINE NAME: CALCTPER / CALCTFF DATE: 01.29.67
R0288 MOD NO: 0 LOG SECTION: TIME OF FREE FALL
R0290 MOD BY: RR BAIRNSFATHER
R0291 MOD NO: 1 MOD BY: RR BAIRNSFATHER DATE: 21 MAR 67
R0292 MOD NO: 2 MOD BY: RR BAIRNSFATHER DATE: 14 APR 67
R0293 MOD NO: 3 MOD BY: RR BAIRNSFATHER DATE: 8JUL 67 NEAR EARTH MUE AND NEG TFF (GONEPAST)
R0295 MOD NO: 4 MOD BY: RR BAIRNSFATHER DATE: 21 NOV 67 ADD VARIABLE MU.
R0297 MOD NO: 5 MOD BY: RR BAIRNSFATHER DATE: 21 MAR 68 ACCEPT DIFFERENT EARTH/MOON SCALES
R0299 FUNCTIONAL DESCRIPTION: PROGRAM CALCULATES THE FREE-FALL TIME OF FLIGHT FROM PRESENT POSITION RN AND
R0301 VELOCITY VN TO A RADIUS LENGTH SPECIFIED BY RTERM , SUPPLIED BY THE USER. THE POSITION VECTOR
R0303 RN MAY BE ON EITHER SIDE OF THE CONIC, BUT RTERM IS CONSIDERED ON THE INBOUND SIDE.
R0305 THE EQUATIONS ARE

R0306 Q2 = -SQRT(RTERM (2-RTERM ALFA) - LCP) (INBOUND SIDE)) LEQ +- LCE/SQRT(ALFA)
R0308 - -
R0309 Q1 = RN.VN / SQRT(MU) LEQ +- LCE/SQRT(ALFA)

R0311 Z = NUM / DEN LEQ +- 1/SQRT(ALFA)

R0313 WHERE, IF INBOUND
R0314 NUM = RTERM - RN LEQ +- 2 LCE/ALFA
R0316 DEN = Q2+Q1 LEQ +- 2 LCE/SQRT(ALFA)

R0318 AND, IF OUTBOUND
R0319 NUM = Q2-Q1 LEQ +- 2 LCE/SQRT(ALFA)
R0321 DEN = 2 - ALFA (RTERM + RN) . LEQ +- 2 LCE

R0323 IF ALFA ZZ < 1.0 (FOR ALL CONICS EXCEPT ELLIPSES HAVING ABS(DEL ECC ANOM) G 90 DEG)

R0325 THEN X = ALFA Z Z
R0326 AND TFF = (RTERM +RN -2 ZZ T(X)) Z/SQRT(MU)

R0327 EXCEPT IF ALFA PNZ, AND IF TFF NEG,
R0328 THEN TFF = 2 PI /(ALFA SQRT(ALFA)) + TFF

R0329 OR IF ALFA ZZ GEQ 1.0 (FOR ELLIPSES HAVING ABS(DEL ECC ANOM) GEQ 90 DEG)

R0331 THEN X = 1/ALFA Z Z
R0332 AND TFF = (PI/SQRT(ALFA) -Q2 +Q1 +2(X T(X) -1) /ALFA Z) /ALFA SQRT(MU)

R0334 WHERE T(X) IS A POLYNOMIAL APPROXIMATION TO THE SERIES
R0335 2 3 2
R0336 1/3 -X/5 +X /7 -X /9 ... (X < 1.0)

R0337 CALLING SEQUENCE: TIME TO RTERM TIME TO PERIGEE
R0339 CALL CALL
R0340 CALCTFF CALCTPER
R0342 C(MPAC) = TERMNL RAD M C(MPAC) = PERIGEE RAD M
R0344 FOR EITHER, E: (-29) M: (-27)
R0345 FOR EITHER, PUSHLOC = PDL+0 , ARBITRARY IF LEQ 8D.

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R0346   SUBROUTINES CALLED:  T(X),  VIA RTB
R0347   NORMAL EXIT MODE:  RVQ
R0348           HOWEVER, PROGRAM EXITS WITH ONE OF THE FOLLOWING VALUES FOR TFF (-28) CS  IN MPAC. USER MUST STORE.
R0350                   A.  TFF= FLIGHT TIME. NORMAL CASE FOR POSITIVE FLIGHT TIME LESS THAN ONE ORBITAL PERIOD.
R0352                   B.  (THIS OPTION IS NO LONGER USED.)
R0353                   C.  TFF = POSMAX.  THIS INDICATES THAT THE CONIC FROM THE PRESENT POSITION WILL NOT RETURN TO
R0355                       THE SPECIFIED ALTITUDE.  ALSO INDICATES OUTBOUND PARABOLA OR HYPERBOLA.
R0357   OUTPUT:  C(MPAC)  (-28)  CS     TIME OF FLIGHT, OR TIME TO PERIGEE
R0358           TFFX     (0)           X,                                  LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0360           NRTERM   E: (-29+NR)   M  RTERM, WEIGHTED BY NR            LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0362                    M: (-27+NR)
R0363           TFFTEM   E: (-59+2NR)  LCP Z Z SGN(SDELF)                  LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0365                    M: (-55+2NR)  LCP /ALFA SGN(SDELF)                LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0367           NOTE:  TFFTEM = PDL 36D AND WILL BE DESTROYED BY .:UNIT:.
R0368           RMAG1  E:(-29)  M:(-27)  PDL 12 NOT TOUCHED.
R0369           TFFQ1  E:(-16)  M:(-15)  PDL 14D
R0370           TFFDELQ E:(-16) M:(-15)  PDL 10D
R0371           PUSHLOC AT PDL+0
R0372   ERASABLE INITIALIZATION REQUIRED:
R0373           RONE   E:(-29)  M:(-27)  M   STATE VECTOR                  LEFT BY USER
R0375           VONE'  E:(+10)  M:(+9)   VN/SQRT(MU)                       LEFT BY TFF/CONIC
R0377           RMAG1  E:(-29)  M:(-27)  PRESENT RADIUS,  M                LEFT BY TFFCONIC
R0379           C(MPAC)E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH, M  LEFT BY USER
R0381           THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0382           TFF/RTMU  E:(17)  M:(14)  1/SQRT(MU)                       LEFT BY TFFCONIC.
R0384           NRMAG  E: (-29+NR)  M  RMAG, NORMALIZED                    LEFT BY TFFCONIC
R0386                  M: (-27+NR)
R0387           X1                        -NR, NORM COUNT                  LEFT BY TFFCONIC
R0389           TFFNP  E: (-38+2NR)  M   LCP, SEMI LATUS RECTUM, WEIGHT  NR  LEFT BY TFFCONIC
R0391                  M: (-36+2NR)
R0392           TFFALFA  E: (26-NR)    1/M  ALFA, WEIGHT  NR               LEFT BY TFFCONIC
R0394                    M: (24-NR)
R0395           TFFRTALF  E:(10+NA)    SQRT(ALFA), NORMALIZED              LEFT BY TFFCONIC
R0397                     M:(9+NA)
R0398           X2                        -NA, NORM COUNT                  LEFT BY TFFCONIC
R0400           TFF1/ALF  E: (-22-2NA)  SIGNED SEMIMAJ AXIS, WEIGHTED BY NA  LEFT BY TFFCONIC
R0402                     M: (-20-2NA)
R0403   DEBRIS:  QPRET,   PDL+0 ... PDL+3
R0404           RTERM  E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH
R0405           RAPO   E:(-29)  M:(-27)  PDL 16D  (=NRTERM)
R0406           RPER   E:(-29)  M:(-27)  PDL 14D   (=TFFQ1)
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P0407
 0408                          27,3256  77614 1  CALCTPER SETGO                ENTER WITH RPER  IN MPAC
 0409  REF   1                 27,3257  03436 0                  TFFSW
 0410                          27,3260  57263 1                  +3
 0411                          27,3261  77614 1  CALCTFF  CLEAR                ENTER WITH RTERM IN MPAC
 0412  REF   2  LAST 1380     27,3262  03676 0                  TFFSW
 0413  REF   3  LAST  814     27,3263  00023 0  +3      STORE   RTERM          E: (-29)  M: (-27)
 0414                          27,3264  77657 0          SL*
 0415                          27,3265  20201 0                  0,1           X1=-NR
 0416  REF   6  LAST  819     27,3266  00021 1          STORE   NRTERM         RTERM  E: (-29+NR)  M: (-27+NR)
 0417                          27,3267  44205 0          DMP     BDSU
 0418  REF   3  LAST 1377     27,3270  00033 1                  TFFALFA        ALFA  E: (26-NR)  M: (24-NR)
 0419  REF   4  LAST 1377     27,3271  15326 1                  TFF1/4
 0420                          27,3272  41206 0          PUSH    DMP           (2-ALFA RTERM)  (-3)  TO PDL+0
 0421  REF   7  LAST 1380     27,3273  00021 1                  NRTERM         E: (-29+NR)  M: (-27+NR)
 0422                          27,3274  53725 1          PDDL    SR*           RTERM(2-ALFA RTERM) TO PDL+2
A0423                                                                          E: (-32+NR)   M: (-30+NR)
 0424  REF   5  LAST 1377     27,3275  00035 1                  TFFNP          LC P  E:(-38+2NR)  M:(-36+2NR)
 0425                          27,3276  20573 1                  0 -6,1        X1 = -NR
 0426                          27,3277  43276 0          DCOMP   DAD           DUE TO SHIFTS, KEEP PRECISION FOR SQRT
A0427                                                                          RTERM(2-ALFA RTERM) FROM PDL+2
A0428                                                                          E: (-32+NR)  M: (-30+NR)
 0429                          27,3300  77657 0          SR*                   LEAVE  E: (-32)  M: (-30)
 0430                          27,3301  20601 1                  0,1           X1 = -NR
 0431                          27,3302  71214 0          BOFF    DLOAD         CHECK TFF / TPER SWITCH
 0432  REF   3  LAST 1380     27,3303  03756 0                  TFFSW
 0433                          27,3304  57306 0                  +2            IF TFF, CONTINUE
 0434  REF   1                 27,3305  15336 0                  TFFZEROS      IF TPER, SET Q2 = 0
 0435                          27,3306  75440 0  +2      BMN     SQRT          E: (-16)  M: (-15)

 0436  REF   1                 27,3307  57441 1                  MAXTFF1       NO FREE FALL CONIC TO RTERM FROM HERE
A0437                                                                          RESET PDL, SET TFF=PDSMAX, AND EXIT.

 0438                          27,3310  41076 0          DCOMP   BOVB          RT IS ON INBOUND SIDE.  ASSURE OVFIND=0
 0439  REF  12  LAST 1377     27,3311  57544 0                  TCDANZIG      ANY PORT IN A STORM.
 0440  REF   3  LAST  820     27,3312  24045 0          STOVL   TFFTEM         Q2   E: (-16)  M: (-15)
 0441  REF   4  LAST 1374     27,3313  02362 1                  VONE'         VN/SQRT(MU) E: (10)  M: (9)
 0442                          27,3314  52441 1          DOT     SL3
 0443  REF  17  LAST 1374     27,3315  02320 1                  RONE          SAVED RN.  E: (-29)  M: (-27)
 0444  REF   1                 27,3316  00017 1          STORE   TFFQ1         Q1, SAVE FOR GONEPAST TEST.
A0445                                                                          E: (-16)  M: (-15)
 0446                          27,3317  44240 1          BMN     BDSU
 0447  REF   1                 27,3320  57341 0                  INBOUND       USE ALTERNATE Z
 0448  REF   4  LAST 1380     27,3321  00045 0                  TFFTEM         Q2  E: (-16)  M: (-15)

A0449                                    OUTBOUND  Z CALC CONTINUES HERE

 0450  REF   2  LAST  819     27,3322  14043 0          STODL   TFFX          NUM=Q2-Q1  E: (-16)  M: (-15)
 0451  REF   4  LAST 1380     27,3323  00033 1                  TFFALFA       ALFA  E: (26-NR)  M: (24-NR)
 0452                          27,3324  44205 0          DMP     BDSU
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 0453  REF  7  LAST 1374   27,3325  00041 1                NRMAG     RMAG  E: (-29+NR)  M: (-27+NR)
A0454                                                                (2-RTERM ALFA)  (-3) FROM PDL+0
 0455                      27,3326  51406 1  SAVEDEN  PUSH  ABS      DEN TO PDL+0  E: (-3) OR (-16)
A0456                                                                              M: (-3) OR (-15)
 0457                      27,3327  40015 1           DAD   BOV      INDETERMINANCY TEST
 0458  REF  1              27,3330  31763 1                 LIM(-22) =1,0-B(-22)
 0459  REF  1              27,3331  57352 1                 TFFXTEST GO IF DEN >/= B(-22)
 0460                      27,3332  65345 0           DLOAD PDDL     SET DEN=0  OTHERWISE
 0461  REF  2  LAST 1380   27,3333  15336 0                 TFFZEROS
A0462                                                                XCH ZERO WITH PDL+0
 0463                      27,3334  57545 1           DLOAD DCOMP
 0464  REF  5  LAST 1380   27,3335  00033 1                 TFFALFA  ALFA  E: (26-NR)  M: (24-NR)
 0465                      27,3336  71240 1           BMN   DLOAD    FOR TPER: Z INDET AT DELE/2=0 AND 90.
 0466  REF  1              27,3337  57446 0                 TFFELI   ASSUME 90, AND LEAVE 0 IN PDL: I/Z=D/N

A0467                                                                Z INDET. AT PERIGEE FOR PARAB OR HYPERB.
 0468                      27,3340  77616 0  DUMPTFF1 RVQ            RETURN  TFF =0

A0469                                       INBOUND  Z  CALC CONTINUES HERE
 0470                      27,3341  77745 1  INBOUND  DLOAD          RESET PDL+0
 0471                      27,3342  45345 1           DLOAD  DSU     ALTERNATE Z CALC
 0472  REF  4  LAST 1380   27,3343  00023 0                 RTERM    E: (-29)  M: (-27)
 0473  REF  2  LAST 1374   27,3344  00015 0                 RMAG1    E: (-29)  M: (-27)
 0474  REF  3  LAST 1380   27,3345  14043 0           STODL TFFX     NUM=RTERM-RN  E: (-29)  M: (-27)
 0475  REF  5  LAST 1380   27,3346  00045 0                 TFFTEM   Q2  E: (-16)  M: (-15)
 0476                      27,3347  52015 1           DAD   GOTO
 0477  REF  2  LAST 1380   27,3350  00017 1                 TFFQ1    Q1  E: (-16)  M: (-15)
 0478  REF  1              27,3351  57326 1                 SAVEDEN  DEN = Q2+Q1  E: (-16)  M: (-15)

 0479                      27,3352  65215 1  TFFXTEST DAD   PDDL      (ABS(DEN) TO PDL+2))  E: (-3) OR (-16)
A0480                                                                              M: (-3) OR (-15)
 0481  REF  1              27,3353  31765 1                 DP(-22)  RESTORE ABS(DEN) TO MPAC
 0482  REF  4  LAST 1381   27,3354  00043 0                 TFFX     NUM E:(-16) OR (-29)  M:(-15) OR (-27)
 0483                      27,3355  53605 1           DMP   SR*
 0484  REF  2  LAST 1375   27,3356  00031 0                 TFFRTALF SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0485                      27,3357  57201 0                 0 -3,2   X2=-NA
 0486                      27,3360  77671 1           DDV             C(MPAC) =NUM SQRT(ALFA)  E:(-3) OR (-16)
A0487                                                                              M:(-3) OR (-15)
A0488                                                                ABS(DEN) FROM PDL+2  E:(-3) OR (-16)
A0489                                                                              M:(-3) OR (-15)
 0490                      27,3361  40145 0           DLOAD BOV      (THE DLOAD IS SHARED WITH TFFELL)
 0491  REF  5  LAST 1381   27,3362  00043 0                 TFFX     NUM  E: (-16) OR (-29)  M:(-15) OR (-27)
 0492  REF  1              27,3363  57444 1                 TFFELL   USE EQN FOR DELE GEQ 90, LEQ -90

A0493                                       OTHERWISE, CONTINUE FOR GENERAL CONIC FOR TFF EQN

 0494                      27,3364  45471 1           DDV   STADR
A0495                                                                DEN FROM PDL+0   E: (-3) OR (-16)
A0496                                                                              M: (-3) OR (-15)
 0497  REF  6  LAST 1381   27,3365  77732 1           STORE TFFTEM   Z  SAVE FOR SIGN OF SDELF.
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A0498                                                                   E: (-13)  M: (-12)
 0499                    27,3366  63406 0        PUSH    DSQ            Z TO PDL+0
 0500                    27,3367  41206 0        PUSH    DMP            Z SQ TO PDL+2  E: (-26)  M: (-24)
 0501  REF  6 LAST 1380 27,3370  00035 1                TFFNP          LC P  E: (-38+2NR)  M: (-36+2NR)
 0502                    27,3371  75261 0        SL      SIGN
 0503                    27,3372  20206 1                5
 0504  REF  7 LAST 1381 27,3373  00045 0                TFFTEM         AFFIX SIGN FOR SDELF (ENTRY DISPLAY)
 0505  REF  8 LAST 1382 27,3374  14045 0        STODL   TFFTEM         P ZSQ  E: (-59+2NR)  M: (-55+2NR)
A0506                                                                   (ARG IS USED IN TFF/TRIG)
A0507                                                                   ZSQ FROM PDL+2  E: (-26)  M: (-24)
 0508                    27,3375  41206 0        PUSH    DMP            RESTORE PUSH LOC
 0509  REF  6 LAST 1381 27,3376  00033 1                TFFALFA        ALFA  E: (26-NR)  M: (24-NR)
 0510                    27,3377  77657 0        SL*
 0511                    27,3400  20201 0                0,1            X1=-NR
 0512  REF  6 LAST 1381 27,3401  00043 0        STORE   TFFX           X
 0513                    27,3402  41234 1        RTB     DMP
 0514  REF  1           27,3403  57526 1                T(X)            POLY
A0515                                                                   ZSQ FROM PDL+2  E: (-26)  M: (-24)
 0516                    27,3404  44302 0        SR2     BDSU           2 ZSQ T(X)  E: (-29)  M: (-27)
 0517  REF  5 LAST 1381 27,3405  00023 0                RTERM          RTERM  E: (-29)  M: (-27)
 0518                    27,3406  41215 1        DAD     DMP
 0519  REF  3 LAST 1381 27,3407  00015 0                RMAG1          E: (-29)  M: (-27)
A0520                                                                   Z FROM PDL+0  E: (-13)  M: (-12)
 0521                    27,3410  51042 0        SR3     BPL            TFF SQRT(MU)  E: (-45)  M: (-42)
 0522  REF  1           27,3411  57432 0                ENDTFF         (NO PUSH UP)
 0523                    27,3412  75206 1        PUSH    SIGN           TFF SQRT(MU)  TO PDL+0
 0524  REF  3 LAST 1381 27,3413  00017 1                TFFQ1          Q1 FOR GONEPAST TEST
 0525                    27,3414  71244 0        BPL     DLOAD          GONE PAST ?
 0526  REF  1           27,3415  57436 1                NEGTFF         YES. TFF < 0 .
 0527  REF  3 LAST 1377 27,3416  00027 1                TFF1/ALF       1/ALFA  E: (-22-2NA)  M: (-20-2NA)
 0528                    27,3417  51076 1        DCOMP   BPL            ALFA > 0 ?
 0529  REF  2 LAST 1382 27,3420  57436 1                NEGTFF         NO. TFF IS NEGATIVE.

AC530                                  CORRECT FOR ORBITAL PERIOD.

 0531                    27,3421  77676 0                DCOMP                 YES. CORRECT FOR ORB PERIOD.
 0532                    27,3422  56205 0                DMP     DDV
 0533  REF  1           27,3423  31761 0                PI/16          2 PI (-5)
 0534  REF  3 LAST 1381 27,3424  00031 0                TFFRTALF       SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0535                    27,3425  53657 0        SL*     SL*
 0536                    27,3426  57602 1                0 -4,2         X2=-NA
 0537                    27,3427  57602 1                0 -4,2
 0538                    27,3430  43257 0        SL*     DAD
 0539                    27,3431  57576 1                0,2
A0540                                                                   TFF SQRT(MU) FROM PDL+0  E:(-45) M:(-42)
 0541                    27,3432  40005 0 ENDTFF  DMP     DDV            TFF SQRT(MU) IN MPAC     E:(-45) M:(-42)
 0542  REF  6 LAST 1374 27,3433  00037 0                TFF/RTMU       E: (17)  M: (14)
 0543  REF  1           27,3434  57442 1                MAXTFF         SET POSMAX IF OVFL.

 0544                    27,3435  77616 0 DUMPTFF2 RVQ                  RETURN  TFF   (-28) CS IN MPAC.
```

L TIME OF FREE FALL

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 0545                          27,3436  77745 1  NEGTFF   DLOAD
A0546                                                                 TFF SQRT(MU)  FROM PDL+0, NEGATIVE.
 0547                          27,3437  77650 1           GOTO
 0548  REF   2  LAST 1382     27,3440  57432 0                    ENDTFF

 0549                          27,3441  77745 1  MAXTFF1  DLOAD                  RESET PDL
 0550                          27,3442  43545 1  MAXTFF   DLOAD  RVQ
 0551  REF   7  LAST 1377     27,3443  15344 0                    NEARONE

R0552  TIME OF FLIGHT ELLIPSE WHEN DEL (ECCENTRIC ANOM) GEQ 90 AND LEQ -90.

A0553
A0554                                                                 NUM FROM TFFX.  E: (-16) OR (-29)
                                                                                      M: (-15) OR (-27)
 0555                          27,3444  77712 0  TFFELL   SL2
 0556                          27,3445  41465 0           BDDV   PUSH   NUM  E:(-14) OR (-27)  M:(-13) OR (-25)
A0557                                                                 TEMP SAVE D/N IN PDL+0
A0558                                                                 DEN FROM PDL+0  E:(-3)/(-16) M:(-3)/(-15)
 0559                                                                 N/D TO PDL+0  E: (11)  M: (10)
 0559                          27,3446  45345 1  TFFEL1   DLOAD  DSU  (ENTER WITH D/N=0 IN PDL+0)
 0560  REF   9  LAST 1382     27,3447  00045 0                    TFFTEM Q2  E: (-16)  M: (-15)
 0561  REF   4  LAST 1382     27,3450  00017 1                    TFFQ1  Q1  E: (-16)  M: (-15)
 0562  REF   1                27,3451  14013 0           STODL  TFFDELQ Q2-Q1  E: (-16)  M: (-15)
A0563                                                                 D/N FROM PDL+0
 0564                          27,3452  77626 0           STADR
 0565  REF  10  LAST 1383     27,3453  77732 1           STORE  TFFTEM  D/N  E: (11)  M: (10)
 0566                          27,3454  53605 1           DMP    SL*
 0567  REF   4  LAST 1382     27,3455  00027 1                    TFF1/ALF  1/ALFA E: (-22-2NA)  M: (-20-2NA)
 0568                          27,3456  57576 1                    0,2       1/ALFA Z  E: (-11-NA)  M: (-10-NA)
 0569                          27,3457  41206 0           PUSH   DMP                  TO PDL+0
 0570  REF  11  LAST 1383     27,3460  00045 0                    TFFTEM    1/Z  E: (11)  M: (10)
 0571                          27,3461  41057 0           SL*    BOVB
 0572                          27,3462  57576 1                    0,2       X2= -NA
 0573  REF  16  LAST 1324     27,3463  45761 0                    SIGNMPAC  IN CASE X= 1.0, CONTINUE
 0574  REF   7  LAST 1382     27,3464  00043 0           STORE  TFFX      X=1/ALFA ZSQ
 0575                          27,3465  41234 1           RTB    DMP
 0576  REF   2  LAST 1382     27,3466  57526 1                    T(X)      POLY
 0577  REF   8  LAST 1383     27,3467  00043 0                    TFFX
 0578                          27,3470  45242 1           SR3    DSU
 0579  REF   2  LAST  938     27,3471  31767 0                    DP2(-3)
 0580                          27,3472  41405 0           DMP    PUSH      2(X T(X)-1) /Z ALFA  E: (-15-NA)
A0581                                                                                           M: (-14-NA)
A0582                                                                 1/ALFA Z FROM PDL+0  E: (-11-NA)
A0583                                                                                     M: (-10-NA)
 0584                          27,3473  41345 0           DLOAD  DMP        GET SIGN FOR SDELF
 0585  REF  12  LAST 1383     27,3474  00045 0                    TFFTEM    1/Z  E: (11)  M: (10)
 0586  REF   4  LAST 1382     27,3475  00015 0                    RMAG1     E: (-29)  M: (-27)
 0587                          27,3476  43312 0           SL2    DAD
 0588  REF   5  LAST 1383     27,3477  00017 1                    TFFQ1     Q1  E: (-16)  M: (-15)
 0589  REF  13  LAST 1383     27,3500  14045 0           STODL  TFFTEM    (Q1+R 1/Z)  =SGN OF SDELF E:(-16) M:(-15
 0590  REF   7  LAST 1382     27,3501  00035 1                    TFFNP     LC P E: (-38+2NR)  M: (-36+2NR)
 0591                          27,3502  53605 1           DMP    SL*       CALC FOR ARG FOR TFF/TRIG.
```

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0592  REF   5  LAST 1383   27,3503  00027 1          TFF1/ALF     1/ALFA   E:(-22-2NA)  M:(-20-2NA)
0593                       27,3504  57575 1          1,2          X2=-NA
0594                       27,3505  53765 0    SIGN  SL*
0595  REF  14  LAST 1383   27,3506  00045 0          TFFTEM       AFFIX SIGN FOR SDELF
0596                       27,3507  57576 1          0,2
0597  REF  15  LAST 1384   27,3510  14045 0    STODL TFFTEM       P/ALFA  E:(-59+2NR)  M:(-55+2NR)
A0598                                                            (ARG FOR USE IN TFF/TRIG)
0599  REF   6  LAST 1384   27,3511  00027 1          TFF1/ALF     1/ALFA E:(-22-2NA)  M:(-20-2NA)
0600                       27,3512  41366 1    SQRT  DMP
0601  REF   2  LAST 1382   27,3513  31761 0          PI/16        PI (-4)
0602                       27,3514  77615 0    DAD
A0603                                                           2(XT(X)-1)/Z ALFA FROM PDL E:(-15-NA)
A0604                                                                                M:(-14-NA)
0605                       27,3515  45257 0    SL*   DSU
0606                       27,3516  57577 0          0 -1,2
0607  REF   2  LAST 1383   27,3517  00013 0          TFFDELQ      Q2-Q1  E: (-16)  M: (-15)
0608                       27,3520  53605 1    DMP   SL*
0609  REF   7  LAST 1384   27,3521  00027 1          TFF1/ALF     1/ALFA  E:(-22-2NA)  M:(-20-2NA)
0610                       27,3522  57601 1          0 -3,2
0611                       27,3523  52057 1    SL*   GOTO
0612                       27,3524  57602 1          0 -4,2
0613  REF   3  LAST 1383   27,3525  57432 0          ENDTFF       TFF SQRT(MU) IN MPAC E:(-45) M:(-42)
```

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```
R0614   PROGRAM NAME:      T(X)                                    DATE:    01.17.67
R0616   MOD NO:  0                                                LOG SECTION:    TIME OF FREE FALL
R0618   MOD BY:  RR BAIRNSFATHER
R0619   FUNCTIONAL DESCRIPTION:      THE POLYNOMIAL T(X) IS USED BY TIME OF FLIGHT SUBROUTINES  CALCTFF AND
R0621           CALCTPER TO APPROXIMATE THE SERIES
R0622                                2     3
R0623                   1/3 -X/5 +X /7 -X /9 ...

R0624           WHERE  X = ALFA Z Z        IF ALFA Z Z  LEQ 1
R0625                  X = 1/(ALFA Z Z )  IF ALFA Z Z   G  1

R0626           ALSO   X IS NEG FOR HYPERBOLIC ORBITS
R0627                  X = 0 FOR PARABOLIC ORBITS
R0628                  X IS POSITIVE FOR ELLIPTIC ORBITS
R0629           FOR FLIGHT 278, THE POLYNOMIAL  T(X) IS FITTED OVER THE RANGE  (0,+1)  AND HAS A MAXIMUM
R0631           DEVIATION FROM THE SERIES OF  2 E-5        (T(X) IS A CHEBYCHEV  TYPE FIT AND WAS OBTAINED USING
R0633           MAC PROGRAM AUTCURFIT294RRB  AND IS VALID TO THE SAME TOLERANCE OVER THE RANGE  (-.08,+1). )
R0635   CALLING SEQUENCE:  RTB
R0636                        T(X)
R0637           C(MPAC) = X

R0638   SUBROUTINES CALLED:  NONE
R0639   NORMAL EXIT MODE:    TC   DANZIG
R0640   ALARMS:  NONE
R0641   OUTPUT:  C(MPAC) = T(X)
R0642   ERASABLE INITIALIZATION REQUIRED:
R0643           C(MPAC)  =  X
R0644   DEBRIS:  NONE

 0645   REF  10  LAST 1292   27,3526  0 7171 1  T(X)      TC     POLY
 0646                        27,3527   00004 0              DEC    4                    N-1
 0647                        27,3530   12525 0              2DEC   3.333333333 E-1
 0647                        27,3531   12525 0
 0648                        27,3532   71463 0              2DEC*  -1.999819135 E-1 *
 0648                        27,3533   57703 1
 0649                        27,3534   04423 0              2DEC*  1.418148467  E-1 *
 0649                        27,3535   17645 0
 0650                        27,3536   74604 0              2DEC*  -1.01310997  E-1 *
 0650                        27,3537   43667 1
 0651                        27,3540   01626 1              2DEC*  5.609004986  E-2 *
 0651                        27,3541   37256 1
 0652                        27,3542   77404 1              2DEC*  -1.536156925 E-2 *
 0652                        27,3543   52071 0
 0653   REF  68  LAST 1316   27,3544  0 6030 1  ENDT(X)   TC     DANZIG

 0654   REF   1              27,3544            TCDANZIG =      ENDT(X)
```

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```
P0655   TFF CONSTANTS
 0657   REF   1                34,2000                 SETLOC TOF-FF1
 0658                          34,3756                 BANK

 06585  REF   1                                        COUNT* $$/TFF
A0659                                                        NOTE _  NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0661                          34,3756   24775 1  MUEARTHMU  2DEC*  3.99378224755E5 B17* CUBE MODIFIED EARTH MU
 0662                          34,3757   30424 0
A0663                                                        NOTE _  NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0664                                    MUM      =         4.902 778  E8     M CUBE /CS SQ

A0665                                    RTMUM    2DEC*     2.21422175 E4 B-18*
 0666                          34,3760   06220 1  PI/16     2DEC      3.141592653 B-4
 0666                          34,3761   37553 0
 0667                          34,3762   37777 1  LIM(-22)  2OCT      37777 37700       1.0 -B(-22)
 0667                          34,3763   37700 1
 0668                          34,3764   00000 1  DP(-22)   2OCT      00000 00100       B(-22)
 0668                          34,3765   00100 0
 0669                          34,3766   04000 0  DP2(-3)   2DEC      1  B-3
 0669                          34,3767   00000 1
 0670                          34,3770   02000 0  DP2(-4)   2DEC      1 B-4             1/16
 0670                          34,3771   00000 1
RC671   RPAD1    2DEC    6373338 B-29    M  (-29)  =20 909 901.57 FT

 0672   REF    4  LAST   547    22,3172              RPAD1     =       RPAD
 0674   REF   12  LAST   941    26,3343              NEARONE   EQUALS  DPPOSMAX
 0675   REF   31  LAST  1354    26,3335              TFFZEROS  EQUALS  HI6ZEROS
 0676   REF    4  LAST   941    26,3325              TFF1/4    EQUALS  HIDP1/4
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```
0002  REF   2 LAST  602   15,2000                SETLOC STARTAB
0003                      15,3437                BANK

0004  REF   1                                    COUNT* $$/STARS
0500                      15,3437   15264 0      2DEC   +.8345006310 B-1     STAR 37   X
0500                      15,3440   07253 1
0501                      15,3441   74133 0      2DEC   -.2388718657 B-1     STAR 37   Y
0501                      15,3442   45130 1
0502                      15,3443   70034 1      2DEC   -.4965369357 B-1     STAR 37   Z
0502                      15,3444   53644 1
0503                      15,3445   15015 1      2DEC   +.8141988673 B-1     STAR 36   X
0503                      15,3446   35262 1
0504                      15,3447   67072 0      2DEC   -.5553601830 B-1     STAR 36   Y
0504                      15,3450   57521 0
0505                      15,3451   02552 1      2DEC   +.1692786800 B-1     STAR 36   Z
0505                      15,3452   27310 0
0506                      15,3453   07210 0      2DEC   +.4542117996 B-1     STAR 35   X
0506                      15,3454   34714 1
0507                      15,3455   67300 0      2DEC   -.5390337930 B-1     STAR 35   Y
0507                      15,3456   47414 0
0508                      15,3457   13262 0      2DEC   +.7093195408 B-1     STAR 35   Z
0508                      15,3460   27671 1
0509                      15,3461   05101 1      2DEC   +.3205423120 B-1     STAR 34   X
0509                      15,3462   34175 0
0510                      15,3463   70717 1      2DEC   -.4434583652 B-1     STAR 34   Y
0510                      15,3464   46031 1
0511                      15,3465   62467 0      2DEC   -.8370169081 B-1     STAR 34   Z
0511                      15,3466   45023 1
0512                      15,3467   10655 0      2DEC   +.5524232365 B-1     STAR 33   X
0512                      15,3470   16340 1
0513                      15,3471   63237 1      2DEC   -.7930716636 B-1     STAR 33   Y
0513                      15,3472   45012 0
0514                      15,3473   73711 1      2DEC   -.2566435348 B-1     STAR 33   Z
0514                      15,3474   62337 1
0515                      15,3475   07207 0      2DEC   +.4540867784 B-1     STAR 32   X
0515                      15,3476   34100 1
0516                      15,3477   61751 0      2DEC   -.8777450759 B-1     STAR 32   Y
0516                      15,3500   60311 1
0517                      15,3501   02344 0      2DEC   +.1528685033 B-1     STAR 32   Z
0517                      15,3502   11437 1
0518                      15,3503   03243 1      2DEC   +.2074286490 B-1     STAR 31   X
0518                      15,3504   10132 0
0519                      15,3505   62031 1      2DEC   -.8718956797 B-1     STAR 31   Y
0519                      15,3506   55616 0
0520                      15,3507   70716 0      2DEC   -.4435890882 B-1     STAR 31   Z
0520                      15,3510   43617 0
0521                      15,3511   01747 1      2DEC   +.1219537054 B-1     STAR 30   X
0521                      15,3512   01335 0
0522                      15,3513   63532 0      2DEC   -.7702168243 B-1     STAR 30   Y
0522                      15,3514   54217 1
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0523	15,3515	12010 0	2DEC	+.6260138474 B-1	STAR 30	Z
0523	15,3516	11614 1				
0524	15,3517	76152 0	2DEC	-.1120382967 B-1	STAR 29	X
0524	15,3520	45651 1				
0525	15,3521	60371 1	2DEC	-.9695442116 B-1	STAR 29	Y
0525	15,3522	57632 1				
0526	15,3523	03370 0	2DEC	+.2177876068 B-1	STAR 29	Z
0526	15,3524	03556 1				
0527	15,3525	76127 1	2DEC	-.1142900725 B-1	STAR 28	X
0527	15,3526	67425 0				
0528	15,3527	72436 0	2DEC	-.3400201762 B-1	STAR 28	Y
0528	15,3530	61577 0				
0529	15,3531	61041 0	2DEC	-.9334474056 B-1	STAR 28	Z
0529	15,3532	46271 1				
0530	15,3533	72303 1	2DEC	-.3511952476 B-1	STAR 27	X
0530	15,3534	40213 0				
0531	15,3535	62637 1	2DEC	-.8242322268 B-1	STAR 27	Y
0531	15,3536	74356 1				
0532	15,3537	70711 1	2DEC	-.4441881743 B-1	STAR 27	Z
0532	15,3540	46567 1				
0533	15,3541	67366 0	2DEC	-.5324545035 B-1	STAR 26	X
0533	15,3542	44175 1				
0534	15,3543	64424 1	2DEC	-.7163035719 B-1	STAR 26	Y
0534	15,3544	41241 0				
0535	15,3545	07156 1	2DEC	+.4510004372 B-1	STAR 26	Z
0535	15,3546	23036 0				
0536	15,3547	63330 1	2DEC	-.7860186221 B-1	STAR 25	X
0536	15,3550	75735 1				
0537	15,3551	67512 0	2DEC	-.5221457573 B-1	STAR 25	Y
0537	15,3552	62476 0				
0538	15,3553	05227 0	2DEC	+.3309660611 B-1	STAR 25	Z
0538	15,3554	10611 0				
0539	15,3555	64757 0	2DEC	-.6895375091 B-1	STAR 24	X
0539	15,3556	51701 0				
0540	15,3557	71233 0	2DEC	-.4185354938 B-1	STAR 24	Y
0540	15,3560	53334 0				
0541	15,3561	66425 1	2DEC	-.5910719617 B-1	STAR 24	Z
0541	15,3562	76017 0				
0542	15,3563	66546 0	2DEC	-.5812217481 B-1	STAR 23	X
0542	15,3564	64151 0				
0543	15,3565	73256 1	2DEC	-.2911759648 B-1	STAR 23	Y
0543	15,3566	65757 1				
0544	15,3567	14120 1	2DEC	+.7598669864 B-1	STAR 23	Z
0544	15,3570	32444 1				
0545	15,3571	61251 0	2DEC	-.9168160791 B-1	STAR 22	X
0545	15,3572	56124 0				
0546	15,3573	72307 0	2DEC	-.3506241694 B-1	STAR 22	Y
0546	15,3574	65764 1				
0547	15,3575	74742 0	2DEC	-.1910784362 B-1	STAR 22	Z
0547	15,3576	65735 0				

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0548		15,3577	70607 1	2DEC	-.4521486548 B-1	STAR 21	X
0548		15,3600	77742 0				
0549		15,3601	77151 1	2DEC	-.0495728431 B-1	STAR 21	Y
0549		15,3602	74615 0				
0550		15,3603	61600 0	2DEC	-.8905639377 B-1	STAR 21	Z
0550		15,3604	60003 1				
0551		15,3605	60605 1	2DEC	-.9524366380 B-1	STAR 20	X
0551		15,3606	64345 1				
0552		15,3607	77026 0	2DEC	-.0597677121 B-1	STAR 20	Y
0552		15,3610	54200 1				
0553		15,3611	73160 1	2DEC	-.2988181236 B-1	STAR 20	Z
0553		15,3612	42475 1				
0554		15,3613	60430 0	2DEC	-.9657334280 B-1	STAR 19	X
0554		15,3614	66614 1				
0555		15,3615	00653 1	2DEC	+.0521664164 B-1	STAR 19	Y
0555		15,3616	13072 0				
0556		15,3617	04042 0	2DEC	+.2542392790 B-1	STAR 19	Z
0556		15,3620	27232 1				
0557		15,3621	62162 0	2DEC	-.8610673209 B-1	STAR 18	X
0557		15,3622	44274 0				
0558		15,3623	07322 0	2DEC	+.4632386329 B-1	STAR 18	Y
0558		15,3624	33165 0				
0559		15,3625	03265 0	2DEC	+.2096974909 B-1	STAR 18	Z
0559		15,3626	32741 1				
0560		15,3627	63467 1	2DEC	-.7745052221 B-1	STAR 17	X
0560		15,3630	50064 0				
0561		15,3631	11655 1	2DEC	+.6149043688 B-1	STAR 17	Y
0561		15,3632	11373 0				
0562		15,3633	75477 1	2DEC	-.1484394758 B-1	STAR 17	Z
0562		15,3634	77366 1				
0563		15,3635	70425 0	2DEC	-.4661511162 B-1	STAR 16	X
0563		15,3636	51217 1				
0564		15,3637	07505 0	2DEC	+.4772744503 B-1	STAR 16	Y
0564		15,3640	32504 1				
0565		15,3641	13726 0	2DEC	+.7449243154 B-1	STAR 16	Z
0565		15,3642	15341 0				
0566		15,3643	72157 1	2DEC	-.3613649782 B-1	STAR 15	X
0566		15,3644	66255 0				
0567		15,3645	11142 0	2DEC	+.5745656444 B-1	STAR 15	Y
0567		15,3646	32737 0				
0568		15,3647	64200 1	2DEC	-.7343634472 B-1	STAR 15	Z
0568		15,3650	43016 1				
0569		15,3651	71316 0	2DEC	-.4122762536 B-1	STAR 14	X
0569		15,3652	64201 0				
0570		15,3653	16400 1	2DEC	+.9063680102 B-1	STAR 14	Y
0570		15,3654	36737 1				
0571		15,3655	01364 1	2DEC	+.0923326629 B-1	STAR 14	Z
0571		15,3656	14350 1				
0572		15,3657	75051 1	2DEC	-.1824340636 B-1	STAR 13	X
0572		15,3660	60001 0				

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0573	15,3661	17027 1	2DEC	+.9404062129 B-1	STAR 13	Y	
0573	15,3662	31661 1					
0574	15,3663	73321 0	2DEC	-.2869738089 B-1	STAR 13	Z	
0574	15,3664	43422 1					
0575	15,3665	77007 0	2DEC	-.0616090080 B-1	STAR 12	X	
0575	15,3666	51442 1					
0576	15,3667	11514 1	2DEC	+.6031289258 B-1	STAR 12	Y	
0576	15,3670	32502 1					
0577	15,3671	63215 1	2DEC	-.7952608559 B-1	STAR 12	Z	
0577	15,3672	47106 0					
0578	15,3673	02140 0	2DEC	+.1367280274 B-1	STAR 11	X	
0578	15,3674	02335 0					
0579	15,3675	12716 1	2DEC	+.6814364033 B-1	STAR 11	Y	
0579	15,3676	12356 1					
0580	15,3677	13401 0	2DEC	+.7189922632 B-1	STAR 11	Z	
0580	15,3700	37404 0					
0581	15,3701	03154 1	2DEC	+.2007345455 B-1	STAR 10	X	
0581	15,3702	15267 0					
0582	15,3703	17403 0	2DEC	+.9691236271 B-1	STAR 10	Y	
0582	15,3704	01743 0					
0583	15,3705	75552 1	2DEC	-.1431958012 B-1	STAR 10	Z	
0583	15,3706	76050 0					
0584	15,3707	05465 0	2DEC	+.3502769546 B-1	STAR 9	X	
0584	15,3710	17001 0					
0585	15,3711	16221 1	2DEC	+.8927907521 B-1	STAR 9	Y	
0585	15,3712	27572 1					
0586	15,3713	04420 0	2DEC	+.2832502918 B-1	STAR 9	Z	
0586	15,3714	14273 1					
0587	15,3715	06440 1	2DEC	+.4101921571 B-1	STAR 8	X	
0587	15,3716	11323 0					
0588	15,3717	07767 0	2DEC	+.4989947555 B-1	STAR 8	Y	
0588	15,3720	30366 1					
0589	15,3721	14155 0	2DEC	+.7633784305 B-1	STAR 8	Z	
0589	15,3722	23047 0					
0590	15,3723	13176 0	2DEC	+.7028937840 B-1	STAR 7	X	
0590	15,3724	03307 0					
0591	15,3725	13247 1	2DEC	+.7078988678 B-1	STAR 7	Y	
0591	15,3726	03342 1					
0592	15,3727	01070 1	2DEC	+.0694227718 B-1	STAR 7	Z	
0592	15,3730	26607 1					
0593	15,3731	10557 1	2DEC	+.5448995598 B-1	STAR 6	X	
0593	15,3732	32115 0					
0594	15,3733	10404 0	2DEC	+.5317389073 B-1	STAR 6	Y	
0594	15,3734	00124 0					
0595	15,3735	65500 1	2DEC	-.6483349473 B-1	STAR 6	Z	
0595	15,3736	72703 0					
0596	15,3737	00151 1	2DEC	+.0128995818 B-1	STAR 5	X	
0596	15,3740	25431 0					
0597	15,3741	00077 1	2DEC	+.0078096205 B-1	STAR 5	Y	
0597	15,3742	37176 0					

L STAR TABLES USER'S PAGE NO. 5 E0 S3

```
0598                15,3743  17777 0                2DEC   +.9998862988 B-1   STAR  5   Z
0598                15,3744  02143 0
0599                15,3745  07675 1                2DEC   +.4918322686 B-1   STAR  4   X
0599                15,3746  02702 0
0600                15,3747  03420 1                2DEC   +.2207092653 B-1   STAR  4   Y
0600                15,3750  01470 0
0601                15,3751  62414 1                2DEC   -.8422520048 B-1   STAR  4   Z
0601                15,3752  50541 1
0602                15,3753  07506 0                2DEC   +.4773424940 B-1   STAR  3   X
0602                15,3754  14361 0
0603                15,3755  01674 0                2DEC   +.1168141178 B-1   STAR  3   Y
0603                15,3756  36075 0
0604                15,3757  15736 1                2DEC   +.8709182540 B-1   STAR  3   Z
0604                15,3760  21775 1
0605                15,3761  16745 0                2DEC   +.9342466124 B-1   STAR  2   X
0605                15,3762  13112 1
0606                15,3763  02620 1                2DEC   +.1739271769 B-1   STAR  2   Y
0606                15,3764  31757 0
0607                15,3765  73011 0                2DEC   -.3113400137 B-1   STAR  2   Z
0607                15,3766  60052 0
0608                15,3767  15776 0                2DEC   +.8747608555 B-1   STAR  1   X
0608                15,3770  01237 0
0609                15,3771  00330 1                2DEC   +.0264803244 B-1   STAR  1   Y
0609                15,3772  35521 1
0610                15,3773  07573 1                2DEC   +.4838307948 B-1   STAR  1   Z
0610                15,3774  21256 0
0611                15,3775  16004 1  CATLOG  DEC   7172
```

L AGC BLOCK TWO SELF-CHECK USER'S PAGE NO. 1 E0 S3

R0001 PROGRAM DESCRIPTION DATE 20 DECEMBER 1967
R0003 PROGRAM NAME - SELF-CHECK LOG SECTION AGC BLOCK TWO SELF-CHECK
R0005 MOD NO - 1 ASSEMBLY SUBROUTINE UTILITYM REV 25
R0007 MOD BY - GAUNTT

R0008 FUNCTIONAL DESCRIPTION

R0009 PROGRAM HAS TWO MAIN PARTS. THE FIRST IS SELF-CHECK WHICH RUNS AS A ZERO PRIORITY JOB WITH NO CORE SET, AS
R0011 PART OF THE BACK-UP IDLE LOOP. THE SECOND IS SHOW-BANKSUM WHICH RUNS AS A REGULAR EXECUTIVE JOB WITH ITS OWN
R0013 STARTING VERB.
R0014 THE PURPOSE OF SELF-CHECK IS TO CHECK OUT VARIOUS PARTS OF THE COMPUTER AS OUTLINED BELOW IN THE OPTIONS.
R0016 THE PURPOSE OF SHOW-BANKSUM IS TO DISPLAY THE SUM OF EACH BANK , ONE AT A TIME.
R0020 IN ALL THERE ARE 7 POSSIBLE OPTIONS IN THIS BLOCK II VERSION OF SELF-CHECK. MORE DETAIL DESCRIPTION MAY BE
R0022 FOUND IN E-2065 BLOCK II AGC SELF-CHECK AND SHOW BANKSUM BY EDWIN D. SMALLY DECEMBER 1966, AND ADDENDA 2 AND 3.
R0024 THE DIFFERENT OPTIONS ARE CONTROLLED BY PUTTING DIFFERENT NUMBERS IN THE SMODE REGISTER (NOUN 27). BELOW IS
R0026 A DESCRIPTION OF WHAT PARTS OF THE COMPUTER THAT ARE CHECKED BY THE OPTIONS, AND THE CORRESPONDING NUMBER, IN
R0028 OCTAL, TO LOAD INTO SMODE.
R0032 +-4 ERASABLE MEMORY
R0033 +-5 FIXED MEMORY
R0034 +-1,2,3,6,7,10 EVERYTHING IN OPTIONS 4 AND 5.
R0036 -0 SAME AS +-10 UNTIL AN ERROR IS DETECTED.
R0037 +0 NO CHECK, PUTS COMPUTER INTO THE BACKUP IDLE LOOP.

R0038 WARNINGS

R0039 USE OF E MEMORY RESERVED FOR SELF-CHECK (EVEN IN IDLE LOOP) AS TEMP STORAGE BY OTHER PROGRAMS IS DANGEROUS.
R0041 SMODE SET GREATER THAN OCT 10 PUTS COMPUTER INTO BACKUP IDLE LOOP.

R0042 CALLING SEQUENCE

R0043 TO CALL SELF-CHECK KEY IN
R0044 V 21 N 27 E OPTION NUMBER E
R0047 TO CALL SHOW-BANKSUM KEY IN
R0048 V 91 E DISPLAYS FIRST BANK
R0049 V 33 E PROCEED, DISPLAYS NEXT BANK

R0050 EXIT MODES, NORMAL AND ALARM

R0051 SELF-CHECK NORMALLY CONTINUES INDEFINITELY UNLESS THERE IS AN ERROR DETECTED. IF SO + OPTION NUMBERS PUT
R0053 COMPUTER INTO BACKUP IDLE LOOP, - OPTION NUMBERS RESTART THE OPTION.
R0054 THE -0 OPTION PROCEEDS FROM THE LINE FOLLOWING THE LINE WHERE THE ERROR WAS DETECTED.
R0057 SHOW-BANKSUM PROCEEDS UNTIL A TERMINATE IS KEYED IN (V 34 E). THE COMPUTER IS PUT INTO THE BACKUP IDLE LOOP
R0059

R0060 OUTPUT

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R0061 SELF-CHECK UPON DETECTING AN ERROR LOADS THE SELF-CHECK ALARM CONSTANT (01102) INTO THE FAILREG SET AND
R0063 TURNS ON THE ALARM LIGHT. THE OPERATOR MAY THEN DISPLAY THE THREE FAILREGS BY KEYING IN V 05 N 09 E. FOR FURTHER
R0065 INFORMATION HE MAY KEY IN V 05 N 08 E, THE DSKY DISPLAY IN R1 WILL BE ADDRESS+1 OF WHERE THE ERROR WAS DETECTED,
R0067 IN R2 THE BBCON OF SELF-CHECK, AND IN R3 THE TOTAL NUMBER OF ERRORS DETECTED BY SELF-CHECK SINCE THE LAST MAN
R0069 INITIATED FRESH START (SLAP1).
R0073 SHOW-BANKSUM STARTING WITH BANK 0 DISPLAYS IN R1 THE BANK SUM (A +-NUMBER EQUAL TO THE BANK NUMBER), IN R2
R0075 THE BANK NUMBER, AND IN R3 THE BUGGER WORD.

R0076 ERASABLE INITIALIZATION REQUIRED

R0077 ACCOMPLISHED BY FRESH START
R0078 SMODE SET TO +0

R0079 DEBRIS

R0080 ALL EXITS FROM THE CHECK OF ERASABLE (ERASCHK) RESTORE ORIGINAL CONTENTS TO REGISTERS UNDER CHECK.
R0082 EXCEPTION IS A RESTART. RESTART THAT OCCURS DURING ERASCHK RESTORES ERASABLE, UNLESS THERE IS EVIDENCE TO DOUBT
R0084 E MEMORY, IN WHICH CASE PROGRAM THEN DOES A FRESH START (DOFSTART).

```
0086  REF   1              43,2000                SETLOC SELFCHEC
0087                       43,3166                BANK
0088  REF   1                                     COUNT* $$/SELF
0089  REF  62  LAST 1204   4770          SBIT1    EQUALS BIT1
0090  REF  38  LAST 1204   4767          SBIT2    EQUALS BIT2
0091  REF  42  LAST 1204   4766          SBIT3    EQUALS BIT3
0092  REF  36  LAST 1204   4765          SBIT4    EQUALS BIT4
0093  REF  31  LAST 1120   4764          SBIT5    EQUALS BIT5
0094  REF  33  LAST 1161   4763          SBIT6    EQUALS BIT6
0095  REF  38  LAST 1201   4762          SBIT7    EQUALS BIT7
0096  REF  31  LAST 1226   4761          SBIT8    EQUALS BIT8
0097  REF  25  LAST 1038   4760          SBIT9    EQUALS BIT9
0098  REF  28  LAST 1204   4757          SBIT10   EQUALS BIT1
0099  REF  31  LAST 1210   4756          SBIT11   EQUALS BIT11
0100  REF  27  LAST 1204   4755          SBIT12   EQUALS BIT12
0101  REF  40  LAST 1204   4754          SBIT13   EQUALS BIT13
0102  REF  63  LAST 1366   4753          SBIT14   EQUALS BIT14
0103  REF  45  LAST 1204   4752          SBIT15   EQUALS BIT15

0104  REF 248  LAST 1331   4772          S+ZERO   EQUALS ZERO
0105  REF  63  LAST 1393   4770          S+1      EQUALS BIT1
0106  REF  39  LAST 1393   4767          S+2      EQUALS BIT2
0107  REF  47  LAST 1368   6214          S+3      EQUALS THREE
0108  REF  20  LAST 1366   4766          S+4      EQUALS FOUR
0109  REF  27  LAST 1140   4773          S+5      EQUALS FIVE
0110  REF  34  LAST 1369   6211          S+6      EQUALS SIX
0111  REF  17  LAST 1204   4774          S+7      EQUALS SEVEN
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```
0112   REF  13  LAST 1194      4350                 S8BITS   EQUALS LOW8      00377
0113   REF   9  LAST 1092      5004                 CNTRCON  =      OCT50     USED IN CNTRCHK
0114                        43,3166   00061 0       ERASCON1 OCTAL  00061     USED IN ERASCHK
0115                        43,3167   01373 1       ERASCON2 OCTAL  01373     USED IN ERASCHK
0116   REF   9  LAST 1204      5024                 ERASCON6 =      OCT1400   USED IN ERASCHK
0117   REF   4  LAST  632      5030                 ERASCON3 EQUALS V06N49    USED IN ERASCHK
0118                        43,3170   01773 0       ERASCON4 OCTAL  01773     USED IN ERASCHK
0119   REF  17  LAST 1130      5041                 S10BITS  EQUALS LOW10     01777, USED IN ERASCHK
0120   REF   4  LAST  962      5050                 SBNK03   EQUALS PRIO6     06000, USED IN ROPECHK
0121   REF   6  LAST 1204      4344                 -MAXADRS =      H15       FOR ROPECHK
0122   REF   2  LAST  536      5010                 SIXTY    EQUALS SUPER011
0123                        43,3171   60017 1       SUPRCON  OCTAL  60017     USED IN ROPECHK
0124                        43,3172   17777 0       S13BITS  OCTAL  17777
0125                        43,3173   25252 0       CONC+S1  OCTAL  25252     USED IN CYCLSHFT
0126                        43,3174   52400 1       CONC+S2  OCTAL  52400     USED IN CYCLSHFT
0127                        43,3175   76777 1       ERASCON5 OCTAL  76777
0128   REF   2  LAST  224      5736                 S-7      =      OCT77770
0129   REF   3  LAST 1114      6061                 S-4      EQUALS NEG4
0130   REF   4  LAST  578      7700                 S-3      EQUALS NEG3
0131   REF  10  LAST 1208      7701                 S-2      EQUALS NEG2
0132   REF  26  LAST 1204      7702                 S-1      EQUALS NEGONE
0133   REF  17  LAST 1102      4771                 S-ZERO   EQUALS NEG0

0134   REF  44  LAST 1235   E3,1400                          EBANK= LST1
0135   REF   3  LAST  273   43,3176   01371 0       ADRS1    ADRES  SKEEP1
0136   REF   4  LAST 1218   43,3177   03270 1       SELFADRS ADRES  SELFCHK    SELFCHK RETURN ADDRESS. SHOULD BE PUT
A0137                                                                          IN SELFRET WHEN GOING FROM SELFCHK TO
A0138                                                                          SHOWSUM AND PUT IN SKEEP1 WHEN GOING
A0139                                                                          FROM SHOWSUM TO SELF-CHECK.

0140   REF   6  LAST  198   43,3200   3 1360 0      PRERRORS CA     ERESTORE   IS IT NECESSARY TO RESTORE ERASABLE
0141                        43,3201   0 0006 1               EXTEND
0142   REF   1             43,3202   1 3211 1               BZF    ERRORS     NO
0143                        43,3203   0 0006 1               EXTEND
0144   REF   3  LAST  198   43,3204   3 1376 1               DCA    SKEEP5
0145   REF   3  LAST  198   43,3205   51'377 0               INDEX  SKEEP7
0146                        43,3206   52 001 1               DXCH   0000       RESTORE THE TWO ERASABLE REGISTERS
0147   REF   2  LAST  273   43,3207   3 4772 1               CA     S+ZERO
0148   REF   7  LAST 1394   43,3210   55'360 1               TS     ERESTORE
0149                        43,3211   0 0004 0      ERRORS   INHINT
0150   REF 276  LAST 1317   43,3212   3 0002 0               CA     Q
0151   REF   3  LAST  393   43,3213   55'357 0               TS     SFAIL      SAVE Q FOR FAILURE LOCATION
0152   REF   4  LAST  788   43,3214   55'363 1               TS     ALMCADR    FOR DISPLAY WITH BBANK AND ERCOUNT
0153   REF   3  LAST  194   43,3215   25'365 0               INCR   ERCOUNT    KEEP TRACK OF NUMBER OF MALFUNCTIONS.
0154   REF   2  LAST  788   43,3216   0 5673 0      TCALARM2 TC     ALARM2
0155                        43,3217    01102 0              OCT    01102      SELF-CHECK MALFUNCTION INDICATOR
0156   REF   5  LAST  283   43,3220   11'362 0               CCS    SMODE
0157   REF   3  LAST 1394   43,3221   3 4772 1      SIDLOOP  CA     S+ZERO
0158   REF   6  LAST 1394   43,3222   55'362 0               TS     SMODE
0159   REF   5  LAST 1394   43,3223   0 3270 1               TC     SELFCHK    GO TO IDLE LOOP
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0160   REF   4  LAST 1394   43,3224  0 1357 1            TC      SFAIL          CONTINUE WITH SELF-CHECK

0161   REF 338  LAST 1369   43,3225  10 000 0  -1CHK     CCS     A
0162   REF   1               43,3226  1 3200 1            TCF     PRERRORS
0163   REF   2  LAST 1395   43,3227  1 3200 1            TCF     PRERRORS
0164   REF 339  LAST 1395   43,3230  10 000 0            CCS     A
0165   REF   3  LAST 1395   43,3231  1 3200 1            TCF     PRERRORS
0166   REF 277  LAST 1394   43,3232  0 0002 0            TC      Q

0167                        43,3233  0 0006 1  SMODECHK  EXTEND
0168   REF   4  LAST 1394   43,3234  23'371 0            QXCH    SKEEP1
0169   REF   1               43,3235  0 3264 1            TC      CHECKNJ        CHECK FOR NEW JOB
0170   REF   7  LAST 1394   43,3236  11'362 0            CCS     SMODE
0171   REF   1               43,3237  0 3244 0            TC      SOPTIONS
0172   REF   1               43,3240  0 3235 0            TC      SMODECHK +2    TO BACKUP IDLE LOOP
0173   REF   2  LAST 1395   43,3241  0 3244 0            TC      SOPTIONS
0174   REF   2  LAST   87   43,3242  25'366 0            INCR    SCOUNT
0175   REF   5  LAST 1395   43,3243  0 1371 0            TC      SKEEP1         CONTINUE WITH SELF-CHECK

0176   REF   1               43,3244  6 5736 0  SOPTIONS AD      S-7
0177                        43,3245  0 0006 1            EXTEND
0178                        43,3246  6 3250 0            BZMF    +2             FOR OPTIONS BELOW NINE.
0179   REF   1               43,3247  0 3221 0  BNKOPTN   TC      SIDLOOP        ILLEGAL OPTION.  GO TO IDLE LOOP.
0180   REF   3  LAST 1395   43,3250  25'366 0            INCR    SCOUNT         FOR OPTIONS BELOW NINE.
0181   REF   1               43,3251  6 4774 1            AD      S+7

0182   REF 340  LAST 1395   43,3252  50 000 1            INDEX   A
0183   REF   1               43,3253  0 3254 1            TC      SOPTION1
0184   REF   6  LAST 1395   43,3254  0 1371 0  SOPTION1  TC      SKEEP1         WAS TC+TCF
0185   REF   7  LAST 1395   43,3255  0 1371 0  SOPTION2  TC      SKEEP1         WAS IN:OUT1
0186   REF   8  LAST 1395   43,3256  0 1371 0  SOPTION3  TC      SKEEP1         WAS COUNTCHK
0187   REF   1               43,3257  0 3271 0  SOPTION4  TC      ERASCHK
0188   REF   1               43,3260  0 3452 1  SOPTION5  TC      ROPECHK
0189   REF   9  LAST 1395   43,3261  0 1371 0  SOPTION6  TC      SKEEP1
0190   REF  10  LAST 1395   43,3262  0 1371 0  SOPTION7  TC      SKEEP1
0191   REF  11  LAST 1395   43,3263  0 1371 0  SOPTON10  TC      SKEEP1         CONTINUE WITH SELF-CHECK

0192                        43,3264  0 0006 1  CHECKNJ   EXTEND
0193   REF   7  LAST 1220   43,3265  23'361 1            QXCH    SELFRET        SAVE RETURN ADDRESS WHILE TESTING NEWJOB
0194   REF  56  LAST 1259   43,3266  0 4655 0            TC      POSTJUMP       TO SEE IF ANY JOBS HAVE BECOME ACTIVE.
0195   REF   2  LAST 1215   43,3267   03177 0            CADR    ADVAN

0196   REF   2  LAST 1395   43,3270  0 3233 0  SELFCHK   TC      SMODECHK       ** CHARLEY, COME IN HERE

R0197  SKEEP7 HOLDS LOWEST OF TWO ADDRESSES BEING CHECKED.
R0198  SKEEP6 HOLDS B(X+1).
R0199  SKEEP5 HOLDS B(X).
R0200  SKEEP4 HOLDS C(EBANK) DURING ERASLOOP AND CHECKNJ.
R0201  SKEEP3 HOLDS LAST ADDRESS BEING CHECKED (HIGHEST ADDRESS).
R0202  SKEEP2 CONTROLS CHECKING OF NON-SWITCHABLE ERASABLE MEMORY WITH BANK NUMBERS IN EB.
```

L AGC BLOCK TWO SELF-CHECK USER'S PAGE NO. 5 E3 S4

```
R0204   ERASCHK TAKES APPROXMATELY 7 SECONDS
 0205   REF   2  LAST  273   43,3271  3 4770 0  ERASCHK   CA     S+1
 0206   REF   3  LAST  273   43,3272  55'372 1           TS     SKEEP2
 0207   REF   4  LAST 1394   43,3273  3 4772 1  0EBANK   CA     S+ZERO
 0208   REF  35  LAST 1194   43,3274  54 003 0           TS     EBANK
 0209   REF   1              43,3275  3 5030 1           CA     ERASCON3    01461
 0210   REF   4  LAST 1394   43,3276  55'377 1           TS     SKEEP7      STARTING ADDRESS
 0211   REF   1              43,3277  3 5041 1           CA     S10BITS     01777
 0212   REF   3  LAST  273   43,3300  55'373 0           TS     SKEEP3      LAST ADDRESS CHECKED
 0213   REF   1              43,3301  0 3321 1           TC     ERASLOOP

 0214   REF   1              43,3302  3 5024 1  E134567B CA     ERASCON6    01400
 0215   REF   5  LAST 1396   43,3303  55'377 1           TS     SKEEP7      STARTING ADDRESS
 0216   REF   2  LAST 1396   43,3304  3 5041 1           CA     S10BITS     01777
 0217   REF   4  LAST 1396   43,3305  55'373 0           TS     SKEEP3      LAST ADDRESS CHECKED
 0218   REF   2  LAST 1396   43,3306  0 3321 1           TC     ERASLOOP

 0219   REF   2  LAST 1396   43,3307  3 5024 1  2EBANK   CA     ERASCON6    01400
 0220   REF   6  LAST 1396   43,3310  55'377 1           TS     SKEEP7      STARTING ADDRESS
 0221   REF   1              43,3311  3 3170 1           CA     ERASCON4    01773
 0222   REF   5  LAST 1396   43,3312  55'373 0           TS     SKEEP3      LAST ADDRESS CHECKED
 0223   REF   3  LAST 1396   43,3313  0 3321 1           TC     ERASLOOP

 0224   REF   4  LAST 1396   43,3314  55'372 1  NOEBANK  TS     SKEEP2      +0
 0225   REF   1              43,3315  3 3166 0           CA     ERASCON1    00061
 0226   REF   7  LAST 1396   43,3316  55'377 1           TS     SKEEP7      STARTING ADDRESS
 0227   REF   1              43,3317  3 3167 1           CA     ERASCON2    01373
 0228   REF   6  LAST 1396   43,3320  55'373 0           TS     SKEEP3      LAST ADDRESS CHECKED

 0229                        43,3321  0 0004 0  ERASLOOP INHINT
 0230   REF  36  LAST 1396   43,3322  3 0003 1           CA     EBANK       STORES C(EBANK)
 0231   REF   3  LAST  198   43,3323  55'374 1           TS     SKEEP4
 0232                        43,3324  0 0006 1           EXTEND
 0233   REF   8  LAST 1396   43,3325  5 1377 0           NDX    SKEEP7
 0234                        43,3326  3 0001 0           DCA    0000
 0235   REF   4  LAST 1394   43,3327  53'376 0           DXCH   SKEEP5      STORES C(X) AND C(X+1) IN SKEEP6 AND 5.
 0236   REF   9  LAST 1396   43,3330  3 1377 0           CA     SKEEP7
 0237   REF   8  LAST 1394   43,3331  55'360 1           TS     ERESTORE    IF RESTART, RESTORE C(X) AND C(X+1)
 0238   REF 177  LAST 1231   43,3332  54 001 1           TS     L
 0239   REF 178  LAST 1396   43,3333  24 001 0           INCR   L
 0240   REF 341  LAST 1395   43,3334  50 000 1           NDX    A
 0241                        43,3335  52 001 1           DXCH   0000        PUTS OWN ADDRESS IN X AND X +1
 0242   REF  10  LAST 1396   43,3336  51'377 0           NDX    SKEEP7
 0243                        43,3337  4 0001 1           CS     0001        CS  X+1
 0244   REF  11  LAST 1396   43,3340  51'377 0           NDX    SKEEP7
 0245                        43,3341  6 0000 1           AD     0000        AD X
 0246   REF   1              43,3342  0 3225 1           TC     -1CHK
 0247   REF   9  LAST 1396   43,3343  3 1360 0           CA     ERESTORE    HAS ERASABLE BEEN RESTORED
 0248                        43,3344  0 0006 1           EXTEND
 0249   REF   1              43,3345  1 3371 0           BZF    ELOOPFIN    YES, EXIT ERASLOOP.
```

```
0250                        43,3346  0 0006 1           EXTEND
0251   REF  12  LAST 1396   43,3347  5 1377 0           NDX     SKEEP7
0252                        43,3350  4 0001 1           DCS     0000          COMPLEMENT OF ADDRESS OF X AND X+1
0253   REF  13  LAST 1397   43,3351  51'377 0           NDX     SKEEP7
0254                        43,3352  52 001 1           DXCH    0000          PUT COMPLEMENT OF ADDRESS OF X AND X+1
0255   REF  14  LAST 1397   43,3353  51'377 0           NDX     SKEEP7
0256                        43,3354  4 0000 0           CS      0000          CS  X
0257   REF  15  LAST 1397   43,3355  51'377 0           NDX     SKEEP7
0258                        43,3356  6 0001 0           AD      0001          AD X+1
0259   REF   2  LAST 1396   43,3357  0 3225 1           TC      -1CHK
0260   REF  10  LAST 1396   43,3360  3 1360 0           CA      ERESTORE      HAS ERASABLE BEEN RESTORED
0261                        43,3361  0 0006 1           EXTEND
0262   REF   2  LAST 1396   43,3362  1 3371 0           BZF     ELOOPFIN      YES, EXIT ERASLOOP.
0263                        43,3363  0 0006 1           EXTEND
0264   REF   5  LAST 1396   43,3364  3 1376 1           DCA     SKEEP5
0265   REF  16  LAST 1397   43,3365  51'377 0           NDX     SKEEP7
0266                        43,3366  52 001 1           DXCH    0000          PUT B(X) AND B(X+1) BACK INTO X AND X+1
0267   REF   5  LAST 1396   43,3367  3 4772 1           CA      S+ZERO
0268   REF  11  LAST 1397   43,3370  55'360 1           TS      ERESTORE      IF RESTART, DO NOT RESTORE C(X), C(X+1)
0269                        43,3371  0 0003 1  ELOOPFIN RELINT
0270   REF   2  LAST 1395   43,3372  0 3264 1           TC      CHECKNJ       CHECK FOR NEW JOB
0271   REF   4  LAST 1396   43,3373  3 1374 0           CA      SKEEP4        REPLACES B(EBANK)
0272   REF  37  LAST 1396   43,3374  54 003 0           TS      EBANK
0273   REF  17  LAST 1397   43,3375  25'377 0           INCR    SKEEP7
0274   REF  18  LAST 1397   43,3376  4 1377 1           CS      SKEEP7
0275   REF   7  LAST 1396   43,3377  6 1373 1           AD      SKEEP3
0276                        43,3400  0 0006 1           EXTEND
0277                        43,3401  1 3403 1           BZF     +2
0278   REF   4  LAST 1396   43,3402  0 3321 1           TC      ERASLOOP      GO TO NEXT ADDRESS IN SAME BANK
0279   REF   5  LAST 1396   43,3403  11'372 1           CCS     SKEEP2
0280   REF   1              43,3404  0 3314 1           TC      NOEBANK
0281   REF   6  LAST 1397   43,3405  25'372 0           INCR    SKEEP2        PUT +1 IN SKEEP2.
0282   REF  38  LAST 1397   43,3406  3 0003 1           CA      EBANK
0283   REF   1              43,3407  6 4760 1           AD      SBIT9
0284   REF  39  LAST 1397   43,3410  54 003 0           TS      EBANK
0285   REF   1              43,3411  6 3175 1           AD      ERASCON5      76777, CHECK FOR BANK E2
0286                        43,3412  0 0006 1           EXTEND
0287   REF   1              43,3413  1 3307 1           BZF     2EBANK
0288   REF  40  LAST 1397   43,3414  10 003 0           CCS     EBANK
0289   REF   1              43,3415  0 3302 0           TC      E1345676      GO TO EBANKS 1,3,4,5,6, AND 7
0290   REF   3  LAST 1396   43,3416  3 5024 1           CA      ERASCON6      END OF ERASCHK
R0292  CNTRCHK PERFORMS A CS OF ALL REGISTERS FROM OCT. 60 THROUGH OCT. 10.
R0293  INCLUDED ARE ALL COUNTERS, T6-1, CYCLE AND SHIFT, AND ALL RUPT REGISTERS
0294   REF   1              43,3420  3 5004 0  CNTRCHK  CA      CNTRCON       00050
0295   REF   7  LAST 1397   43,3421  55'372 1  CNTRLOOP TS     SKEEP2
0296   REF   1              43,3422  6 4765 1           AD      SBIT4         +10 OCTAL
0297   REF 342  LAST 1396   43,3423  50 000 1           INDEX   A
0298                        43,3424  4 0000 0           CS      0000
0299   REF   8  LAST 1397   43,3425  11'372 1           CCS     SKEEP2
```

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```
 0300   REF   1                 43,3426  0 3421 0            TC     CNTRLOOP

R0301   CYCLSHFT CHECKS THE CYCLE AND SHIFT REGISTERS
 0302   REF   1                 43,3427  3 3173 1  CYCLSHFT CA     CONC+S1          25252
 0303   REF  36  LAST 1196      43,3430  54 020 1            TS     CYR              C(CYR) = 12525
 0304   REF  25  LAST 1186      43,3431  54 022 0            TS     CYL              C(CYL) = 52524
 0305   REF  26  LAST 1186      43,3432  54 021 0            TS     SR               C(SR) = 12525
 0306   REF  11  LAST 1109      43,3433  54 023 1            TS     EDOP             C(EDOP) = 00125
 0307   REF  37  LAST 1398      43,3434  6 0020 0            AD     CYR              37777          C(CYR) = 45252
 0308   REF  26  LAST 1398      43,3435  6 0022 1            AD     CYL              00-12524       C(CYL) = 25251
 0309   REF  27  LAST 1398      43,3436  6 0021 1            AD     SR               00-25251       C(SR) = 05252
 0310   REF  12  LAST 1398      43,3437  6 0023 0            AD     EDOP             00-25376       C(EDOP) = +
 0311   REF   1                 43,3440  6 3174 0            AD     CONC+S2          C(CONC+S2) = 52400
 0312   REF   3  LAST 1397      43,3441  0 3225 1            TC     -1CHK
 0313   REF  38  LAST 1398      43,3442  6 0020 0            AD     CYR              45252
 0314   REF  27  LAST 1398      43,3443  6 0022 1            AD     CYL              72523
 0315   REF  28  LAST 1398      43,3444  6 0021 1            AD     SR               77775
 0316   REF  13  LAST 1398      43,3445  6 0023 0            AD     EDOP             77775
 0317   REF   3  LAST 1396      43,3446  6 4770 0            AD     S+1              77776
 0318   REF   4  LAST 1398      43,3447  0 3225 1            TC     -1CHK

 0319   REF   4  LAST 1395      43,3450  25'367 1            INCR   SCOUNT +1
 0320   REF   3  LAST 1395      43,3451  0 3233 0            TC     SMODECHK
R0321   SKEEP1 HOLDS SUM
R0322   SKEEP2 HOLDS PRESENT CONTENTS OF ADDRESS IN ROPECHK AND SHOWSUM ROUTINES
R0323   SKEEP2 HOLDS BANK NUMBER IN LOW ORDER BITS DURING SHOWSUM DISPLAY
R0324   SKEEP3 HOLDS PRESENT ADDRESS (00000 TO 01777 IN COMMON FIXED BANKS)
R0325                                (04000 TO 07777 IN FXFX BANKS)
R0326   SKEEP3 HOLDS BUGGER WORD DURING SHOWSUM DISPLAY
R0327   SKEEP4 HOLDS BANK NUMBER AND SUPER BANK NUMBER
R0328   SKEEP5 COUNTS 2 SUCCESSIVE TC SELF WORDS
R0329   SKEEP6 CONTROLS ROPECHK OR SHOWSUM OPTION
R0330   SKEEP7 CONTROLS WHEN ROUNTINE IS IN COMMON FIXED OR FIXED FIXED BANKS

 0331   REF   1                 43,3452  3 4771 1  ROPECHK  CA     S-ZERO           *
03311   REF   4  LAST  273      43,3453  55'376 0            TS     SKEEP6           * -0 FOR ROPECHK.
03312   REF   6  LAST 1397      43,3454  3 4772 1  STSHOSUM CA     S+ZERO           * SHOULD BE ROPECHK

 0332   REF   5  LAST 1397      43,3455  55'374 1            TS     SKEEP4           BANK NUMBER
 0333   REF   4  LAST 1398      43,3456  3 4770 0            CA     S+1
 0334   REF  19  LAST 1397      43,3457  55'377 1  COMMFX   TS     SKEEP7
 0335   REF   7  LAST 1398      43,3460  3 4772 1            CA     S+ZERO
 0336   REF  12  LAST 1395      43,3461  55'371 1            TS     SKEEP1
 0337   REF   8  LAST 1397      43,3462  55'373 0            TS     SKEEP3
 0338   REF   5  LAST 1398      43,3463  3 4770 0            CA     S+1
 0339   REF   5  LAST 1397      43,3464  55'375 0            TS     SKEEP5           COUNTS DOWN 2 TC SELF WORDS
 0340   REF   6  LAST 1398      43,3465  3 1374 0  COMADRS  CA     SKEEP4
 0341   REF 179  LAST 1396      43,3466  54 001 1            TS     L                TO SET SUPER BANK
 0342   REF   7  LAST 1394      43,3467  7 4344 1            MASK   HI5
 0343   REF   9  LAST 1398      43,3470  6 1373 1            AD     SKEEP3
```

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```
0344   REF   2  LAST  367    43,3471  0 4671 0          TC      SUPDACAL        SUPER DATA CALL
0345   REF   1               43,3472  0 3515 0          TC      ADSUM
0346   REF   1               43,3473  6 4756 1          AD      SBIT11          0200
0347   REF   1               43,3474  0 3526 0          TC      ADRSCHK

0348   REF 343  LAST 1397    43,3475  4 0000 0  FXFX    CS      A
0349   REF  20  LAST 1398    43,3476  55'377 1          TS      SKEEP7
0350                         43,3477  0 0006 1          EXTEND
0351                         43,3500  1 3503 0          BZF     +3
0352   REF   1               43,3501  3 4755 1          CA      SBIT12          04000, STARTING ADDRESS OF BANK  2
0353                         43,3502  0 3504 0          TC      +2
0354   REF   1               43,3503  3 5050 1          CA      S8NK03          06000, STARTING ADDRESS OF BANK  3
0355   REF  10  LAST 1398    43,3504  55'373 0          TS      SKEEP3
0356   REF   8  LAST 1398    43,3505  3 4772 1          CA      S+ZERO
0357   REF  13  LAST 1398    43,3506  55'371 1          TS      SKEEP1
0358   REF   6  LAST 1398    43,3507  3 4770 0          CA      S+1
0359   REF   7  LAST 1398    43,3510  55'375 0          TS      SKEEP5          COUNTS DOWN 2 TC SELF WORDS
0360   REF  11  LAST 1399    43,3511  51'373 1  FXADRS  INDEX   SKEEP3
0361                         43,3512  3 0000 1          CA      0000
0362   REF   2  LAST 1399    43,3513  0 3515 0          TC      ADSUM
0363   REF   2  LAST 1399    43,3514  0 3526 0          TC      ADRSCHK

0364   REF   9  LAST 1397    43,3515  55'372 1  ADSUM   TS      SKEEP2
0365   REF  14  LAST 1399    43,3516  6 1371 0          AD      SKEEP1
0366   REF  15  LAST 1399    43,3517  55'371 1          TS      SKEEP1
0367   REF   9  LAST 1399    43,3520  3 4772 1          CAF     S+ZERO
0368   REF  16  LAST 1399    43,3521  6 1371 0          AD      SKEEP1
0369   REF  17  LAST 1399    43,3522  55'371 1          TS      SKEEP1
0370   REF  10  LAST 1399    43,3523  4 1372 1          CS      SKEEP2
0371   REF  12  LAST 1399    43,3524  6 1373 1          AD      SKEEP3
0372   REF 278  LAST 1395    43,3525  0 0002 0          TC      Q

0373   REF 344  LAST 1399    43,3526  22 000 1  ADRSCHK LXCH    A
0374   REF  13  LAST 1399    43,3527  3 1373 1          CA      SKEEP3
0375   REF  18  LAST 1394    43,3530  7 5041 0          MASK    LOW10           RELATIVE ADDRESS
0376   REF   1               43,3531  6 4344 0          AD      -MAXADRS        SUBTRACT MAX RELATIVE ADDRESS = 1777
0377                         43,3532  0 0006 1          EXTEND
0378   REF   1               43,3533  1 3622 0          BZF     SOPTION         CHECKSUM FINISHED IF LAST ADDRESS.
0379   REF   8  LAST 1399    43,3534  11'375 0          CCS     SKEEP5          IS CHECKSUM FINISHED
0380                         43,3535  0 3540 0          TC      +3              NO
0381                         43,3536  0 3540 0          TC      +2              NO
0382   REF   2  LAST 1399    43,3537  0 3622 1          TC      SOPTION         GO TO ROPECHK SHOWSUM OPTION
0383   REF 180  LAST 1398    43,3540  10 001 1          CCS     L               - 0 MEANS A TC SELF WORD.
0384   REF   1               43,3541  0 3550 1          TC      CONTINU
0385   REF   2  LAST 1399    43,3542  0 3550 1          TC      CONTINU
0386   REF   3  LAST 1399    43,3543  0 3550 1          TC      CONTINU
0387   REF   9  LAST 1399    43,3544  11'375 0          CCS     SKEEP5
0388   REF   4  LAST 1399    43,3545  0 3551 0          TC      CONTINU +1
0389   REF   1               43,3546  3 7702 0          CA      S-1
0390   REF   5  LAST 1399    43,3547  0 3551 0          TC      CONTINU +1      AD IN THE BUGGER WORD
```

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```
0391   REF   7  LAST 1399   43,3550  3 4770 0  CONTINU  CA    S+1       MAKE SURE TWO CONSECUTIVE TC SELF WORDS
0392   REF  10  LAST 1399   43,3551  55'375 0           TS    SKEEP5
03921  REF   5  LAST 1398   43,3552  11'376 0           CCS   SKEEP6    *
03922  REF  22  LAST 1220   43,3553  10 067 1           CCS   NEWJOB    * +1, SHOWSUM
03923  REF   4  LAST  882   43,3554  0 5152 1           TC    CHANG1    *
03924                       43,3555  0 3557 0           TC    +2        *
0393   REF   3  LAST 1397   43,3556  0 3264 1           TC    CHECKNJ   - IN SKEEP6 FOR ROPECHK

0394   REF  14  LAST 1399   43,3557  25'373 1  ADRS+1   INCR  SKEEP3
0395   REF  21  LAST 1399   43,3560  11'377 1           CCS   SKEEP7
0396   REF   1              43,3561  0 3465 0           TC    COMADRS
0397   REF   2  LAST 1400   43,3562  0 3465 0           TC    COMADRS
0398   REF   1              43,3563  0 3511 1           TC    FXADRS
0399   REF   2  LAST 1400   43,3564  0 3511 1           TC    FXADRS

0400   REF   7  LAST 1398   43,3565  4 1374 1  NXTBNK   CS    SKEEP4
0401   REF   1              43,3566  6 3655 1           AD    LSTBNKCH  LAST BANK TO BE CHECKED
0402                        43,3567  0 0006 1           EXTEND
0403   REF   1              43,3570  1 2764 1           BZF   ENDSUMS   END OF SUMMING OF BANKS.
0404   REF   8  LAST 1400   43,3571  3 1374 0           CA    SKEEP4
0405   REF   2  LAST 1399   43,3572  6 4756 1           AD    SBIT11
0406   REF   9  LAST 1400   43,3573  55'374 1           TS    SKEEP4    37 TO 40 INCRMTS SKEEP4 BY END RND CARRY
0407   REF   1              43,3574  0 3600 1           TC    CHKSUPR
0408   REF   1              43,3575  3 4752 0  17TO20   CA    SBIT15
0409   REF  10  LAST 1400   43,3576  27'374 1           ADS   SKEEP4    SET FOR BANK 20
0410   REF   1              43,3577  0 3614 1           TC    GONXTBNK
0411   REF   8  LAST 1398   43,3600  7 4344 1  CHKSUPR  MASK  HI5
0412                        43,3601  0 0006 1           EXTEND
0413   REF   1              43,3602  1 3612 0           BZF   NXTSUPR   INCREMENT SUPER BANK
0414   REF   1              43,3603  6 3172 0  27TO30   AD    S13BITS
0415                        43,3604  0 0006 1           EXTEND
0416                        43,3605  1 3607 1           BZF   +2        BANK SET FOR 30
0417   REF   2  LAST 1400   43,3606  0 3614 1           TC    GONXTBNK
0418   REF   1              43,3607  3 5010 0           CA    SIXTY     FIRST SUPER BANK
0419   REF  11  LAST 1400   43,3610  27'374 1           ADS   SKEEP4
0420   REF   3  LAST 1400   43,3611  0 3614 1           TC    GONXTBNK
0421   REF   1              43,3612  6 3171 0  NXTSUPR  AD    SUPRCON   SET BNK 30 + INCR SUPR BNK AND CANCEL
0422   REF  12  LAST 1400   43,3613  27'374 1           ADS   SKEEP4    ERC BIT OF THE 37 TO 40 ADVANCE.
0423   REF  22  LAST 1400   43,3614  11'377 1  GONXTBNK CCS   SKEEP7
0424   REF   1              43,3615  0 3457 1           TC    COMMFX
0425   REF   8  LAST 1400   43,3616  3 4770 0           CA    S+1
0426   REF   1              43,3617  0 3475 1           TC    FXFX
0427   REF   1              43,3620  3 4762 0           CA    SBIT7     HAS TO BE LARGER THAN NO OF FXSW BANKS.
0428   REF   2  LAST 1400   43,3621  0 3457 1           TC    COMMFX

0429   REF  13  LAST 1400   43,3622  3 1374 0  SOPTION  CA    SKEEP4
0430   REF   9  LAST 1400   43,3623  7 4344 1           MASK  HI5       = BANK BITS
0431   REF   5  LAST  364   43,3624  0 4333 0           TC    LEFT5
0432   REF 181  LAST 1399   43,3625  54 001 1           TS    L         BANK NUMBER BEFORE SUPER BANK
0433   REF  14  LAST 1400   43,3626  3 1374 0           CA    SKEEP4
```

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```
0434   REF   1                43,3627  7 4350 1          MASK    S8BITS          = SUPER BANK BITS
0435                          43,3630  0 0006 1          EXTEND
0436   REF   1                43,3631  1 3637 1          BZF     SOPT            BEFORE SUPER BANK
0437   REF  29  LAST 1398     43,3632 54 0021 0          TS      SR              SUPER BANK NECESSARY
0438   REF 182  LAST 1400     43,3633  3 0001 0          CA      L
0439   REF  18  LAST 1393     43,3634  7 4774 0          MASK    SEVEN
0440   REF  30  LAST 1401     43,3635  6 0021 1          AD      SR
0441   REF 183  LAST 1401     43,3636 54 0001 1          TS      L               BANK NUMBER WITH SUPER BANK
0442   REF   6  LAST 1400     43,3637  3 1376 1  SOPT    CA      SKEEP6          *
0443                          43,3640  0 0006 1          EXTEND                  *
0444                          43,3641  1 3643 1          BZF     +2              * ON -0 CONTINUE WITH ROPE CHECK.
0445   REF   1                43,3642  0 2746 0          TC      SDISPLAY        * ON +1 GO TO DISPLAY OF SUM.
0446   REF  18  LAST 1399     43,3643 11'371 1          CCS     SKEEP1          FORCE SUM TO ABSOLUTE VALUE.
04461                         43,3644  0 3646 0          TC      +2
04462                         43,3645  0 3647 1          TC      +2
04463  REF   9  LAST 1400     43,3646  6 4770 0          AD      S+1
04464  REF  19  LAST 1401     43,3647 55'371 1          TS      SKEEP1
0447   REF 184  LAST 1401     43,3650  4 0001 1  BNKCHK  CS      L               = - BANK NUMBER
0448   REF  20  LAST 1401     43,3651  6 1371 0          AD      SKEEP1
0449   REF   2  LAST 1399     43,3652  6 7702 0          AD      S-1
0450   REF   5  LAST 1398     43,3653  0 3225 1          TC      -1CHK           CHECK SUM
0451   REF   2  LAST  273     43,3654  0 3565 1          TC      NXTBNK

0454   REF  23  LAST 1400       0067                    EBANK=  NEWJOB
0455                          43,3655  66100 0  LSTBNKCH BBCON*                  * CONSTANT, LAST BANK.

0456   REF  13  LAST  941     30,2000                   SBANK=  LOWSUPER
```

L PHASE TABLE MAINTENANCE USER'S PAGE NO. 1 E S?

P0001 SUBROUTINE TO UPDATE THE PROGRAM NUMBER DISPLAY ON THE DSKY.

```
0004   REF    6  LAST 1207      4000                        SETLOC  FFTAG1
0005                            5344                        BANK

00055  REF    2 LAST  238 TO  241:     19     19*           COUNT*  $$/PHASE
0006   REF  279  LAST 1399      5344  50 002 0  NEWMODEX    INDEX   Q               UPDATE MODREG. ENTRY FOR MODE IN FIXED.
0007                            5345  3 0000 1              CAF     0
0008   REF  280  LAST 1402      5346  24 002 0              INCR    Q

0009   REF   16  LAST  781      5347  55'214 0  NEWMODEA    TS      MODREG          ENTRY FOR MODE IN A.
0014                            5350  3 5353 1  MMDSPLAY    CAF     +3              DISPLAY MAJOR MODE.
0015   REF   29  LAST 1317      5351  22 006 1  PREBJUMP    LXCH    BBANK           PUTS BBANK IN L
0016   REF    8  LAST 1329      5352  1 4660 1              TCF     BANKJUMP        PUTS Q INTO A
0017   REF    1                 5353   20463 1              CADR    SETUPDSP

R0018 RETURN TO CALLER +3 IF MODE = THAT AT CALLER +1. OTHERWISE RETURN TO CALLER +2.

0020   REF  281  LAST 1402      5354  50 002 0  CHECKMM     INDEX   Q
0021                            5355  4 0000 0              CS      0
0022   REF   17  LAST 1402      5356  6 1214 1              AD      MODREG
0023                            5357  0 0006 1              EXTEND
0024   REF    7  LAST 1219      5360  1 6710 0              BZF     Q+2
0025   REF    4  LAST  420      5361  1 6706 1              TCF     Q+1             NO MATCH

0028   REF    1                10,2000                     SETLOC  PHASETAB
0029                           10,2463                     BANK

0030   REF    1                                            COUNT*  $$/PHASE
0031                           10,2463  0 0004 0  SETUPDSP  INHINT
0032   REF   30  LAST 1098     10,2464  52 071 0            DXCH    RUPTREG1        SAVE CALLER-S RETURN 2CADR
0034   REF    4  LAST  740     10,2465  0 5120 1            TC      NOVAC3D         EITHER A TASK OR JOB CAN COMETO NEWMODEX
0035   REF   18  LAST 1402        1214                      EBANK=  MODREG
0036   REF    2  LAST  391     10,2466   03377 1            2CADR   DSPMMJOB
0036                           10,2467   60102 1
0037   REF   31  LAST 1402     10,2470  52 071 0            DXCH    RUPTREG1
0038                           10,2471  0 0003 1            RELINT
0039   REF   14  LAST  833     10,2472  52 006 0            DXCH    Z               RETURN

0040   REF    1                40,3377           DSPMMJOB  EQUALS  DSPMMJB

0042   REF    7  LAST 1402        4000                      SETLOC  FFTAG1
0043                              5362                      BANK
```

L PHASE TABLE MAINTENANCE USER'S PAGE NO. 2 EO S3

P0044 PHASCHNG IS THE MAIN WAY OF MAKING PHASE CHANGES FOR RESTARTS. THERE ARE THREE FORMS OF PHASCHNG, KNOWN AS TYPE
R0046 A, TYPE B, AND TYPE C. THEY ARE ALL CALLED AS FOLLOWS, WHERE OCT XXXXX CONTAINS THE PHASE INFORMATION,

```
A0048                                   TC      PHASCHNG
A0049                                   OCT     XXXXX
```

R0050 TYPE A IS CONCERNED WITH FIXED PHASE CHANGES, THAT IS, PHASE INFORMATIONTHAT IS STORED PERMANENTLY. THESE
R0052 OPTIONS ARE, WHERE G STANDS FOR A GROUP AND .X FOR THE PHASE,

```
R0053                   G.0             INACTIVE, WILLNOT PERMIT A GROUP G RESTART
R0055                   G.1             WILL CAUSE THE LAST DISPLAY TO BE REACTIVATED, USED MAINLY IN MANNED FLIGHTS
R0057                   G.EVEN          A DOUBLE TABLE RESTART, CAN CAUSE ANY COMBINATION OF TWO JOBS, TASKS, AND/OR
R0059                                   LONGCALL TO BE RESTARTED.
R0060                   G.ODD NOT .1    A SINGLE TABLE RESTART, CAN CAUSE EITHER A JOB, TASK, OR LONGCALL RESTART
```

R0062 THIS INFORMATION IS PUT INTO THE OCTAL WORD AFTER TC PHASCHNG AS FOLLOWS

```
R0063                   TLO OOP PPP PPP GGG                             ,
```

R0065 WHERE EACH LETTER OR NUMBER STANDS FOR A BIT. THE G:S STAND FOR THE GROUP, OCTAL 1 - 7, THE P:S FOR THE PHASE,
R0067 OCTAL 0 - 127. O:S MUST BE 0. IF ONE WISHES TO HAVE THE TBASE OF GROUP G TO BE SET AT THIS TIME,
R0069 T IS SET TO 1, OTHERWISE IT IS SET TO 0. SIMIARLY IF ONE WISHES TO SET LONGBASE, THEN L IS SET TO 1, OTHERWISE
R0071 IT IS SET TO 0. SOME EXAMPLES,

```
A0072                                   TC      PHASCHNG        THIS WILL CAUSE GROUP 3 TOBE SET TO 0,
A0073                                   OCT     00003           MAKING GROUP 3 INACTIVE

A0074                                   TC      PHASCHNG        IF A RESTART OCCURS THIS WOULD CAUSE
A0075                                   OCT     00012           GROUP 2 TO RESTART THE LAST DISPLAY

A0076                                   TC      PHASCHNG        THIS SETS THE TBASE OF GROUP 4 AND IN
A0077                                   OCT     40064           CASE OF A RESTART WOULD START UP THE TWO
A0078                                                           THINGS LOCATED IN THE DOUBLE 4.6 RESTART
A0079                                                           LOCATION
A0080                                   TC      PHASCHNG        THIS SETS LONGBASE AND UPON A RESTART
A0081                                   OCT     20135           CAUSES 5.13 TO BE RESTARTED (SINCE
A0082                                                           LONGBASE WAS SET THIS SINGLE ENTRY
A0083                                                           SHOULD BE A LONGCALL)
A0084                                   TC      PHASCHNG        SINCE BOTH TBASE4 AND LONGBASE ARE SET,
A0085                                   OCT     60124           4.12 SHOULD CONTAIN BOTH A TASK AND A
A0086                                                           LONGCALL TO BE RESTARTED
```

R0087 TYPE C PHASCHNG CONTAINS THE VARIABLE TYPE OF PHASCHNG INFORMATION. INSTEAD OF THE INFORMATION BEING IN A
R0089 PERMANENT FORM, ONE STORES THE DESIRED RESTART INFORMATION IN A VARIABKE LOCATION. THE BITS ARE AS FOLLOWS,

```
R0091                   TLO 1AD XXX CJW GGG
```

R0092 WHERE EACH LETTER OR NUMBER STANDS FOR A BIT. THE G:S STAND FOR THE GROUP, OCTAL 1 - 7. IF THE RESTART IS TO
R0094 BE BY WAITLIST, W IS SET TO 1, IF IT IS A JOB, J IS SET TO 1, IF IT IS A LONGCALL, C IS SET TO 1. ONLY ONE OF
R0096 THESE THREE BIT S MAY BE SET. X:S ARE IGNORED 1 MUST BE 1, AND 0 MUST BE 0. AGAIN T STANDS FOR THE TBASE,

```
RC098   AND L FOR LONGBASE.  THE BITS A AND D ARE CONCERNED WITH THE VARIABLE INFORMATION. IF D IS SET TO 1, A PRIORITY
RC100   OR DELTA TIME WILL BE READ FROM THE NEXT LOCATION AFTER THE OCTAL INFORMATION, IF THIS IS TO BE INDIRECT, THAT
RC102   IS, THE NAME OF A LOCATION COMT+INING THE INFORMATION (DELTA TIME ONLY), THEN THIS IS GIVEN AS THE -GENADR OF
RC104   THAT LOCATION WHICH CONTAINS THE DELTA TIME.  IF THE OLD PRIORITY OR DELTA TIME IS TO BE USED, THAT WHICH IS
RC106   ALREADY IN THE VARIABLE STORAGE, THEN D IS SET TO 0. NEXT THE A BIT IS USED.  IF IT IS SET TO 0, THE ADDRESS
RC108   THAT WOULD BE RESTARTED DURING A RESTART IS THE NEXT LOCATION AFTER THE  PHASE INFORMATION, THAT IS, EITHER
RC110   (TC PHASCHNG) +2 OR +3, DEPENDING ON WHETHER D HAD BEEN SET OR NOT.  IF A IS SET TO 1, THEN THE ADDRESS THAT
RC112   WOULD BE RESTARTED IS THE 2CADR THAT IS READ FROM THE NEXT TWO LOCATIONS.  EXAMPLES,

AC114                   AD      TC      PHASCHNG        THIS WOULD CAUSE LOCATION AD +3 TO BE
AC115                   AD+1    OCT     05023           RESTARTED BY GROUP THREE WITHA PRIORITY
AC116                   AD+2    OCT     23000           OF 23.  NOTE UPON RETURNING IT WOULD
AC117                   AD+3                            ALSO GO TO AD+3

AC118                   AD      TC      PHASCHNG        GROUP  1 WOULD CAUSE CAUSE CALLCALL TO
AC119                   AD+1    OCT     27441           BE STARTED AS A LONGCALL FROM THE TIME
AC120                   AD+2    -GENADR DELTIME         STORED IN LONGBASE (LONGBASE WAS SET) BY
AC121                   AD+3    2CADR   CALLCALL        A DELTATIME STORED IN DELTIME.  THE
AC122                   AD+4                            BBCON OF THE 2CADR SHOULD CONTAIN THE E
AC123                   AD+5                            BANK OF DELTIME. PHASCHNG RETURNS TO
AC124                                                   LOCATION AD+5

RC125   NOTE THAT IF A VARIABLE PRIORITY IS GIVEN FOR A JOB, THE JOB WILL BE RESTARTED AS A NOVAC IF THE PRIORITY IS
RC127   NEGATIVE, AS A FINDVAC IF THE PRIORITY IS POSITIVE.

RC128   TYPE B PHASCHNG IS A COMBINATION OF VARIABLE AND FIXED PHASE CHANGES. IT WILL START UP A JOB AS INDICATED
RC130   BELOW AND ALSO START UP ONE FIXED RESTART, THAT IS EITHER AN G.I OR  A G.ODD OR THE FIRST ENTRY OF G.EVEN
RC132   DOUBLE ENTRY.  THE BIT INFORMATION IS AS FOLLOWS,

RC133                   TL1 DAP PPP PPP GGG

RC134   WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7. THE P:S FOR THE FIXED
RC136   PHASE INFORMATION, OCTAL 0 - 127. I MUST BE 1.  AND AGAIN T STANDS FOR THE TBASE AND L FOR LONGBASE. D THIS
RC138   TIME STANDS ONLY FOR PRIORITY SINCE THIS WILL BE CONSIDERED A JOB, AND IT MUST BE GIVEN DIRECTLY IF GIVEN.
RC140   AGAIN A STANDS FOR THE ADDRESS OF THE LOCATION TO BE RESTARTED, 1 IF THE 2CADR IS GIVEN , OR 0 IF IT IS TO BE
RC142   THE NEXT LOCATION.(THE RETURN LOCATION OF PHASCHNG) EXAMPLES,

AC143                   AD      TC      PHASCHNG        TBASE IS SET AND ARESTART CAUSE GROUP 3
AC144                   AD+1    OCT     56043           TO START THE JOB AJOBAJOB WITH PRIORITY
AC145                   AD+2    OCT     31000           31 AND THE FIRST ENTRY OF 3.4SPOT(WE CAN
AC146                   AD+3    2CADR   AJOBAJOB        ASSUME IT IS A TASK SINCE WE SET TBASE3)
AC147                   AD+4                            UPON RETURN FROM PHASCHNG CONTROL WOULD
AC148                   AD+5                            GO TO AD+5

AC149                   AD      TC      PHASCHNG        UPON A RESTART THE LAST DISPLAY WOULD BE
AC150                   AD+1    OCT     10015           RESTARTED AND A JOB WITH THE PREVIOUSLY
AC151                   AD+2                            STORED PRIORITY WOULD BE BEGUN AT AD+2
AC152                                                   BY MEANS OF GROUP 5
```

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R0153 THE NOVAC-FINDVAC CHOICE FOR JOBS HOLDS HERE ALSO - NEGATIVE PRIORITY CAUSES A NOVAC CALL, POSITIVE A FINDVAC.

R0155 SUMMARY OF BITS

R0156 TYPE A TL0 00P PPP PPP GGG

R0157 TYPE B TL1 DAP PPP PPP GGG

R0158 TYPE C TL0 1AD XXX CJW GGG

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R0159 2PHSCHNG IS USED WHEN ONE WISHES TO START UP A GROUP OR CHANGE A GROUP WHILE UNDER THE CONTROL OF A DIFFERENT
R0161 GROUP. FOR EXAMPLE, CHANGE THE PHASE OF GROUP 3 WHILE THE PORTION OF THE PROGRAM IS UNDER GROUP 5. ALL 2PHSCHNG
R0163 CALLS ARE MADE IN THE FOLLOWING MANNER,

```
A0164                                   TC      2PHSCHNG
A0165                                   OCT     XXXXX
A0166                                   OCT     YYYYY
```

R0167 WHERE OCT XXXXX MUST BE OF TYPE A AND OCT YYYYY MAY BE OF EITHER TYPE A OR TYPE B OR TYPEC. THERE IS ONE
R0169 DIFFERENCE --- NOTE- IF LONGBASE IS TO BE SET THIS INFORMATION IS GIVEN IN THE OCT YYYYY INFORMATION, IT WILL
R0171 BE DISREGARDED IF GIVEN WITH THE OCT XXXXX INFORMATION. A COUPLE OF EXAMPLES MAY HELP,

```
A0173                           AD      TC      2PHSCHNG        SET TBASE3 AND IF A RESTART OCCURS START
A0174                           AD+1    OCT     40083           THE TWO ENTRIES IN 3.8 TABLE LOCATION
A0175                           AD+2    OCT     05025           THIS IS OF TYPE C, SET THE JOB TO BE
A0176                           AD+3    OCT     18000           TO BE LOCATION AD+4, WITH A PRIORITY 18,
A0177                           AD+4                            FOR GROUP 5 PHASE INFORMATION

 0178  REF   3 LAST 1402 TO 1402:    14    33*             COUNT*  $$/PHASE
 0179                        5362  0 0004 0  2PHSCHNG INHINT                 THE ENTRY FOR A DOUBLE PHASE CHANGE
 0180  REF 282  LAST 1402    5363  50 002 0          NDX     Q
 0181                        5364  3 0000 1          CA      0
 0182  REF 283  LAST 1406    5365  24 002 0          INCR    Q
 0183  REF   1               5366  54 072 0          TS      TEMPP2

 0184  REF   1               5367  7 4774 0          MASK    OCT7
 0185                        5370  6 0000 1          DOUBLE
 0186  REF   1               5371  54 071 0          TS      TEMPG2

 0187  REF   2  LAST 1406    5372  3 0072 1          CA      TEMPP2
 0188  REF   1               5373  7 5056 0          MASK    OCT17770        NEED ONLY 1770, BUT WHY GET A NEW CONST.
 0189                        5374  0 0006 1          EXTEND
 0190  REF  28  LAST 1393    5375  7 4755 0          MP      BIT12
 0191  REF   3  LAST 1406    5376  56 072 1          XCH     TEMPP2

 0192  REF  46  LAST 1393    5377  7 4752 1          MASK    BIT15
 0193  REF   1               5400  54 066 0          TS      TEMPSW2         INDICATES WHETHER TO SET TBASE OR NOT

 0194  REF 104  LAST 1348    5401  1 5405 1          TCF     PHASCHNG +3

 0195                        5402  0 0004 0  PHASCHNG INHINT
 0196  REF 149  LAST 1368    5403  3 4770 0          CA      ONE             INDICATESWE CAME FROM A PHASCHNG ENTRY
 0197  REF   2  LAST 1406    5404  54 066 0          TS      TEMPSW2

 0198  REF 284  LAST 1406    5405  50 002 0    +3    NDX     Q
 0199                        5406  3 0000 1          CA      0
 0200  REF 285  LAST 1406    5407  24 002 0          INCR    Q
 0201  REF   1               5410  54 065 0          TS      TEMPSW
```

```
0202                          5411  0 0006 1          EXTEND
0203   REF   1                5412  3 5415 1          DCA     ADRPCHN2        OFF TO SWITCHED BANK
0204                          5413  52 006 0          DTCB

0205   REF  45  LAST 1394 E3,1400                     EBANK=  LST1
0206   REF   1                5414   02473 0  ADRPCHN2 2CADR  PHSCHNG2
0206   REF   1                5415   20063 0

0207   REF   1                5416  22 073 0  ONEORTWO LXCH    TEMPBBCN
0208   REF  30  LAST 1402     5417  22 006 1           LXCH    BBANK
0209   REF   2  LAST 1407     5420  22 073 0           LXCH    TEMPBBCN

0210   REF   1                5421  7 5053 0           MASK    OCT14000        SEE WHAT KIND OF PHASE CHANGE IT IS
0211   REF 345  LAST 1399     5422  10 000 0           CCS     A
0212   REF   1                5423  1 5464 0           TCF     CHECKB          IT IS OF TYPE :B:

0213   REF   1                5424  3 0062 0           CA      TEMPP
0214   REF  39  LAST 1393     5425  7 4762 1           MASK    BIT7
0215   REF 346  LAST 1407     5426  10 000 0           CCS     A               SHALL WE USE THE OLD PRIORITY
0216   REF   1                5427  1 5451 0           TCF     GETPRIO         NO GET A NEW PRIORITY (OR DELTA T)

0217   REF   4  LAST  238     5430  50 061 0  OLDPRIO  NDX     TEMPG           USE THE OLD PRIORITY (OR DELTA T)
0218   REF   1                5431  3 1256 1           CA      PHSPRDT1 -2
0219   REF   1                5432  54 070 1     -1    TS      TEMPPR

0220   REF   2  LAST 1407     5433  3 0062 0  CON1     CA      TEMPP           SEE IF A 2CADR IS GIVEN
0221   REF  32  LAST 1393     5434  7 4761 1           MASK    BIT8
0222   REF 347  LAST 1407     5435  10 000 0           CCS     A
0223   REF   1                5436  1 5455 1           TCF     GETNEWNM

0224   REF 286  LAST 1406     5437  3 0002 0           CA      Q
0225   REF   1                5440  54 063 0           TS      TEMPNM
0226   REF   1                5441  3 0006 1           CA      BB
0227                          5442  0 0006 1           EXTEND                  PICK UP USERS SUPERBANK
0228   REF  21  LAST 1232     5443  04 007 1           ROR     SUPERBNK
0229   REF   1                5444  54 064 1           TS      TEMPBB

0230   REF   1                5445  3 5450 0  TOCON2   CA      CON2ADR         BACK TO SWITCHED BANK
0231   REF   3  LAST 1407     5446  22 073 0           LXCH    TEMPBBCN
0232                          5447  52 006 0           DTCB

0233   REF   1                5450   02561 1  CON2ADR  GENADR  CON2

0234   REF 287  LAST 1407     5451  50 002 0  GETPRIO  NDX     Q               DON:T CARE IF DIRECT OR INDIRECT
0235                          5452  3 0000 1           CA      0               LEAVE THAT DECISION TO RESTARTS
0236   REF 288  LAST 1407     5453  24 002 0           INCR    Q               OBTAIN RETURN ADDRESS
0237   REF   1                5454  1 5432 0           TCF     CON1 -1

0238                          5455  0 0006 1  GETNEWNM EXTEND
```

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```
0239   REF 289  LAST 1407      5456  5 0002 0          INDEX  Q
0240                          5457  3 0001 0          DCA    0
0241   REF   2  LAST 1407      5460  52 064 1          DXCH   TEMPNM
0242   REF  62  LAST 1234      5461  3 4767 0          CA     TWO
0243   REF 290  LAST 1408      5462  26 002 1          ADS    Q              OBTAIN RETURN ADDRESS

0244   REF   1                 5463  1 5445 0          TCF    TOCON2

0245   REF   5  LAST  700      5053            OCT14000 EQUALS PRIO14
0246   REF  19  LAST 1366      0061            TEMPG    EQUALS ITEMP1
0247   REF  18  LAST 1366      0062            TEMPP    EQUALS ITEMP2
0248   REF   3  LAST   69      0063            TEMPNM   EQUALS ITEMP3
0249   REF   3  LAST   69      0064            TEMPBB   EQUALS ITEMP4
0250   REF   2  LAST   69      0065            TEMPSW   EQUALS ITEMP5
0251   REF   3  LAST  167      0066            TEMPSW2  EQUALS ITEMP6
0252   REF  32  LAST 1402      0070            TEMPPR   EQUALS RUPTREG1
0253   REF   8  LAST  592      0071            TEMPG2   EQUALS RUPTREG2
0254   REF   5  LAST 1106      0072            TEMPP2   EQUALS RUPTREG3

0255   REF   5  LAST 1106      0073            TEMPBBCN EQUALS RUPTREG4
0256   REF  31  LAST 1407      0006            BB       EQUALS BBANK

0258   REF   2  LAST 1402     10,2000                   SETLOC PHASETAB
0259                          10,2473                   BANK

0260   REF   3  LAST  223     E3,1436                   EBANK= PHSNAME1
0261   REF   2  LAST 1402 TO 1406:     8      8*        COUNT* $$/PHASE
0262   REF   4  LAST 1407     10,2473  22 073 0  PHSCHNG2 LXCH   TEMPBBCN
0263   REF   2  LAST 1406     10,2474  3 0065 1          CA     TEMPSW
0264   REF   2  LAST 1406     10,2475  7 4774 0          MASK   OCT7
0265                          10,2476  6 0000 1          DOUBLE
0266   REF   5  LAST 1407     10,2477  54 061 1          TS     TEMPG

0267   REF   3  LAST 1408     10,2500  3 0065 1          CA     TEMPSW
0268   REF   2  LAST 1406     10,2501  7 5056 0          MASK   OCT17770
0269                          10,2502  0 0006 1          EXTEND
0270   REF  29  LAST 1406     10,2503  7 4755 0          MP     BIT12
0271   REF   3  LAST 1407     10,2504  54 062 1          TS     TEMPP

0272   REF   4  LAST 1408     10,2505  3 0065 1          CA     TEMPSW
0273   REF   2  LAST  107     10,2506  7 4076 0          MASK   OCT60000
0274   REF   5  LAST 1408     10,2507  56 065 1          XCH    TEMPSW
0275   REF   2  LAST 1407     10,2510  7 5053 0          MASK   OCT14000
0276   REF 348  LAST 1407     10,2511  10 000 0          CCS    A

0277   REF   1                 10,2512  1 5416 0          TCF    ONEORTWO

0278   REF   4  LAST 1408     10,2513  3 0062 0          CA     TEMPP          START STORING THE PHASE INFORMATION
0279   REF   6  LAST 1408     10,2514  50 061 0          NDX    TEMPG
```

L PHASE TABLE MAINTENANCE USER'S PAGE NO. 8 E3 S3

```
0280   REF   3  LAST  223   10,2515  55'154 1          TS     PHASE1 -2

0281   REF   3  LAST 1406   10,2516  10 066 0  BELOW1  CCS    TEMPSW2        IS IT A PHASCHNG OR A 2PHSCHNG
0282   REF   1               10,2517  1 2533 1          TCF    BELOW2         IT:S A PHASCHNG

0283                         10,2520  1 2521 1          TCF    +1             IT:S A 2PHSCHNG
0284   REF   4  LAST 1406   10,2521  4 0072 0          CS     TEMPP2
0285   REF   5  LAST 1409   10,2522  22 072 1          LXCH   TEMPP2
0286   REF   2  LAST 1406   10,2523  50 071 1          NDX    TEMPG2
0287   REF   5  LAST  238   10,2524  53'154 1          DXCH   -PHASE1 -2

0288   REF   4  LAST 1409   10,2525  10 066 0          CCS    TEMPSW2
0289                         10,2526  12 527 1          NOOP                  CAN:T GET HERE
0290   REF   2  LAST 1409   10,2527  1 2533 1          TCF    BELOW2

0291   REF  23  LAST 1102   10,2530  4 0025 1          CS     TIME1
0292   REF   3  LAST 1409   10,2531  50 071 1          NDX    TEMPG2
0293   REF   4  LAST  396   10,2532  55'255 0          TS     TBASE1 -2

0294   REF   6  LAST 1408   10,2533  10 065 0  BELOW2  CCS    TEMPSW         SEE IF WE SHOULD SET TBASE OR LONGBASE
0295   REF   1               10,2534  1 2547 1          TCF    BELOW3         SET LONGBASE ONLY
0296   REF   1               10,2535  1 2552 0          TCF    BELOW4         SET NEITHER

0297   REF  24  LAST 1409   10,2536  4 0025 1          CS     TIME1          SET TBASE TO BEGIN WITH
0298   REF   7  LAST 1408   10,2537  50 061 0          NDX    TEMPG
0299   REF   5  LAST 1409   10,2540  55'255 0          TS     TBASE1 -2

0300   REF   7  LAST 1409   10,2541  3 0065 1          CA     TEMPSW          SHALL WE NOW SET LONGBASE
0301   REF   1               10,2542  6 2545 1          AD     BIT14COM
0302   REF 349  LAST 1408   10,2543  10 000 0          CCS    A
0303                         10,2544  12 545 0          NOOP                  ***** CANT GET HERE *****
0304                         10,2545   17777 0  BIT14COM OCT    17777         ***** CANT GET HERE *****
0305   REF   2  LAST 1409   10,2546  1 2552 0          TCF    BELOW4         NO WE NEED ONLY SET TBASE

0306                         10,2547  0 0006 1  BELOW3  EXTEND                SET LONGBASE
0307   REF  35  LAST 1329   10,2550  3 0025 0          DCA    TIME2
0308   REF   1               10,2551  53'303 1          DXCH   LONGBASE

0309   REF   5  LAST 1408   10,2552  4 0062 1  BELOW4  CS     TEMPP          AND STORE THE FINAL PART OF THE PHASE
0310   REF   8  LAST 1409   10,2553  50 061 0          NDX    TEMPG
0311   REF   6  LAST 1409   10,2554  55'153 0          TS     -PHASE1 -2

0312   REF 291  LAST 1408   10,2555  3 0002 0          CA     Q
0313   REF   5  LAST 1408   10,2556  22 073 0          LXCH   TEMPBBCN
0314                         10,2557  0 0003 1          RELINT
0315                         10,2560  52 006 0          DTCB
0316   REF   6  LAST 1409   10,2561  22 073 0  CON2    LXCH   TEMPBBCN

0317   REF   6  LAST 1409   10,2562  3 0062 0          CA     TEMPP
0318   REF   9  LAST 1409   10,2563  50 061 0          NDX    TEMPG
```

L PHASE TABLE MAINTENANCE USER'S PAGE NO. 9 E3 S3

```
0319   REF   4  LAST 1409   10,2564  55'154 1          TS      PHASE1 -2

0320   REF   2  LAST 1407   10,2565  3 0070 0          CA      TEMPPR
0321   REF  10  LAST 1409   10,2566  50 061 0          NDX     TEMPG
0322   REF   2  LAST 1407   10,2567  55'256 0          TS      PHSPRDT1 -2

0323                        10,2570  0 0006 1          EXTEND
0324   REF   3  LAST 1408   10,2571  3 0064 0          DCA     TEMPNM
0325   REF  11  LAST 1410   10,2572  50 061 0          NDX     TEMPG
0326   REF   4  LAST 1408   10,2573  53'435 0          DXCH    PHSNAME1 -2

0327   REF   1              10,2574  1 2516 0          TCF     BELOW1

0329   REF   8  LAST 1402      4000                    SETLOC  FFTAG1
0330                           5464                    BANK

0331   REF   4 LAST 1406 TO 1408:    66     99*        COUNT*  $$/PHASE
0332   REF  30  LAST 1408      5464  7 4755 0  CHECKB   MASK    BIT12          SINCE THIS IS OF TYPE B, THIS BIT SHOULD
0333   REF 350  LAST 1409      5465  10 000 0          CCS     A               BE HERE IF WE ARE TO GET A NEW PRIORITY
0334   REF   2  LAST 1407      5466  1 5451 0          TCF     GETPRIO        IT IS, SO GET NEW PRIORITY

0335   REF   1                 5467  1 5430 1          TCF     OLDPRIO        IT ISN:T, USE THE OLD PRIORITY
```

L RESTARTS ROUTINE USER'S PAGE NO. 1 E. S3

```
0002   REF   2  LAST  230   01,2000                          SETLOC  RESTART
0003                        01,3467                          BANK

0004   REF   5  LAST 1410   E3,1436                          EBANK=  PHSNAME1        GOPROG MUST SWITCH TO THIS EBANK

0005   REF   1                                              COUNT*  $$/RSROU
0006   REF 661  LAST 1369   01,3467  3 0161 1  RESTARTS    CA      MPAC +5         GET GROUP NUMBER -1
0007                        01,3470  6 0000 1               DOUBLE                  SAVE FOR INDEXING
0008   REF   1              01,3471  54 155 1               TS      TEMP2G

0009   REF   1              01,3472  3 3127 0               CA      PHS2CADR        SET UP EXIT IN CASE IT IS AN EVEN
0010   REF   1              01,3473  54 157 0               TS      TEMPSWCH        TABLE PHASE

0011   REF   1              01,3474  3 3526 0               CA      RTRNCADR        TO SAVE TIME ASSUME IT WILL GET NEXT
0012   REF   1              01,3475  54 707 0               TS      GOLOC +2        GROUP AFTER THIS

0013   REF   1              01,3476  3 0154 1               CA      TEMPPHS
0014   REF  10  LAST 1394   01,3477  7 5024 0               MASK    OCT1400
0015   REF 351  LAST 1410   01,3500  10 000 0               CCS     A               IS IT A VARIABLE OR TABLE RESTART
0016   REF   1              01,3501  1 3512 0               TCF     ITSAVAR         IT:S A VARIABLE RESTART

0017   REF   2  LAST 1411   01,3502  10 154 0  GETPART2     CCS     TEMPPHS         IS IT AN X.1 RESTART
0018   REF 352  LAST 1411   01,3503  10 000 0               CCS     A
0019   REF   1              01,3504  1 3612 0               TCF     ITSATBL         NO, ITS A TABLE RESTART

0020   REF   6  LAST 1408   01,3505  3 5053 1               CA      PRIO14          IT IS AN X.1 RESTART, THEREFORE START
0021   REF  37  LAST 1313   01,3506  0 5135 0  FVACCADR     TC      FINDVAC         THE DISPLAY RESTART ROUTINE (=GENADR)
0022   REF  46  LAST 1407   E3,1400                          EBANK=  LST1
0023   REF   1              01,3507   03263 0               2CADR   INITDSP
0023   REF   1              01,3510   20063 0

0024   REF   2  LAST 1411   01,3511  0 3526 0               TC      RTRNCADR        FINISHED WITH THIS GROUP, GET NEXT ONE

0025   REF  11  LAST 1411   01,3512  7 5024 0  ITSAVAR      MASK    OCT1400         IS IT TYPE B ?
0026   REF 353  LAST 1411   01,3513  10 000 0               CCS     A
0027   REF   1              01,3514  1 3563 0               TCF     ITSLIKEB        YES,IT IS TYPE B

0028                        01,3515  0 0006 1               EXTEND                  STORE THE JOB (OR TASK) 2CADR FOR EXIT
0029   REF   2  LAST 1411   01,3516  5 0155 0               NDX     TEMP2G
0030   REF   6  LAST 1411   01,3517  3 1437 0               DCA     PHSNAME1
0031   REF   2  LAST 1411   01,3520  52 706 1               DXCH    GOLOC

0032   REF   3  LAST 1411   01,3521  3 0154 1               CA      TEMPPHS         SEE IF THIS IS A JOB, TASK, OR A LONGCAL
0033   REF   3  LAST 1408   01,3522  7 4774 0               MASK    OCT7
0034   REF   2  LAST 1258   01,3523  6 7701 0               AD      MINUS2
0035   REF 354  LAST 1411   01,3524  10 000 0               CCS     A
0036   REF   1              01,3525  1 3675 1               TCF     ITSLNGCL        ITS A LONGCALL

0037   REF   4  LAST  329   01,3526  0 4651 1  RTRNCADR     TC      SWRETURN        CANT GET HERE
0038   REF   1              01,3527  1 3531 1               TCF     ITSAWAIT
```

L RESTARTS ROUTINE USER'S PAGE NO. 2 E3 S3

```
0039   REF   1                01,3530  1 3576 1          TCF     ITSAJOB          ITS A JOB

0040   REF   1                01,3531  3 3463 0 ITSAWAIT CA      WTLTCADR         SET UP WAITLIST CALL
0041   REF   3  LAST 1411     01,3532  54 704 0          TS      GOLOC -1

0042   REF   3  LAST 1411     01,3533  50 155 0          NDX     TEMP2G           DIRECTLY STORED
0043   REF   3  LAST 1410     01,3534  3 1260 1          CA      PHSPRDT1
0044   REF 355  LAST 1411     01,3535  10 000 0 TIMETEST CCS     A                IS IT AN IMMEDIATE RESTART
0045   REF 356  LAST 1412     01,3536  24 000 1          INCR    A                NO,
0046   REF   1                01,3537  1 3542 0          TCF     FINDTIME         FIND OUT WHEN IT SHOULD BEGIN

0047   REF   1                01,3540  1 5470 0          TCF     ITSINDIR         STORED INDIRECTLY

0048   REF   1                01,3541  1 3561 1          TCF     IMEDIATE         IT WANTS AN IMMEDIATE RESTART

R0049  ***** THIS MUST BE IN FIXED FIXED *****

0051   REF   3  LAST  640        4000                    SETLOC  FFTAG2
0052                             5470                    BANK

0053   REF   1                                           COUNT*  $$/RSROU
0054   REF   4  LAST 1412        5470  22 706 0 ITSINDIR LXCH    GOLOC +1         GET THE CORRECT E BANK IN CASE THIS IS
0055   REF   2  LAST 1407        5471  22 006 1          LXCH    BB               SWITCHED ERRASIBLE

0056   REF 357  LAST 1412        5472  50 000 1          NDX     A                GET THE TIME INDIRECTLY
0057                             5473  3 0001 0          CA      1

0058   REF   3  LAST 1412        5474  22 006 1          LXCH    BB               RESTORE THE BB AND GOLOC
0059   REF   5  LAST 1412        5475  22 706 0          LXCH    GOLOC +1

0060   REF   2  LAST 1412        5476  1 3542 0          TCF     FINDTIME         FIND OUT WHEN IT SHOULD BEGIN

R0061  ***** YOU  MAY RETURN TO  SWITCHED FIXED *****

0063   REF   3  LAST 1411     01,2000                    SETLOC  RESTART
0064                          01,3542                    BANK

0065   REF   2 LAST 1411 TO 1412:     43    43*         COUNT*  $$/RSROU
0066                          01,3542  4 0000 0 FINDTIME COM                      MAKE NEGITIVE SINCE IT WILL BE SUBTRACTD
0067   REF 185  LAST 1401     01,3543  54 001 1          TS      L                AND SAVE
0068   REF   4  LAST 1412     01,3544  50 155 0          NDX     TEMP2G
0069   REF   6  LAST 1409     01,3545  4 1257 1          CS      TBASE1
0070                          01,3546  0 0006 1          EXTEND
0071   REF  25  LAST 1409     01,3547  60 025 0          SU      TIME1
0072   REF 358  LAST 1412     01,3550  10 000 0          CCS     A
0073                          01,3551  4 0000 0          COM
0074   REF   6  LAST 1039     01,3552  6 7663 0          AD      OCT37776
0075   REF 150  LAST 1406     01,3553  6 4770 0          AD      ONE
0076   REF 186  LAST 1412     01,3554  6 0001 0          AD      L
0077   REF 359  LAST 1412     01,3555  10 000 0          CCS     A
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L RESTARTS ROUTINE USER'S PAGE NO. 3 E3 S3

```
0078   REF 249  LAST 1393   01,3556  3 4772 1     -3      CAF     ZERO
0079                        01,3557  1 3561 1             TCF     +2
0080                        01,3560  1 3561 1             TCF     +1
0081   REF 151  LAST 1412   01,3561  6 4770 0  IMEDIATE   AD      CNE
0082   REF   6  LAST 1412   01,3562  0 0704 1             TC      GOLOC -1
0083   REF   3  LAST 1411   01,3563  3 3526 0  ITSLIKEB   CA      RTRNCADR        TYPE B,                 SO STORE RETURN IN
0084   REF   2  LAST 1411   01,3564  54 157 0             TS      TEMPSWCH        TEMPSWCH IN CASE OF AN EVEN PHASE

0085   REF   1              01,3565  3 3133 0             CA      PRT2CADR        SET UP EXIT TO GET TABLE PART OF THIS
0086   REF   7  LAST 1413   01,3566  54 707 0             TS      GOLOC +2        VARIABLE TYPE OF PHASE

0087   REF   4  LAST 1411   01,3567  3 0154 1             CA      TEMPPHS         MAKE THE PHASE LOOK RIGHT FOR THE TABLE
0088   REF   1              01,3570  7 6043 1             MASK    OCT177          PART OF THIS VARIABLE PHASE
0089   REF   5  LAST 1413   01,3571  54 154 0             TS      TEMPPHS

0090                        01,3572  0 0006 1             EXTEND
0091   REF   5  LAST 1412   01,3573  5 0155 0             NDX     TEMP2G          OBTAIN THE JOB:S 2CADR
0092   REF   7  LAST 1411   01,3574  3 1437 0             DCA     PHSNAME1
0093   REF   8  LAST 1413   01,3575  52 706 1             DXCH    GOLOC

0094   REF   6  LAST 1413   01,3576  50 155 0  ITSAJOB    NDX     TEMP2G          NOW ADD THE PRIORITY AND LET:S GO
0095   REF   4  LAST 1412   01,3577  3 1260 1             CA      PHSPRDT1
0096   REF   9  LAST 1413   01,3600  54 704 0  CHKNOVAC   TS      GOLOC -1        SAVE PRIO UNTIL WE SEE IF ITS
0097                        01,3601  0 0006 1             EXTEND                  A FINDVAC OR A NOVAC
0098   REF   1              01,3602  6 3606 1             BZMF    ITSNOVAC

0099   REF   1              01,3603  3 3506 1             CAF     FVACCADR        POSITIVE, SET UP FINDVAC CALL
0100   REF  10  LAST 1413   01,3604  56 704 1             XCH     GOLOC -1        PICK UP PRIO,
0101   REF  11  LAST 1413   01,3605  0 0704 1             TC      GOLOC -1        AND GO

0102   REF   1              01,3606  3 5310 0  ITSNOVAC   CAF     NOVACADR        NEGATIVE,
0103   REF  12  LAST 1413   01,3607  56 704 1             XCH     GOLOC -1        SET UP NOVAC CALL,
0104                        01,3610  4 0000 0             COM                     CORRECT PRIO,
0105   REF  13  LAST 1413   01,3611  0 0704 1             TC      GOLOC -1        AND GO

0106   REF  39  LAST 1398   01,3612  54 020 1  ITSATBL    TS      CYR             FIND OUT IF THE PHASE IS ODD OR EVEN
0107   REF  40  LAST 1413   01,3613  10 020 1             CCS     CYR
0108                        01,3614  1 3615 1             TCF     +1              IT:S EVEN
0109   REF   1              01,3615  1 3713 0             TCF     ITSEVEN

0110   REF   4  LAST 1413   01,3616  3 3526 0             CA      RTRNCADR        IN CASE THIS IS THE SECOND PART OF A
0111   REF  14  LAST 1413   01,3617  54 707 0             TS      GOLOC +2        TYPE B RESTART, WE NEED PROPER EXIT

0112   REF   6  LAST 1413   01,3620  3 0154 1             CA      TEMPPHS         SET UP POINTER FOR FINDING OUR PLACE IN
0113   REF  31  LAST 1401   01,3621  54 021 0             TS      SR              THE RESTART TABLES
0114   REF  32  LAST 1413   01,3622  6 0021 1             AD      SR
0115   REF   7  LAST 1413   01,3623  50 155 0             NDX     TEMP2G
0116   REF   1              01,3624  6 2001 1             AD      SIZETAB +1
0117   REF   1              01,3625  54 156 1             TS      POINTER
```

L RESTARTS ROUTINE USER'S PAGE NO. 4 E3 S3

```
0118                          01,3626  0 0006 1  CONTBL2  EXTEND                FIND OUT WHAT:S IN THE TABLE
0119  REF   2  LAST 1413     01,3627  5 0156 0            NDX     POINTER
0120  REF   1                01,3630  3 2002 1            DCA     CADRTAB      GET THE 2CADR

0121  REF  15  LAST 1413     01,3631  22 706 0            LXCH    GOLOC +1     STORE THE BB INFORMATION

0122  REF 360  LAST 1412     01,3632  10 000 0            CCS     A            IS IT A JOB OR IS IT  TIMED
0123  REF 361  LAST 1414     01,3633  24 000 1            INCR    A            POSITIVE, MUST BE A JOB
0124  REF   1                01,3634  1 3707 0            TCF     ITSAJOB2

0125  REF 362  LAST 1414     01,3635  24 000 1            INCR    A            MUST BE EITHER A WAITLIST OR LONGCALL
0126  REF  16  LAST 1414     01,3636  54 705 1            TS      GOLOC        LET-S STORE THE CORRECT CADR

0127  REF   2  LAST 1412     01,3637  3 3463 0            CA      WTLTCADR     SET UP OUR EXIT TO WAITLIST
0128  REF  17  LAST 1414     01,3640  54 704 0            TS      GOLOC -1

0129  REF  18  LAST 1414     01,3641  3 0706 0            CA      GOLOC +1     NOW FIND OUT IF IT IS A WAITLIST CALL
0130  REF  29  LAST 1393     01,3642  7 4757 1            MASK    BIT10        THIS SHOULD BE ONE IF WE HAVE -BB
0131  REF 363  LAST 1414     01,3643  10 000 0            CCS     A            FOR THAT MATTER SO SHOULD BE BITS 9,8,7,
A0132                                                                         6,5, AND LAST BUT NOT LEAST (PERHAPS NOT
A0133                                                                         IN IMPORTANCE ANYWAY. BIT 4
0134  REF   1                01,3644  1 3702 0            TCF     ITSWTLST     IT IS A WAITLIST CALL

0135  REF   3  LAST 1414     01,3645  50 156 0            NDX     POINTER      OBTAIN THE ORIGINAL DELTA T
0136  REF   1                01,3646  3 2000 0            CA      PRDTTAB      ADDRESS FOR THIS LONGCALL

0137  REF   1                01,3647  1 5477 1            TCF     ITSLGCL1     NOW GO GET THE DELTA TIME

R0138 ***** THIS MUST BE IN FIXED FIXED *****

0140  REF   4  LAST 1412      4000                       SETLOC  FFTAG2
0141                          5477                       BANK

0142  REF   2 LAST 1412 TO 1412:    7      7*           COUNT*  $$/RSROU
0143  REF  19  LAST 1414      5477  22 706 0  ITSLGCL1  LXCH    GOLOC +1     OBTAIN THE CORRECT E BANK
0144  REF   4  LAST 1412      5500  22 006 1            LXCH    BB
0145  REF  20  LAST 1414      5501  22 706 0            LXCH    GOLOC +1     AND PRESERVE OUR E AND F BANKS

0146                          5502  0 0006 1            EXTEND               GET THE DELTA TIME
0147  REF 364  LAST 1414      5503  5 0000 1            NDX     A
0148                          5504  3 0001 0            DCA     0

0149  REF  21  LAST 1414      5505  22 706 0            LXCH    GOLOC +1     RESTORE OUR E AND F BANK
0150  REF   5  LAST 1414      5506  22 006 1            LXCH    BB           RESTORE THE TASKS E AND F BANKS
0151  REF  22  LAST 1414      5507  22 706 0            LXCH    GOLOC +1     AND PRESERVE OUR L

0152  REF   1                 5510  1 3650 0            TCF     ITSLGCL2     NOW LET:S PROCESS THIS LONGCALL

R0153 ***** YOU  MAY RETURN TO  SWITCHED FIXED *****
```

L RESTARTS ROUTINE USER'S PAGE NO. 5 E3 S3

```
0155   REF   4  LAST 1412   01,2000                        SETLOC  RESTART
0156                        01,3650                        BANK

0157   REF   3 LAST 1412 TO 1414:    70   113*            COUNT*  $$/RSROU
0158   REF   8  LAST 1235   01,3650  53'305 1  ITSLGCL2   DXCH    LONGTIME

0159                        01,3651  0 0006 1               EXTEND                  CALCULATE TIME LEFT
0160   REF  36  LAST 1409   01,3652  4 0025 1               DCS     TIME2
0161   REF   9  LAST 1415   01,3653  21'305 1               DAS     LONGTIME
0162                        01,3654  0 0006 1               EXTEND
0163   REF   2  LAST 1409   01,3655  3 1303 0               DCA     LONGBASE
0164   REF  10  LAST 1415   01,3656  21'305 1               DAS     LONGTIME

0165   REF  11  LAST 1415   01,3657  11'304 0               CCS     LONGTIME        FIND OUT HOW THIS SHOULD BE RESTARTED
0166   REF   1              01,3660  1 3670 1               TCF     LONGCLCL
0167                        01,3661  1 3663 0               TCF     +2
0168   REF   2  LAST 1412   01,3662  1 3556 0               TCF     IMEDIATE -3
0169   REF  12  LAST 1415   01,3663  11'305 1               CCS     LONGTIME +1
0170   REF   2  LAST 1415   01,3664  1 3670 1               TCF     LONGCLCL
0171                        01,3665  13 666 0               NOOP                    CAN:T GET HERE    *********
0172   REF   3  LAST 1415   01,3666  1 3556 0               TCF     IMEDIATE -3
0173   REF   4  LAST 1415   01,3667  1 3561 1               TCF     IMEDIATE

0174   REF   1              01,3670  3 3137 1  LONGCLCL     CA      LGCLCADR        WE WILL GO TO LONGCALL
0175   REF  23  LAST 1414   01,3671  54 704 0               TS      GOLOC -1

0176                        01,3672  0 0006 1               EXTEND                  PREPARE OUR ENTRY TO LONGCALL
0177   REF  13  LAST 1415   01,3673  3 1305 0               DCA     LONGTIME
0178   REF  24  LAST 1415   01,3674  0 0704 1               TC      GOLOC -1

0179   REF   3  LAST 1414   01,3675  3 3463 0  ITSLNGCL     CA      WTLTCADR        ASSUME IT WILL GO TO WAITLIST
0180   REF  25  LAST 1415   01,3676  54 704 0               TS      GOLOC -1

0181   REF   8  LAST 1413   01,3677  50 155 0               NDX     TEMP2G
0182   REF   5  LAST 1413   01,3700  4 1260 0               CS      PHSPRDT1        GET THE DELTA T ADDRESS

0183   REF   2  LAST 1414   01,3701  1 5477 1               TCF     ITSLGCL1        NOW GET THE DELTA TIME

0184   REF  26  LAST 1415   01,3702  4 0706 1  ITSWTLST     CS      GOLOC +1        CORRECT THE BBCON INFORMATION
0185   REF  27  LAST 1415   01,3703  54 706 1               TS      GOLOC +1

0186   REF   4  LAST 1414   01,3704  50 156 0               NDX     POINTER         GET THE DT AND FIND OUT IF IT WAS STORED
0187   REF   2  LAST 1414   01,3705  3 2000 0               CA      PRDTTAB         DIRECTLY OR INDIRECTLY

0188   REF   1              01,3706  1 3535 0               TCF     TIMETEST        FIND OUT HOW THE TIME IS STORED

0189   REF  28  LAST 1415   01,3707  56 705 0  ITSAJ082     XCH     GOLOC           STORE THE CADR

0190   REF   5  LAST 1415   01,3710  50 156 0               NDX     POINTER         ADD THE PRIORITY AND LET:S GO
0191   REF   3  LAST 1415   01,3711  3 2000 0               CA      PRDTTAB
```

L RESTARTS ROUTINE USER'S PAGE NO. 6 E3 S3

```
0192   REF   1                01,3712  1 3600 0          TCF    CHKNOVAC

0193   REF   3  LAST 1413     01,3713  3 0157 1  ITSEVEN CA     TEMPSWCH      SET UP FOR EITHER THE SECOND PART OF THE
0194   REF  29  LAST 1415     01,3714  54 707 0          TS     GOLOC +2      TABLE, OR A RETURN FOR THE NEXT GROUP

0195   REF   9  LAST 1415     01,3715  50 155 0          NDX    TEMP2G        SET UP POINTER FOR OUR LOCATION WITHIN
0196   REF   2  LAST 1413     01,3716  3 2000 0          CA     SIZETAB       THE TABLE
0197   REF   7  LAST 1413     01,3717  6 0154 1          AD     TEMPPHS       THIS MAY LOOK BAD BUT LET:S SEE YOU DO
0198   REF   8  LAST 1416     01,3720  6 0154 1          AD     TEMPPHS       BETTER IN TIME OR NUMBERR OF LOCATIONS
0199   REF   9  LAST 1416     01,3721  6 0154 1          AD     TEMPPHS
0200   REF   6  LAST 1415     01,3722  54 156 1          TS     POINTER

0201   REF   1                01,3723  1 3626 1          TCF    CONTBL2       NOW PROCESS WHAT IS IN THE TABLE

0202   REF  48  LAST 1393     01,3724  3 6214 0  PHSPART2 CA     THREE         SET THE POINTER FOR THE SECOND HALF OF
0203   REF   7  LAST 1416     01,3725  26 156 1          ADS    POINTER       THE TABLE

0204   REF   5  LAST 1413     01,3726  3 3526 0          CA     RTRNCADR      THIS WILL BE OUR LAST TIME THROUGH THE
0205   REF  30  LAST 1416     01,3727  54 707 0          TS     GOLOC +2      EVEN TABLE , SO AFTER IT  GET THE NEXT
A0206                                                                       GROUP
0207   REF   2  LAST 1416     01,3730  1 3626 1          TCF    CONTBL2       SO LET:S GET THE SECOND ENTRY IN THE TBL

0208   REF 662  LAST 1411        0154          TEMPPHS  EQUALS MPAC
0209   REF 663  LAST 1416        0155          TEMP2G   EQUALS MPAC +1
0210   REF 664  LAST 1416        0156          POINTER  EQUALS MPAC +2
0211   REF 665  LAST 1416        0157          TEMPSWCH EQUALS MPAC +3
0213   REF  11  LAST 1394        7701          MINUS2   EQUALS NEG2
0214   REF   9  LAST 1215        6043          OCT177   EQUALS LOW7
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 1 E0 S3

```
0002  REF   1                    4000                    SETLOC  FFTAG3
0003                             5511                    BANK

0004  REF   1                E3,1471                     EBANK=  COMMAND

R0005           FIXED-FIXED ROUTINES.

0006  REF   1                                            COUNT*  $$/IMODE
0007  REF 250  LAST 1413       5511  3 4772 1  ZEROICDU  CAF     ZERO        ZERO ICDU COUNTERS.
0008  REF  29  LAST 1364       5512  54 032 1            TS      CDUX
0009  REF  18  LAST 1364       5513  54 033 0            TS      CDUY
0010  REF  26  LAST 1364       5514  54 034 1            TS      CDUZ
0011  REF 292  LAST 1409       5515  0 0002 0            TC      Q

0012  REF  26  LAST 1393       4760            SPSCODE   =       BIT9
```

L IMU MODE SWITCHING ROUTINES

P0013 IMU ZEROING ROUTINE.

```
0015   REF   1                  07,2000                        SETLOC  MODESW
0016                            07,2627                        BANK

0017   REF   1                                                 COUNT*  $$/IMODE
0018                            07,2627  0 0004 0  IMUZERO     INHINT                          ROUTINE TO ZERO ICDUS.
0019   REF  39  LAST  393       07,2630  4 1241 0              CS      DSPTAB +11D             DONT ZERO CDUS IF IMU IN GIMBAL LOCK AND
0020   REF   4  LAST  195       07,2631  7 5004 1              MASK    BITS4&6                 COARSE ALIGN (GIMBAL RUNAWAY PROTECTION)
0021   REF 365  LAST 1414       07,2632  10 000 0              CCS     A
0022   REF   1                  07,2633  1 2637 0              TCF     IMUZEROA

0023   REF  35  LAST 1359       07,2634  0 5671 1              TC      ALARM                   IF SO.
0024                            07,2635   00206 0              OCT     00206

0025   REF   1                  07,2636  1 3622 0              TCF     CAGETSTJ +4             IMMEDIATE FAILURE.

0032   REF   2  LAST 1418       07,2637  0 3616 0  IMUZEROA    TC      CAGETSTJ
R0033                           DO ALL THE WORK.
0034   REF  33  LAST 1063       07,2640  4 1334 0              CS      IMODES33                DISABLE DAP AUTO AND HOLD MODES
0035   REF   8  LAST 1063       07,2641  7 4763 0              MASK    NOIMUDAP
00352  REF  34  LAST 1418       07,2642  27'334 0              ADS     IMODES33
00355                           07,2643  4 0000 0              COM
00357  REF   1                  07,2644  7 4764 1              MASK    IMUZROBT
0036   REF  35  LAST 1418       07,2645  27'334 0              ADS     IMODES33

0037   REF  47  LAST  773       07,2646  4 1333 1              CS      IMODES30                INHIBIT ICDUFAIL AND IMUFAIL (IN CASE WE
0038   REF   2  LAST  151       07,2647  7 4765 0              MASK    IMUFINHT
00382  REF  48  LAST 1418       07,2650  27'333 1              ADS     IMODES30
00385                           07,2651  4 0000 0              COM
00387  REF   2  LAST  151       07,2652  7 4766 0              MASK    ICDUINHT
0039   REF  49  LAST 1418       07,2653  27'333 1              ADS     IMODES30

0040   REF   5  LAST 1418       07,2654  4 5004 1              CS      BITS4&6                 SEND ZERO ENCODE WITH COARSE AND ERROR
0041                            07,2655  0 0006 1              EXTEND                          COUNTER DISABLED.
0042   REF  45  LAST 1010       07,2656  03 012 1              WAND    CHAN12

0043   REF   3  LAST  152       07,2657  0 3207 1              TC      NOATTOFF                TURN OFF NO ATT LAMP.

0044   REF  32  LAST 1393       07,2660  3 4764 0              CAF     BIT5
0045                            07,2661  0 0006 1              EXTEND
0046   REF  46  LAST 1418       07,2662  05 012 1              WOR     CHAN12

00461  REF   3  LAST  152       07,2663  0 5511 1              TC      ZEROICDU
0047   REF  34  LAST 1393       07,2664  3 4763 1              CAF     BIT6                    WAIT 320 MS TO GIVE AGS ADEQUATE TIME TO
0048   REF  24  LAST 1235       07,2665  0 5223 1              TC      TWIDDLE                 RECEIVE ITS PULSE TRAIN.
0049   REF   5  LAST  199       E3,1474                        EBANK=  CDUIND
0050   REF   1                  07,2666   02677 0              ADRES   IMUZERO2
0051   REF  50  LAST 1418       07,2667  4 1333 1              CS      IMODES30                SEE IF IMU OPERATING AND ALARM IF NOT.
0052   REF   3  LAST  773       07,2670  7 4760 0              MASK    IMUOPBIT
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 3 E3 S3

```
0053   REF 366  LAST 1418   07,2671  10 000 0          CCS     A
0054   REF   1              07,2672  1 2675 0          TCF     MODEEXIT

0055   REF  36  LAST 1418   07,2673  0 5671 1          TC      ALARM
0056                        07,2674   00210 1          OCT     210

0057                        07,2675  0 0003 1 MODEEXIT RELINT                GENERAL MODE-SWITCHING EXIT.
0058   REF   5  LAST 1411   07,2676  1 4651 0          TCF     SWRETURN

0059   REF   1              07,2677  0 3606 1 IMUZERO2 TC      CAGETEST
0061   REF   4  LAST 1418   07,2700  0 5511 1          TC      ZEROICDU        ZERO CDUX, CDUY, CDUZ

0062   REF  33  LAST 1418   07,2701  4 4764 1          CS      BIT5            REMOVE ZERO DISCRETE.
0063                        07,2702  0 0006 1          EXTEND
0064   REF  47  LAST 1418   07,2703  03 012 1          WAND    CHAN12

0065   REF   2  LAST  151   07,2704  3 5025 0          CAF     7.9SEC          WAIT 7.9 SEC FOR CTRS TO FIND GIMBALS
0066   REF   4  LAST  172   07,2705  0 5260 0          TC      VARDELAY

0067   REF   2  LAST 1419   07,2706  0 3606 1 IMUZERO3 TC      CAGETEST
0069   REF   3  LAST 1418   07,2707  3 4765 1          CA      IMUFINHT
00692  REF   3  LAST 1418   07,2710  6 4766 1          AD      ICDUINHT
00695                       07,2711  4 0000 0          COM
0070   REF  51  LAST 1418   07,2712  7 1333 1          MASK    IMODES30
0071   REF  52  LAST 1419   07,2713  55'333 1          TS      IMODES30

0072   REF   9  LAST 1418   07,2714  3 4763 1          CA      NOIMUDAP
00722  REF   2  LAST 1418   07,2715  6 4764 0          AD      IMUZRUBT
00725                       07,2716  4 0000 0          COM
0073   REF  36  LAST 1418   07,2717  7 1334 0          MASK    IMODES33        BIT5 FOR GROUND
0074   REF  37  LAST 1419   07,2720  55'334 0          TS      IMODES33

0075   REF  37  LAST 1090   07,2721  0 4714 1          TC      IBNKCALL        SET ISS WARNING IF EITHER OF ABOVE ARE
0076   REF   5  LAST  167   07,2722   14706 0          CADR    SETISSW         PRESENT.

0077   REF   1              07,2723  1 3563 0          TCF     ENDIMU
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 4 E3 S3

P0078 IMU COARSE ALIGN MODE.

```
0079                          07,2724  0 0004 0  IMUCOARS INHINT
0080  REF   3  LAST 1418     07,2725  0 3616 0           TC     CAGETSTJ
0081  REF   3  LAST  199     07,2726  0 3070 0           TC     SETCOARS

0082  REF  35  LAST 1393     07,2727  3 6211 0           CAF    SIX
0083  REF  28  LAST 1235     07,2730  0 5233 0           TC     WAITLIST
0084  REF   6  LAST 1418     E3,1474                     EBANK= CDUIND
0085  REF   1                07,2731   02734 0           2CADR  COARS
0085  REF   1                07,2732   16063 0

0086  REF   2  LAST 1419     07,2733  1 2675 0           TCF    MODEEXIT

0087  REF   3  LAST 1419     07,2734  0 3606 1  COARS    TC     CAGETEST
0088  REF  35  LAST 1418     07,2735  3 4763 1           CAF    BIT6          ENABLE ALL THREE ISS CDU ERROR COUNTERS
0089                          07,2736  0 0006 1           EXTEND
0090  REF  48  LAST 1419     07,2737  05 012 1           WOR    CHAN12

0091  REF  63  LAST 1408     07,2740  3 4767 0           CAF    TWO           SET CDU INDICATOR
0092  REF   7  LAST 1420     07,2741  55'474 0  COARS1   TS     CDUIND

0093  REF   8  LAST 1420     07,2742  51'474 1           INDEX  CDUIND        COMPUTE THETAD - THETAA IN 1:S
0094  REF  24  LAST 1359     07,2743  3 1307 1           CA     THETAD          COMPLEMENT FORM
0095                          07,2744  0 0006 1           EXTEND
0096  REF   9  LAST 1420     07,2745  5 1474 1           INDEX  CDUIND
0097  REF  30  LAST 1417     07,2746  20 032 1           MSU    CDUX
0098                          07,2747  0 0006 1           EXTEND
0099  REF  41  LAST 1393     07,2750  7 4754 1           MP     BIT13         SHIFT RIGHT 2
0100  REF 187  LAST 1412     07,2751  56 001 0           XCH    L             ROUND
0101                          07,2752  6 0000 1           DOUBLE
0102  REF  20  LAST 1408     07,2753  54 061 1           TS     ITEMP1
0103                          07,2754  1 2756 0           TCF    +2
0104  REF 188  LAST 1420     07,2755  26 001 1           ADS    L

0105  REF  10  LAST 1420     07,2756  51'474 1           INDEX  CDUIND        DIFFERENCE TO BE COMPUTED
0106  REF   2  LAST 1417     07,2757  23'471 1           LXCH   COMMAND
0107  REF  11  LAST 1420     07,2760  11'474 0           CCS    CDUIND
0108  REF   1                07,2761  0 2741 1           TC     COARS1

0109  REF  64  LAST 1420     07,2762  3 4767 0           CAF    TWO           MINIMUM OF 4 MS WAIT
0110  REF   5  LAST 1419     07,2763  0 5260 0  -1       TC     VARDELAY
0111  REF   4  LAST 1420     07,2764  0 3606 1  COARS2   TC     CAGETEST      DONT CONTINUE IF CAGED.
0112  REF  21  LAST 1420     07,2765  54 061 1           TS     ITEMP1        SETS TO +0.
0113  REF  65  LAST 1420     07,2766  3 4767 0           CAF    TWO           SET CDU INDICATOR
0114  REF  12  LAST 1420     07,2767  55'474 0  +3       TS     CDUIND

0115  REF  13  LAST 1420     07,2770  51'474 1           INDEX  CDUIND
0116  REF   3  LAST 1420     07,2771  11'471 0           CCS    COMMAND       NUMBER OF PULSES REQUIRED
0117  REF   1                07,2772  0 2776 0           TC     COMPOS        GREATER THAN MAX ALLOWED
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 5 E3 S3

```
0118  REF   1                07,2773  0 3005 1          TC      NEXTCDU +1
0119  REF   1                07,2774  0 3043 0          TC      COMNEG
0120  REF   2  LAST 1421      07,2775  0 3005 1          TC      NEXTCDU +1

0121  REF   1                07,2776  6 3663 1  COMPOS  AD      -COMMAX          COMMAX = MAX NUMBER OF PULSES ALLOWED
0122                         07,2777  0 0006 1          EXTEND                     MINUS ONE
0123  REF   1                07,3000  6 3053 1          BZMF    COMZERO
0124  REF  14  LAST 1420      07,3001 51'474 1          INDEX   CDUIND
0125  REF   4  LAST 1420      07,3002 55'471 0          TS      COMMAND          REDUCE COMMAND BY MAX NUMBER OF PULSES
0126  REF   1                07,3003  4 3664 1          CS      -COMMAX-           ALLOWED

0127  REF  22  LAST 1420      07,3004 24 061 0  NEXTCDU INCR    ITEMP1
0128  REF  18  LAST 1394      07,3005  6 4771 1    +1    AD      NEGO
0129  REF  15  LAST 1421      07,3006 51'474 1          INDEX   CDUIND
0130  REF   4  LAST 1010      07,3007 54 050 0          TS      CDUXCMD          SET UP COMMAND REGISTER.

0131  REF  16  LAST 1421      07,3010 11'474 0          CCS     CDUIND
0132  REF   1                07,3011  0 2767 0          TC      COARS2 +3

0133  REF  23  LAST 1421      07,3012 10 061 1          CCS     ITEMP1           SEE IF ANY PULSES TO GO OUT.
0134  REF   1                07,3013  1 3057 1          TCF     SENDPULS

0135  REF  11  LAST 1225      07,3014  0 5255 0          TC      FIXDELAY         WAIT FOR GIMBALS TO SETTLE.
0136                         07,3015   00226 1          DEC     150

0137  REF  66  LAST 1420      07,3016  3 4767 0          CAF     TWO              AT END OF COMMAND, CHECK TO SEE THAT
0138  REF  24  LAST 1421      07,3017 54 061 1  CHKCORS TS      ITEMP1           GIMBALS ARE WITHIN 2 DEGREES OF THETAD.
0139  REF 367  LAST 1419      07,3020 50 000 1          INDEX   A
0140  REF  31  LAST 1420      07,3021  3 0032 0          CA      CDUX
0141                         07,3022  0 0006 1          EXTEND
0142  REF  25  LAST 1421      07,3023  5 0061 0          INDEX   ITEMP1
0143  REF  25  LAST 1420      07,3024 21'307 0          MSU     THETAD
0144  REF 368  LAST 1421      07,3025 10 000 0          CCS     A
0145  REF   1                07,3026  1 3034 1          TCF     COARSERR
0146  REF   1                07,3027  1 3031 1          TCF     CORSCHK2
0147  REF   2  LAST 1421      07,3030  1 3034 1          TCF     COARSERR
```

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```
0148   REF  26  LAST 1421   07,3031  10 061 1  CORSCHK2 CCS     ITEMP1
0149   REF   1              07,3032  1 3017 0           TCF     CHKCORS
0150   REF   2  LAST 1419   07,3033  1 3563 0           TCF     ENDIMU          END OF COARSE ALIGNMENT.

0151   REF   1              07,3034  6 3042 1  COARSERR AD      COARSTOL        2 DEGREES.
0152                        07,3035  0 0006 1           EXTEND
0153   REF   2  LAST 1421   07,3036  6 3031 0           BZMF    CORSCHK2

0154   REF  37  LAST 1419   07,3037  0 5671 1           TC      ALARM           COARSE ALIGN ERROR.
0155                        07,3040  00211 0            OCT     211

0156   REF   2  LAST  151   07,3041  1 3625 1           TCF     IMUBAD

0157                        07,3042  77511 1   COARSTOL DEC     -.01111         2 DEGREES SCALED AT HALF-REVOLUTIONS

0158   REF   2  LAST 1421   07,3043  6 3663 1  COMNEG   AD      -COMMAX
0159                        07,3044  0 0006 1           EXTEND
0160   REF   2  LAST 1421   07,3045  6 3053 1           BZMF    COMZERO
0161                        07,3046  4 0000 0           COM
0162   REF  17  LAST 1421   07,3047  51'474 1           INDEX   CDUIND
0163   REF   5  LAST 1421   07,3050  55'471 0           TS      COMMAND
0164   REF   2  LAST 1421   07,3051  3 3664 0           CA      -COMMAX-
0165   REF   3  LAST 1421   07,3052  0 3004 0           TC      NEXTCDU

0166   REF 251  LAST 1417   07,3053  3 4772 1  COMZERO  CAF     ZERO
0167   REF  18  LAST 1422   07,3054  51'474 1           INDEX   CDUIND
0168   REF   6  LAST 1422   07,3055  57'471 1           XCH     COMMAND
0169   REF   4  LAST 1422   07,3056  0 3004 0           TC      NEXTCDU

0170   REF   6  LAST 1066   07,3057  3 7673 1  SENDPULS CAF     13,14,15
0171                        07,3060  0 0006 1           EXTEND
0172   REF  11  LAST 1010   07,3061  05 014 1           WOR     CHAN14
0173   REF   1              07,3062  3 3665 1           CAF     600MS
0174   REF   2  LAST 1421   07,3063  1 2763 0           TCF     COARS2 -1       THEN TO VARDELAY

0175   REF  36  LAST 1420   07,3064  3 4763 1  CA+ECE   CAF     BIT6            ENABLE ALL THREE ISS CDU ERROR COUNTERS
0176                        07,3065  0 0006 1           EXTEND
0177   REF  49  LAST 1420   07,3066  05 012 1           WOR     CHAN12
0178   REF  58  LAST 1313   07,3067  0 5314 1           TC      TASKOVER
```

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```
0179   REF  37  LAST 1393   07,3070  3 4765 1  SETCOARS CAF     BIT4          BYPASS IF ALREADY IN COARSE ALIGN
0180                        07,3071  0 0006 1           EXTEND
0181   REF  50  LAST 1422   07,3072  02 012 0           RAND    CHAN12
0182   REF 369  LAST 1421   07,3073  10 000 0           CCS     A
0183   REF 293  LAST 1417   07,3074  0 0002 0           TC      Q

0184   REF  37  LAST 1422   07,3075  4 4763 0           CS      BIT6          CLEAR ISS ERROR COUNTERS
0185                        07,3076  0 0006 1           EXTEND
0186   REF  51  LAST 1423   07,3077  03 012 1           WAND    CHAN12

0187   REF  30  LAST 1414   07,3100  4 4757 1           CS      BIT10         KNOCK DOWN GYRO ACTIVITY
0188                        07,3101  0 0006 1           EXTEND
0189   REF  12  LAST 1422   07,3102  03 014 1           WAND    CHAN14
0190   REF 252  LAST 1422   07,3103  4 4772 0           CS      ZERO
0191   REF   2  LAST  160   07,3104  54 047 0           TS      GYROCMD

0192   REF  38  LAST 1423   07,3105  3 4765 1           CAF     BIT4          PUT ISS IN COARSE ALIGN
0193                        07,3106  0 0006 1           EXTEND
0194   REF  52  LAST 1423   07,3107  05 012 1           WOR     CHAN12

0195   REF  40  LAST 1418   07,3110  4 1241 0           CS      DSPTAB +11D   TURN ON NO ATT LAMP
0196   REF   1              07,3111  7 7664 0           MASK    OCT40010
0197   REF  41  LAST 1423   07,3112  27'241 0           ADS     DSPTAB +11D

0198   REF  38  LAST 1419   07,3113  4 1334 0           CS      IMODES33      DISABLE DAP AUTO AND HOLD MODES
0199   REF  10  LAST 1419   07,3114  7 4763 0           MASK    NOTMODAP
0200   REF  39  LAST 1423   07,3115  27'334 0           ADS     IMODES33

0201   REF  53  LAST 1419   07,3116  4 1333 1           CS      IMODES30      DISABLE IMUFAIL
0202   REF   4  LAST 1419   07,3117  7 4765 0           MASK    IMUFINHT
0203   REF  54  LAST 1423   07,3120  27'333 1           ADS     IMODES30

0204   REF  12  LAST  760   07,3121  4 4764 1  RNDREFDR CS      TRACKBIT      KNOCK DOWN TRACK FLAG
0205   REF  40  LAST 1017   07,3122  7 0075 1           MASK    FLAGWRD1
0206   REF  41  LAST 1423   07,3123  54 075 1           TS      FLAGWRD1

0207   REF   4  LAST 1225   07,3124  4 4752 1           CS      DRFTBIT       KNOCK DOWN DRIFT FLAG
0208   REF  26  LAST 1225   07,3125  7 0076 1           MASK    FLAGWRD2
0209   REF  27  LAST 1423   07,3126  54 076 1           TS      FLAGWRD2

0210   REF   5  LAST  567   07,3127  4 4754 1           CS      REFSMBIT      KNOCK DOWN REFSMMAT FLAG
0211   REF   7  LAST  567   07,3130  7 0077 0           MASK    FLAGWRD3
0212   REF   8  LAST 1423   07,3131  54 077 0           TS      FLAGWRD3

0213   REF 294  LAST 1423   07,3132  0 0002 0           TC      Q

0214   REF   2  LAST  168        7664          OCT40010 EQUALS OT40010
```

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```
P0215                IMU FINE ALIGN MODE SWITCH.

0216                                07,3133  0 0004 0  IMUFINE  INHINT
0217   REF   4  LAST 1420          07,3134  0 3616 0           TC      CAGETSTJ      SEE IF IMU BEING CAGED.

0218   REF   1                      07,3135  4 5001 1           CS      BITS4-5       RESET ZERO AND COARSE
0219                                07,3136  0 0006 1           EXTEND
0220   REF  53  LAST 1423          07,3137  03 012 1           WAND    CHAN12

0221   REF  11  LAST 1423          07,3140  4 4763 0           CS      NOIMUDAP      INSURE DAP AUTO AND HOLD MODES ENABLED
0222   REF  40  LAST 1423          07,3141  7 1334 0           MASK    IMODES33
0223   REF  41  LAST 1424          07,3142  55'334 0           TS      IMODES33

0224   REF   4  LAST 1418          07,3143  0 3207 1           TC      NOATTOFF

0225   REF  31  LAST 1423          07,3144  3 4757 0           CAF     BIT10         IMU FAIL WAS INHIBITED DURING THE
0226   REF  25  LAST 1418          07,3145  0 5223 1           TC      TWIDDLE       PRESUMABLY PRECEDING COARSE ALIGN. LEAVE
0228   REF   1                      07,3146   03155 0          ADRES   IFAILOK       IT ON FOR THE FIRST 5 SECS OF FIVE ALIGN
0229   REF   6  LAST  829          07,3147  3 5017 1           CAF     2SECS
0230   REF  26  LAST 1424          07,3150  0 5223 1           TC      TWIDDLE
0232   REF   1                      07,3151   03153 0          ADRES   IMUFINED
0233   REF   3  LAST 1420          07,3152  1 2675 0           TCF     MODEEXIT

0234   REF   5  LAST 1420          07,3153  0 3606 1  IMUFINED TC      CAGETEST      SEE THAT NO ONE HAS CAGED THE IMU.
0235   REF   3  LAST 1422          07,3154  1 3563 0           TCF     ENDIMU
```

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```
0236   REF   1                07,3155  0 3613 0  IFAILOK  TC      CAGETSTQ        ENABLE IMU FIAL UNLESS IMU BEING CAGED.
0237   REF  59  LAST 1422     07,3156  1 5314 0           TCF     TASKOVER        IT IS.

0238   REF  39  LAST 1423     07,3157  3 4765 1           CAF     BIT4            DONT RESET IMU FAIL INHIBIT IF SOMEONE
0239                          07,3160  0 0006 1           EXTEND                  HAS GONE INTO COARSE ALIGN.
0240   REF  54  LAST 1424     07,3161  02 012 0           RAND    CHAN12
0241   REF 370  LAST 1423     07,3162  10 000 0           CCS     A
0242   REF  60  LAST 1425     07,3163  1 5314 0           TCF     TASKOVER

0243   REF  55  LAST 1423     07,3164  4 1333 1           CS      IMODES30        RESET IMUFAIL.
0244   REF   2  LAST  391     07,3165  7 4754 1           MASK    IMUFLBIT
0245   REF  56  LAST 1425     07,3166  27'333 1           ADS     IMODES30
0246   REF   5  LAST 1423     07,3167  4 4765 0           CS      IMUFINHT
0247   REF  57  LAST 1425     07,3170  7 1333 1  PFAILOK2 MASK    IMODES30
0248   REF  58  LAST 1425     07,3171  55'333 1           TS      IMODES30
0249   REF  38  LAST 1419     07,3172  0 4714 1           TC      IBNKCALL        THE ISS WARNING LIGHT MAY COME ON NOW
0250   REF   6  LAST 1419     07,3173   14706 0           CADR    SETISSW         THAT THE INHIBIT HAS BEEN REMOVED.
0251   REF  61  LAST 1425     07,3174  1 5314 0           TCF     TASKOVER

0252   REF   2  LAST 1425     07,3175  0 3613 0  PFAILOK  TC      CAGETSTQ        ENABLE PIP FAIL PROG ALARM.
0253   REF  62  LAST 1425     07,3176  1 5314 0           TCF     TASKOVER

0254   REF  59  LAST 1425     07,3177  4 1333 1           CS      IMODES30        RESET IMU AND PIPA FAIL BITS.
0255   REF   4  LAST  392     07,3200  7 4757 1           MASK    PIPAFLBT
0256   REF  60  LAST 1425     07,3201  27'333 1           ADS     IMODES30

0257   REF  42  LAST 1424     07,3202  4 1334 0           CS      IMODES33
0258   REF   3  LAST  391     07,3203  7 4754 1           MASK    PIPZFLBT
0259   REF  43  LAST 1425     07,3204  27'334 0           ADS     IMODES33

0260   REF   1                07,3205  4 4764 1           CS      NOACCALM
0261   REF   1                07,3206  1 3170 0           TCF     PFAILOK2

0262   REF   2  LAST 1423     07,3207  4 7664 0  NOATTOFF CS      OCT40010        SUBROUTINE TO TURN OFF NO ATT LAMP.
0263   REF  42  LAST 1423     07,3210  7 1241 0           MASK    DSPTAB +11D
0264   REF  47  LAST 1406     07,3211  6 4752 0           AD      BIT15
0265   REF  43  LAST 1425     07,3212  55'241 0           TS      DSPTAB +11D
0266   REF 295  LAST 1423     07,3213  0 0002 0           TC      Q
```

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P0267 ROUITNES TO INITIATE AND TERMINATE PROGRAM USE OF THE PIPAS. NO IMUSTALL REQUIRED IN EITHER CASE.

```
0272   REF 253  LAST 1423   07,3214  4 4772 0  PIPUSE   CS      ZERO
0273   REF  10  LAST  839   07,3215  54 037 1           TS      PIPAX
0274   REF   5  LAST  438   07,3216  54 040 1           TS      PIPAY
0275   REF   7  LAST  839   07,3217  54 041 0           TS      PIPAZ

02752  REF   3  LAST 1425   07,3220  0 3613 0  PIPUSE1  TC      CAGETSTQ       DO NOT ENABLE PIPA FAIL IF IMU IS CAGED
02754  REF   6  LAST 1419   07,3221  1 4651 0           TCF     SWRETURN

02756                       07,3222  0 0004 0           INHINT
0276   REF   2  LAST  164   07,3223  4 4770 1           CS      ACCFINHT       IF PIPA FAILS FROM NOW ON (UNTIL
0277   REF  61  LAST 1425   07,3224  7 1333 1           MASK    IMODES30       PIPFREE), LIGHT ISS WARNING.
0278   REF  62  LAST 1426   07,3225  55'333 1           TS      IMODES30

0279   REF  39  LAST 1425   07,3226  0 4714 1  PIPFREE2 TC      IBNKCALL       ISS WARNING MIGHT COME ON NOW.
0280   REF   7  LAST 1425   07,3227   14706 0           CADR    SETISSW        (OR GO OFF ON PIPFREE).

0281   REF   4  LAST 1424   07,3230  1 2675 0           TCF     MODEEXIT

0282                       07,3231  0 0004 0  PIPFREE   INHINT                 PROGRAM DONE WITH PIPAS. DONT LIGHT
0283   REF  63  LAST 1426   07,3232  4 1333 1           CS      IMODES30       ISS WARNING.
0284   REF   3  LAST 1426   07,3233  7 4770 1           MASK    ACCFINHT
0285   REF  64  LAST 1426   07,3234  27'333 1           ADS     IMODES30

0286   REF   5  LAST 1425   07,3235  7 4757 1           MASK    PIPAFLBT       IF PIP FAIL ON, DO PROG ALARM AND RESET
0287   REF 371  LAST 1425   07,3236  10 000 0           CCS     A              ISS WARNING.
0288   REF   5  LAST 1426   07,3237  1 2675 0           TCF     MODEEXIT

0289   REF  38  LAST 1422   07,3240  0 5671 1           TC      ALARM
0290                       07,3241   00212 0           OCT     212

0291                       07,3242  0 0004 0           INHINT

0292   REF   1              07,3243  1 3226 0           TCF     PIPFREE2
```

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```
P0293           THE FOLLOWING ROUTINE TORQUES THE IRIGS ACCORDING TO DOUBLE PRECISION INPUTS IN THE SIX REGISTERS
R0295   BEGINNING AT THE ECADR ARRIVING IN A. THE MINIMUM SIZE OF ANY PULSE TRAIN IS 16 PULSES (.25 CDU COUNTS). THE
R0297   UNSENT PORTION OF THE COMMAND IS LEFT INTACT IN THE INPUT COMMAND REGISTERS.

0300   REF 666  LAST 1416   07,3244  54 161 0  IMUPULSE TS      MPAC +5          SAVE ARRIVING ECADR.
0301   REF   5  LAST 1424   07,3245  0 3616 0            TC      CAGETSTJ         DONT PROCEED IF IMU BEING CAGED.

0302   REF   3  LAST  446   07,3246  11'324 1            CCS     LGYRO            SEE IF GYROS BUSY.
0303   REF   1              07,3247  0 3307 0            TC      GYROBUSY         SLEEP.

0305   REF  38  LAST 1423   07,3250  3 4763 1            CAF     BIT6             ENABLE THE POWER SUPPLY.
0306                        07,3251  0 0006 1            EXTEND
0307   REF  13  LAST 1423   07,3252  05 014 1            WOR     CHAN14

0308   REF  21  LAST 1393   07,3253  3 4766 1            CAF     FOUR
0310   REF  29  LAST 1420   07,3254  0 5233 0  GWAKE2    TC      WAITLIST         (IF A JOB WAS PUT TO SLEEP, THE POWER
0311   REF  19  LAST 1422   E3,1474                      EBANK=  CDUIND           SUPPLY IS LEFT ON BY THE WAKING JOB).
0312   REF   1              07,3255   03324 1           2CADR   STRTGYRO
0312   REF   1              07,3256   16063 0

0313   REF 667  LAST 1427   07,3257  3 0161 1            CA      MPAC +5          SET UP EBANK, SAVING CALLER'S EBANK FOR
0314   REF  42  LAST 1397   07,3260  56 003 1            XCH     EBANK            RESTORATION ON RETURN.
0315   REF 668  LAST 1427   07,3261  56 161 1            XCH     MPAC +5
0316   REF   4  LAST 1427   07,3262  55'324 1            TS      LGYRO            RESERVES GYROS.
0317   REF  14  LAST 1394   07,3263  7 4350 1            MASK    LOW8
0318   REF  27  LAST 1422   07,3264  54 061 1            TS      ITEMP1

0319   REF  67  LAST 1421   07,3265  3 4767 0            CAF     TWO              FORCE SIGN AGREEMENT ON INPUTS.
0320   REF 669  LAST 1427   07,3266  54 157 0  GYROAGRE  TS      MPAC +3
0321                        07,3267  6 0000 1            DOUBLE
0322   REF  28  LAST 1427   07,3270  6 0061 0            AD      ITEMP1
0323   REF 670  LAST 1427   07,3271  54 160 1            TS      MPAC +4
0324                        07,3272  0 0006 1            EXTEND
0325   REF 372  LAST 1426   07,3273  5 0000 1            INDEX   A
0326                        07,3274  3 1401 0            DCA     1400
0327   REF 671  LAST 1427   07,3275  52 155 1            DXCH    MPAC
0328   REF   8  LAST  733   07,3276  0 7224 1            TC      DPAGREE
0329   REF 672  LAST 1427   07,3277  52 155 1            DXCH    MPAC
0330   REF 673  LAST 1427   07,3300  50 160 0            INDEX   MPAC +4
0331                        07,3301  53'401 1            DXCH    1400

0332   REF 674  LAST 1427   07,3302  10 157 0            CCS     MPAC +3
0333   REF   1              07,3303  1 3266 1            TCF     GYROAGRE

0334   REF 675  LAST 1427   07,3304  3 0161 1            CA      MPAC +5          RESTORE CALLER'S EBANK.
0335   REF  43  LAST 1427   07,3305  54 003 0            TS      EBANK
0336   REF   6  LAST 1426   07,3306  1 2675 0            TCF     MODEEXIT
```

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PC337 ROUTINES TO ALLOW TORQUING BY ONLY ONE JOB AT A TIME.

```
0338                              07,3307  0 0006 1  GYROBUSY EXTEND
0339  REF   20  LAST 1190        07,3310  3 0134 1            DCA     BUF2        SAVE RETURN 2FCADR.
0340  REF  676  LAST 1427        07,3311  52 155 1            DXCH    MPAC
0341  REF    1                  07,3312  3 3323 0  REGSLEEP  CAF     LGWAKE
0342  REF    3  LAST 1324        07,3313  1 5163 1            TCF     JOBSLEEP

0343  REF    5  LAST 1427        07,3314  11'324 1  GWAKE     CCS     LGYRO       WHEN AWAKENED, SEE IF GYROS STILL BUSY.
0344  REF    1                  07,3315  1 3312 0            TCF     REGSLEEP    IF SO, SLEEP SOME MORE.

0346                              07,3316  0 0006 1            EXTEND
0347  REF  677  LAST 1428        07,3317  3 0155 0            DCA     MPAC
0348  REF   21  LAST 1428        07,3320  52 134 0            DXCH    BUF2        RESTORE SWRETURN INFO.
0349  REF  152  LAST 1413        07,3321  3 4770 0            CAF     ONE
0350  REF    1                  07,3322  1 3254 0            TCF     GWAKE2

0351  REF    1                  07,3323   17314 1  LGWAKE    CADR    GWAKE
```

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P0352 GYRO-TORQUING WAITLIST TASKS.

```
0353  REF   1              07,3324  4 3560 0  STRTGYRO CS      GDESELCT        DE-SELECT LAST GYRO.
0354                       07,3325  0 0006 1           EXTEND
0355  REF  14  LAST 1427   07,3326  03 014 1           WAND    CHAN14

0356  REF   1              07,3327  0 3575 0           TC      CAGETSTG

0357  REF   6  LAST 1428   07,3330  3 1324 0  STRTGYR2 CA      LGYRO           JUMP ON PHASE COUNTER IN BITS 13-14
0358                       07,3331  0 0006 1           EXTEND
0359  REF  40  LAST 1425   07,3332  7 4765 0           MP      BIT4
0360  REF 373  LAST 1427   07,3333  50 000 1           INDEX   A
0361                       07,3334  1 3335 0           TCF     +1
0362  REF   1              07,3335  0 3352 0           TC      GSELECT         =0. DO Y GYRO.
0363                       07,3336   00202 1           OCT     00202

0364  REF   2  LAST 1429   07,3337  0 3352 0           TC      GSELECT         =1. DO Z GYRO.
0365                       07,3340   00302 0           OCT     00302

0366  REF   3  LAST 1429   07,3341  0 3350 1           TC      GSELECT -2      =2. DO X GYRO.
0367                       07,3342   00100 0           OCT     00100

0368  REF 254  LAST 1426   07,3343  3 4772 1           CAF     ZERO            =3. DONE
0369  REF   7  LAST 1429   07,3344  55'324 1           TS      LGYRO
0370  REF   2  LAST 1428   07,3345  3 3323 0           CAF     LGWAKE          WAKE A POSSIBLE SLEEPING JOB.
0371  REF   6  LAST 1325   07,3346  0 5167 1           TC      JOBWAKE

0372  REF   2  LAST 1424   07,3347  1 3153 1  NORESET  TCF     IMUFINED        DO NOT RESET POWER SUPPLY
```

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```
0373   REF  22  LAST 1427   07,3350  4 4766 0   -2       CS      FOUR      SPECIAL ENTRY TO REGRESS LGYRO FOR X
0374   REF   8  LAST 1429   07,3351  27'324 1             ADS     LGYRO

0375   REF 296  LAST 1425   07,3352  50 002 0   GSELECT   INDEX   Q         SELECT GYRO.
0376                        07,3353  3 0000 1             CAF     0         PACKED WORD CONTAINS GYRO SELECT BITS
0377   REF   4  LAST 1408   07,3354  54 064 1             TS      ITEMP4    AND INCREMENT TO LGYRO.
0378   REF  19  LAST 1401   07,3355  7 4774 0             MASK    SEVEN
0379   REF  42  LAST 1420   07,3356  6 4754 0             AD      BIT13
0380   REF   9  LAST 1430   07,3357  27'324 1             ADS     LGYRO

0381   REF  44  LAST 1427   07,3360  54 003 0             TS      EBANK
0382   REF  15  LAST 1427   07,3361  7 4350 1             MASK    LOW8
0383   REF  29  LAST 1427   07,3362  54 061 1             TS      ITEMP1

0384   REF  20  LAST 1430   07,3363  4 4774 0             CS      SEVEN
0385   REF   5  LAST 1430   07,3364  7 0064 1             MASK    ITEMP4
0386   REF   6  LAST 1430   07,3365  54 064 1             TS      ITEMP4

0387                        07,3366  0 0006 1             EXTEND                MOVE DP COMMAND TO RUPTREGS FOR TESTING.
0388   REF  30  LAST 1430   07,3367  5 0061 0             INDEX   ITEMP1
0389                        07,3370  3 1401 0             DCA     1400 1
0390   REF  33  LAST 1408   07,3371  52 071 0             DXCH    RUPTREG1

0391   REF  34  LAST 1430   07,3372  10 070 1             CCS     RUPTREG1
0392   REF   1              07,3373  1 3406 1             TCF     MAJ+
0393                        07,3374  1 3376 1             TCF     +2
0394   REF   1              07,3375  1 3541 0             TCF     MAJ-

0395   REF   9  LAST 1408   07,3376  10 071 0             CCS     RUPTREG2
0396   REF   1              07,3377  1 3403 1             TCF     MIN+
0397   REF   1              07,3400  1 3330 0             TCF     STRTGYRZ
0398   REF   1              07,3401  1 3536 0             TCF     MIN-
0399   REF   2  LAST 1430   07,3402  1 3330 0             TCF     STRTGYRZ
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 15 E3 S3

```
0400   REF   1              07,3403  6 3437 1  MIN+     AD       -GYROMIN      SMALL POSITIVE COMMAND. SEE IF AT LEAST
0401                        07,3404  0 0006 1           EXTEND                 16 GYRO PULSES.
0402   REF   3  LAST 1430   07,3405  6 3330 1           BZMF     STRTGYR2

0403                        07,3406  0 0006 1  MAJ+     EXTEND                 DEFINITE POSITIVE OUTPUT.
0404   REF   1              07,3407  3 3562 0           DCA      GYROFRAC
0405   REF  35  LAST 1430   07,3410  20 071 0           DAS      RUPTREG1

0406   REF   7  LAST 1430   07,3411  3 0064 0           CA       ITEMP4        SELECT POSITIVE TORQUING FOR THIS GYRO.
0407                        07,3412  0 0006 1           EXTEND
0408   REF  15  LAST 1429   07,3413  05 014 1           WOR      CHAN14

0409   REF  10  LAST 1416   07,3414  3 6043 0           CAF      LOW7          LEAVE NUMBER OF POSSIBLE 8192 AUGMENTS
0410   REF  10  LAST 1430   07,3415  7 0071 0           MASK     RUPTREG2      TO INITIAL COMMAND IN MAJOR PART OF LONG
0411   REF  11  LAST 1431   07,3416  56 071 1           XCH      RUPTREG2      TERM STORAGE AND TRUNCATED FRACTION
0412                        07,3417  0 0006 1  GMERGE   EXTEND                 IN MINOR PART. THE MAJOR PART WILL BE
0413   REF  33  LAST 1407   07,3420  7 4761 1           MP       BIT8          COUNTED DOWN TO ZERO IN THE COURSE OF
0414   REF  19  LAST 1408   07,3421  54 062 1           TS       ITEMP2        PUTTING OUT THE ENTIRE COMMAND.
0415   REF  36  LAST 1431   07,3422  3 0070 0           CA       RUPTREG1
0416                        07,3423  0 0006 1           EXTEND
0417   REF  27  LAST 1417   07,3424  7 4760 0           MP       BIT9
0418   REF  37  LAST 1431   07,3425  54 070 1           TS       RUPTREG1
0419   REF 189  LAST 1420   07,3426  3 0001 0           CA       L
0420                        07,3427  0 0006 1           EXTEND
0421   REF  64  LAST 1393   07,3430  7 4753 0           MP       BIT14
0422   REF  20  LAST 1431   07,3431  26 062 1           ADS      ITEMP2        INITIAL COMMAND.

0423                        07,3432  0 0006 1           EXTEND                 SEE IF MORE THAN ONE PULSE TRAIN NEEDED
0424   REF  38  LAST 1431   07,3433  3 0071 1           DCA      RUPTREG1      (MORE THAN 16383 PULSES).
0425   REF   1              07,3434  6 7702 0           AD       MINUS1
0426   REF 374  LAST 1429   07,3435  10 000 0           CCS      A
0427   REF   1              07,3436  1 3503 0           TCF      LONGGYRO
0428                        07,3437   77601 0  -GYROMIN OCT      -176          MAY BE ADJUSTED TO SPECIFY MINIMUM CMD
0429                        07,3440  1 3444 1           TCF      +4

0430   REF  65  LAST 1431   07,3441  3 4753 1           CAF      BIT14
0431   REF  21  LAST 1431   07,3442  26 062 1           ADS      ITEMP2
0432   REF 255  LAST 1429   07,3443  3 4772 1           CAF      ZERO

0433   REF  31  LAST 1430   07,3444  50 061 0  +4       INDEX    ITEMP1
0434                        07,3445  53'401 1           DXCH     1400
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 16 E3 S3

```
04435  REF  22  LAST 1431   07,3446  3 0062 0          CA    ITEMP2        ENTIRE COMMAND.
0436   REF   3  LAST 1423   07,3447  54 047 0  LASTSEG TS    GYROCMD
04361  REF   1              07,3450  0 3570 0  +1      TC    COARSTST

04367  REF   4  LAST 1432   07,3451  3 0047 1          CA    GYROCMD
0437                        07,3452  0 0006 1          EXTEND
0438   REF  32  LAST 1424   07,3453  7 4757 1          MP    BIT10         WAITLIST DT
0439   REF  49  LAST 1416   07,3454  6 6214 0          AD    THREE         TRUNCATION AND PHASE UNCERTAINTIES.
0440   REF  27  LAST 1424   07,3455  0 5223 1          TC    TWIDDLE
0442   REF   1              07,3456   03467 1          ADRES TWOPULSE
04475  REF   1              07,3457  0 3463 0  EXITGYRO TC    GYROEXIT
04476  REF  63  LAST 1425   07,3460  1 5314 0          TCF   TASKOVER
04477  REF  40  LAST 1393   07,3461  3 4767 0  OUTPULSE CA    BIT2
04478  REF   5  LAST 1432   07,3462  54 047 0          TS    GYROCMD
0448   REF  33  LAST 1432   07,3463  3 4757 0  GYROEXIT CAF   BIT10
0449                        07,3464  0 0006 1          EXTEND
0450   REF  16  LAST 1431   07,3465  05 014 1          WOR   CHAN14
0451   REF 297  LAST 1430   07,3466  0 0002 0          TC    Q
04511  REF  28  LAST 1431   07,3467  4 4760 0  TWOPULSE CS    BIT9
04512                       07,3470  0 0006 1          EXTEND
04513  REF  17  LAST 1432   07,3471  03 014 1          WAND  CHAN14
04514  REF   1              07,3472  0 3461 1          TC    OUTPULSE
04515  REF  64  LAST 1393   07,3473  3 4770 0          CA    BIT1
04516  REF  28  LAST 1432   07,3474  0 5223 1          TC    TWIDDLE
04517  REF   2  LAST 1427   07,3475   03324 1          ADRES STRTGYRO
04518  REF  29  LAST 1432   07,3476  3 4760 1          CA    BIT9
04519                       07,3477  0 0006 1          EXTEND
0452   REF  18  LAST 1432   07,3500  05 014 1          WOR   CHAN14
04521  REF   2  LAST 1432   07,3501  0 3461 1          TC    OUTPULSE
04522  REF  64  LAST 1432   07,3502  1 5314 0          TCF   TASKOVER
0453   REF  32  LAST 1431   07,3503  50 061 0  LONGGYRO INDEX ITEMP1
04531                       07,3504  53'401 1          DXCH  1400            INITIAL COMMAND + N AUGMENTS OF
0454   REF  66  LAST 1431   07,3505  3 4753 1          CAF   BIT14           8192. INITIAL COMMAND IS AT LEAST 8192
0455   REF  23  LAST 1432   07,3506  6 0062 0          AD    ITEMP2
0456   REF   6  LAST 1432   07,3507  54 047 0          TS    GYROCMD

0457                        07,3510  0 0006 1  AUG3    EXTEND                GET WAITLIST DT TO TIME WHEN TRAIN IS
0458   REF  34  LAST 1432   07,3511  7 4757 1          MP    BIT10         ALMOST OUT.
0459   REF   5  LAST 1394   07,3512  6 7700 1          AD    NEG3
0460   REF  29  LAST 1432   07,3513  0 5223 1          TC    TWIDDLE
0462   REF   1              07,3514   03516 0          ADRES 8192AUG
0463   REF   1              07,3515  1 3457 0          TCF   EXITGYRO

0464   REF   2  LAST 1432   07,3516  0 3570 0  8192AUG TC    COARSTST

0465   REF  10  LAST 1430   07,3517  3 1324 0          CA    LGYRO         ADD 8192 PULSES TO GYROCMD
0466   REF  45  LAST 1430   07,3520  54 003 0          TS    EBANK
0467   REF  16  LAST 1430   07,3521  7 4350 1          MASK  LOW8
0468   REF  33  LAST 1432   07,3522  54 061 1          TS    ITEMP1
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 17 E3 S3

```
0469   REF  34  LAST 1432   07,3523  50 061 0          INDEX  ITEMP1     SEE IF THIS IS THE LAST AUG.
0470                        07,3524  11'400 0          CCS    1400
0471   REF   1              07,3525  1 3531 1          TCF    AUG2       MORE TO COME.

0472   REF  67  LAST 1432   07,3526  3 4753 1          CAF    BIT14
0473   REF   7  LAST 1432   07,3527  26 047 0          ADS    GYROCMD
0474   REF   1              07,3530  1 3450 1          TCF    LASTSEG +1

0475   REF  35  LAST 1433   07,3531  50 061 0  AUG2    INDEX  ITEMP1
0476                        07,3532  55'400 0          TS     1400
0477   REF  68  LAST 1433   07,3533  3 4753 1          CAF    BIT14
0478   REF   8  LAST 1433   07,3534  26 047 0          ADS    GYROCMD
0479   REF   1              07,3535  1 3510 1          TCF    AUG3       COMPUTE DT.
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 18 E3 S3

```
0480   REF   2  LAST 1431   07,3536  6 3437 1  MIN-    AD      -GYROMIN      POSSIBLE NEGATIVE OUTPUT
0481                        07,3537  0 0006 1          EXTEND
0482   REF   4  LAST 1431   07,3540  6 3330 1          BZMF    STRTGYR2

0483                        07,3541  0 0006 1  MAJ-    EXTEND                DEFINITE NEGATIVE OUTPUT
0484   REF   2  LAST 1431   07,3542  4 3562 1          DCS     GYROFRAC
0485   REF  39  LAST 1431   07,3543  20 071 0          DAS     RUPTREG1

0486   REF   8  LAST 1431   07,3544  3 0064 0          CA      ITEMP4        SELECT NEGATIVE TORQUING FOR THIS GYRO.
0487   REF  30  LAST 1432   07,3545  6 4760 1          AD      BIT9
0488                        07,3546  0 0006 1          EXTEND
0489   REF  19  LAST 1432   07,3547  05 014 1          WOR     CHAN14

0490   REF  40  LAST 1434   07,3550  4 0070 1          CS      RUPTREG1      SET UP RUPTREGS TO FALL INTO GMERGE.
0491   REF  41  LAST 1434   07,3551  54 070 1          TS      RUPTREG1      ALL NUMBERS PUT INTO GYROCMD ARE
0492   REF  12  LAST 1431   07,3552  4 0071 0          CS      RUPTREG2      POSITIVE - BIT9 OF CHAN 14 DETERMINES
0493   REF  11  LAST 1431   07,3553  7 6043 1          MASK    LOW7          THE SIGN OF THE COMMAND.
0494                        07,3554  4 0000 0          COM
0495   REF  13  LAST 1434   07,3555  56 071 1          XCH     RUPTREG2
0496                        07,3556  4 0000 0          COM
0497   REF   1              07,3557  1 3417 1          TCF     GMERGE

0498                        07,3560   01700 1  GDESELCT OCT     1700          TURN OFF SELECT AND ACTIVITY BITS.
0499                        07,3561   00000 1  GYROFRAC 2DEC    .215 B -21
0499                        07,3562   00034 0
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 19 E3 S3

```
P0500           IMU MODE SWITCHING ROUTINES COME HERE WHEN ACTION COMPLETE.

 0501                                07,3563  0 0006 1  ENDIMU   EXTEND                  MODE IS BAD IF CAGE HAS OCCURED OR IF
 0502   REF  27  LAST 1220          07,3564  00 011 1            READ    DSALMOUT        ISS WARNING IS ON.
 0503   REF  65  LAST 1432          07,3565  7 4770 1            MASK    BIT1
 0504   REF   6  LAST 1204          07,3566  6 7702 0            AD      NEG1
 0505   REF   1                     07,3567  1 3626 1            TCF     BADEND +1
 050603 REF  41  LAST 1429          07,3570  3 4765 1  COARSTST  CAF     BIT4
 050605                             07,3571  0 0006 1            EXTEND
 050607 REF  55  LAST 1425          07,3572  02 012 0            RAND    CHAN12
 050609 REF 375  LAST 1431          07,3573  10 000 0            CCS     A
 050613 REF   1                     07,3574  1 3601 1            TCF     DONTPULS

 050615 REF  65  LAST 1426          07,3575  4 1333 1  CAGETSTG  CS      IMODES30
 050617 REF   4  LAST  209          07,3576  7 4763 0            MASK    IMUNITBT
 050619 REF 376  LAST 1435          07,3577  10 000 0            CCS     A
 050621 REF 298  LAST 1432          07,3600  0 0002 0            TC      Q

 050623 REF 256  LAST 1431          07,3601  3 4772 1  DONTPULS  CAF     ZERO
 050625 REF  11  LAST 1432          07,3602  55'324 1            TS      LGYRO

 050627 REF   3  LAST 1429          07,3603  3 3323 0            CAF     LGWAKE
 050629 REF   7  LAST 1429          07,3604  0 5167 1            TC      JOBWAKE

 0507   REF   3  LAST 1422          07,3605  1 3625 1            TCF     IMUBAD
 0509   REF   5  LAST 1435          07,3606  3 4763 1  CAGETEST  CAF     IMUNITBT        SUBROUTINE TO TERMINATE IMU MODE
 0510   REF  66  LAST 1435          07,3607  7 1333 1            MASK    IMODES30        SWITCH IF IMU HAS BEEN CAGED.
 0511   REF 377  LAST 1435          07,3610  10 000 0            CCS     A
 0512   REF   4  LAST 1435          07,3611  1 3625 1            TCF     IMUBAD          DIRECTLY.
 0513   REF 299  LAST 1435          07,3612  0 0002 0            TC      Q               WITH C(A) = +0.

 0514   REF  67  LAST 1435          07,3613  4 1333 1  CAGETSTQ  CS      IMODES30        SKIP IF IMU NOT BEING CAGED.
 0515   REF   6  LAST 1435          07,3614  7 4763 0            MASK    IMUNITBT
 0516   REF   5  LAST  487          07,3615  1 5651 1            TCF     INCRQCK
 0519   REF  68  LAST 1435          07,3616  4 1333 1  CAGETSTJ  CS      IMODES30        IF DURING MODE SWITCH INITIALIZATION
 0520   REF   7  LAST 1435          07,3617  7 4763 0            MASK    IMUNITBT        IT IS FOUND THAT THE IMU IS BEING CAGED,
 0521   REF 378  LAST 1435          07,3620  10 000 0            CCS     A               SET IMUCADR TO -0 TO INDICATE OPERATION
 0522   REF 300  LAST 1435          07,3621  0 0002 0            TC      Q               COMPLETE BUT FAILED. RETURN IMMEDIATELY

 0523   REF 257  LAST 1435          07,3622  4 4772 0  +4        CS      ZERO            TO SWRETURN
 0524   REF   3  LAST 1225          07,3623  55'335 1            TS      IMUCADR
 0525   REF   7  LAST 1427          07,3624  1 2675 0            TCF     MODEEXIT

 05252  REF   2  LAST 1435          07,3625          IMUBAD     EQUALS  BADEND
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 20 E3 S3

P0526 GENERALIZED MODE SWITCHING TERMINATION. ENTER AT GOODEND FOR SUCCESSFUL COMPLETION OF AN I/O OPERATION
R0528 CR AT BADEND FOR AN UNSUCCESSFUL ONE.

```
0531  REF 258  LAST 1435   07,3625  4 4772 0  BADEND  CS     ZERO       FOR FAILURE
0535  REF   6  LAST 1408   07,3626  54 072 0    +1    TS     RUPTREG3   -0 FAILURE -1 SUCCESS
0537  REF   7  LAST  788   07,3627  11'335 1          CCS    MODECADR
0538                       07,3630  1 3632 1          TCF    +2         YES - WAKE IT UP.
0539  REF   1              07,3631  1 3641 0          TCF    ENDMODE    IF 0, PROGRAM NOT IN YET.

0540  REF 259  LAST 1436   07,3632  3 4772 1          CAF    ZERO       WAKE SLEEPING PROGRAM.
0542  REF   8  LAST 1436   07,3633  57'335 0          XCH    MODECADR
0543  REF   8  LAST 1435   07,3634  0 5167 1          TC     JOBWAKE

0544  REF   7  LAST 1436   07,3635  4 0072 0          CS     RUPTREG3   ADVANCE LOC IF SUCCESSFUL.
0545  REF  21  LAST 1325   07,3636  50 064 0          INDEX  LOCCTR
0546  REF  40  LAST 1220   07,3637  26 164 0          ADS    LOC

0547  REF  65  LAST 1432   07,3640  1 5314 0          TCF    TASKOVER

0548  REF   8  LAST 1436   07,3641  3 0072 1  ENDMODE  CA     RUPTREG3   -0 INDICATES OPERATION COMPLETE BUT
0550  REF   9  LAST 1436   07,3642  55'335 1          TS     MODECADR   SUCCESSFUL.
0551  REF  66  LAST 1436   07,3643  1 5314 0          TCF    TASKOVER
```

```
P0552           GENERAL STALLING ROUTINE. USING PROGRAMS COME HERE TO WAIT FOR I/O COMPLETION.

R0554   PROGRAM DESCRIPTION                                  DATE- 21 FEB 1967
R0555                                          LOG SECTION IMU MODE SWITCHING
R0556   MOD BY- R.MELANSON TO ADD DOCUMENTATION       ASSEMBLY SUNDISK  REV.  82

R0557   FUNCTIONAL DESCRIPTION-
R0558     TO DELAY FURTHER EXECUTION OF THE CALLING ROUTINE UNTIL ITS SELECTED
R0559     I/O FUNCTION IS COMPLETE.THE FOLLOWING CHECKS ON THE CALLING ROUTINE:S
R0560     MODECADR ARE MADE AND ACTED UPON.
R0561       1) +0 INDICATES INCOMPLETE I/O OPERATION.CALLING ROUTINE IS PUT TO
R0562          SLEEP.
R0563       2) -1 INDICATES COMPLETED I/O OPERATION. STALL BYPASSES JOBSLEEP
R0564          CALL AND RETURNS TO CALLING ROUTINE AT L+3
R0565       3) -0 INDICATES COMPLETED I/O WITH FAILURE. STALL CLEARS MODECADR
R0566          AND RETURNS TO CALLING ROUTINE AT L+2.
R0567       4) VALUE GREATER THAN 0 INDICATES TWO ROUTINES CALLING FOR USE OF
R0568          SAME DEVICE. STALL EXITS TO ABORT WHICH EXECUTES A PROGRAM
R0569          RESTART WHICH IN TURN CLEARS ALL MODECADR REGISTERS.

R0570     CALLING SEQUENCE-
R0571      L    TC    BANKCALL
R0572     L+1        CADR    IMUSTALL
R0573

R0574     NORMAL-EXIT MODE-
R0575      TCF    JOBSLEEP OR TCF  MODEXIT

R0576   ALARM OR ABORT EXIT MODE-
R0577        POODOO 21210

R0578   OUTPUT-
R0579     MODECADR= CADR IF JOBSLEEP
R0580     MODECADR=+0     IF I/O COMPLETE
R0581     BUF2=L+3        IF I/O COMPLETE AND GOOD.
R0582     BUF2=L+2 IF I/O COMPLETE BUT FAILED.

R0583   ERASABLE INITIALIZATION-
R0584     BUF2 CONTAINS RETURN ADDRESS PLUS 1,(L+2)
R0585     BUF2+1 CONTAINS FBANK VALUE OF CALLING ROUTINE.
R0586     MODECADR CONTAINS +0, -1, OR -0 OR CADR RETURN ADDRESS.


 0598   REF  10  LAST 1436   07,3644  11'335 1  IMUSTALL CCS    MODECADR
 0599   REF   1              07,3645  1 3661 1            TCF    MODABORT      ALLOWABLE STATES ARE +0, -1, AND -
 0600   REF   1              07,3646  1 3656 0            TCF    MODESLP       OPERATION INCOMPLETE.
 0601   REF   1              07,3647  1 3652 1            TCF    MODEGOOD      COMPLETE AND GOOD IF = -1.

 0603   REF  11  LAST 1437   07,3650  55'335 1  MG2       TS     MODECADR      COMPLETE AND FAILED IF -0. RESET TO +0
 0604   REF   8  LAST 1435   07,3651  1 2675 0            TCF    MODEEXIT      RETURN TO CALLER.
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 22 E3 S3

```
0605  REF 379  LAST 1435   07,3652  10 000 0  MODEGOOD CCS    A          MAKE SURE INITIAL STATE -1.
0606  REF   2  LAST 1437   07,3653  1 3661 1           TCF    MODABORT

0607  REF  22  LAST 1428   07,3654  24 133 0           INCR   BUF2       IF SO, INCREMENT RETURN ADDRESS AND
0608  REF   1              07,3655  1 3650 0           TCF    MG2        RETURN IMMEDIATELY, SETTING CADR = +

0609  REF   4  LAST  571   07,3656  0 4665 0  MODESLP  TC     MAKECADR   CALL FROM SWITCHABLE FIXED ONLY
0611  REF  12  LAST 1437   07,3657  55'335 1           TS     MODECADR
0612  REF   4  LAST 1428   07,3660  1 5163 1           TCF    JOBSLEEP

0613  REF   9  LAST 1339   07,3661  0 5726 1  MODABORT TC     POODOO     TWO PROGRAMS USING SAME DEVICE.
0614                        07,3662   21210 1           OCT    21210
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 23 E3 S3

P0615 CONSTANTS FOR MODE SWITCHING ROUTINES

```
0616   REF   4  LAST 1039      5775              BITS3&4  =       OCT14
0617   REF  10  LAST 1394      5004              BITS4&6  =       OCT50
0618   REF   9  LAST 1002      5001              BITS4-5  EQUALS  BITS4&5
0619   REF  34  LAST 1431      4761              IMUSEFLG EQUALS  BIT8        INTERPRETER SWITCH 7.
0620                        07,3663   77500 1    -COMMAX  DEC     -191
0621                        07,3664   77477 0    -COMMAX- DEC     -192
0622                        07,3665   00074 1    600MS    DEC     60
0623   REF   3  LAST  428   07,3133              IMUFIN2  =       IMUFINE
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 24 E3 S3

```
R0646   PROGRAM DESCRIPTION
R0647   IMU STATUS CHECK ROUTINE R02  (SUBROUTINE UTILITY)
R0648   MOD NO - 1
R0649   MOD BY - N.BRODEUR
R0650   FUNCTIONAL DESCRIPTION
R0651
R0652   TO CHECK WHETHER IMU IS ON AND IF ON WHETHER IT IS ALIGNED TO AN
R0653   ORIENTATION KNOWN BY THE CMC. TO REQUEST SELECTION OF THE APPROPRIATE
R0654   PROGRAM IF THE IMU IS OFF OR NOT ALIGNED TO AN ORIENTATION KNOWN BY THE
R0655   CMC. CALLED THROUGH BANKCALL
R0656   CALLING SEQUENCE-
R0657
R0658   L       TC      BANKCALL
R0659   L+1     CADR    R02BOTH
R0660   SUBROUTINES CALLED
R0661
R0662           VARALARM
R0663           FLAGUP
R0664   NORMAL EXIT MODES
R0665
R0666   AT L+2 OF CALLING SEQUENCE
R0667   ALARM OR ABORT EXIT MODES
R0668           GOTOPOOH, WITH ALARM
R0673   ERASABLE INITIALIZATION REQUIRED
R0674
R0675   NONE
R0676   DEBRIS
R0677
R0678   CENTRALS-A,Q,L
 0680   REF   1                 01,2000                 SETLOC  R02
 0681                           01,3731                 BANK
 0682   REF   1                                         COUNT*  $$/R02
 0684   REF   6  LAST 1423      01,3731  3 4754 0 R02BOTH CAF    REFSMBIT
 0685   REF   9  LAST 1423      01,3732  7 0077 0        MASK   FLAGWRD3
 0686   REF 380  LAST 1438      01,3733  10 000 0        CCS    A
 0687   REF   2  LAST  774      01,3734  0 3745 1        TC     R02ZERO         ZERO IMUS

 0688   REF  69  LAST 1435      01,3735  3 1333 0        CA     IMODES30
 0689   REF   4  LAST 1418      01,3736  7 4760 0        MASK   IMODPBIT        IS ISS INITIALIZED
 0690                           01,3737  0 0006 1        EXTEND
 0691                           01,3740  1 3742 1        BZF    +2
 0692   REF  42  LAST 1435      01,3741  4 4765 0        CS     BIT4            SEND IMU ALARM CODE 210
 0693   REF   1                 01,3742  6 3750 0        AD     OCT220          SEND REFSMM ALARM
 0694   REF   4  LAST  907      01,3743  0 5770 1        TC     VARALARM

 0695   REF  54  LAST  907      01,3744  0 4103 1        TC     GOTOPOOH
 0700   REF  71  LAST 1359      01,3745  0 5547 1 R02ZERO TC     UPFLAG
 0701   REF   4  LAST  429      01,3746   00007 0        ADRES  IMUSE
 0702   REF   7  LAST 1426      01,3747  1 4651 0        TCF    SWRETURN
 07025                          01,3750   00220 1 OCT220  OCT    220
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 25 E3 S3

P0703 PROGRAM DESCRIPTION P06 10FEB67

R0704 TRANSFER THE ISS/CMC FROM THE OPERATE TO THE STANDBY CONDITION.

R0705 THE NORMAL CONDITION OF READINESS OF THE GNCS WHEN NOT IN USE IS STANDBY. IN THIS CONDITION THE IMU
R0707 HEATER POWER IS ON. THE IMU OPERATE POWER IS OFF. THE COMPUTER POWER IS ON. THE OPTICS POWER IS OFF. THE
R0709 CMC STANDBY ON THE MAIN AND LEB DISKYS IS ON.

R0710 CALLING SEQUENCE:
R0711 ASTRONAUT REQUEST THROUGH DSKY V37E 06E.

R0712 SUBROUTINES CALLED:
R0713 GOPERF1
R0716 BANKCALL
R0719 FLAGDOWN

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 26 E3 S3

P0810 PRESTAND PREPARES FOR STANDBY BY SNAPSHOTTING THE SCALER AND TIME1 TIME2
R0811 THE LOW 5 BITS OF THE SCALER ARE INSPECTED TO INSURE COMPATABILITY
R0812 BETWEEN THE SCALER READING AND THE TIME1 TIME2 READING.

```
 08125  REF   1              26,2000                        SETLOC  P05P06
 08126                       26,3654                        BANK

 0813   REF   2  LAST   77     1006                         EBANK=  TIME2SAV
 0814   REF   1                                            COUNT*  $$/P06

 08145  REF  72  LAST 1440   26,3654  0 5547 1  P06       TC      UPFLAG          SET NODOV37 BIT
 08146  REF   5  LAST 1314   26,3655   00054 0             ADRES   NODOFLAG

 0815                       26,3656  0 0004 0  PRESTAND  INHINT
 0816                       26,3657  0 0006 1            EXTEND
 0817   REF  37  LAST 1415   26,3660  3 0025 0            DCA     TIME2           SNAPSHOT TIME1TIME2
 0818   REF   3  LAST 1442   26,3661  53'007 0            DXCH    TIME2SAV
 0819   REF   1              26,3662  0 3715 1            TC      SCALPREP
 0820   REF   1              26,3663  0 3656 1            TC      PRESTAND        T1,T2,SCALER NOT COMPATIBLE
 0821   REF 678  LAST 1428   26,3664  52 155 1            DXCH    MPAC            T1,T2 AND SCALER OK
 0822   REF   1              26,3665  53'011 1            DXCH    SCALSAVE        STORE SCALER
 0823                       26,3666  0 0004 0            INHINT
 0824   REF 214  LAST 1066   26,3667  0 4636 0            TC      BANKCALL
 0825   REF   3  LAST  162   26,3670   17121 0            CADR    RNDREFDR        REFSMM, DRIFT, TRACK FLAGS DOWN

 0826   REF  64  LAST 1314   26,3671  0 5561 0            TC      DOWNFLAG
 0827   REF   5  LAST 1440   26,3672   00007 0            ADRES   IMUSE           IMUSE DOWN
 08271  REF  65  LAST 1442   26,3673  0 5561 0            TC      DOWNFLAG
 08272  REF  10  LAST  628   26,3674   00010 0            ADRES   RNDVZFLG        RNDVZFLG DOWN

 08273  REF  66  LAST 1442   26,3675  0 5561 0            TC      DOWNFLAG
 08274  REF  11  LAST  601   26,3676   00176 1            ADRES   UTFLAG
 0828   REF  32  LAST 1393   26,3677  3 4756 1            CAF     BIT11
 0829                       26,3700  0 0006 1            EXTEND
 0830   REF  16  LAST 1098   26,3701  05 013 0            WOR     CHAN13          SET STANDBY ENABLE BIT

 0831   REF 105  LAST 1406   26,3702  0 5402 1            TC      PHASCHNG        SET RESTART TO POSTAND WHEN STANDBY
 0832                       26,3703   07024 0            OCT     07024             RECOVERS
 0833                       26,3704   20000 0            OCT     20000
 0835   REF   2  LAST 1442     1010                       EBANK=  SCALSAVE
 0834   REF   1              26,3705   03735 0            2CADR   POSTAND
 0834   REF   1              26,3706   54062 1
 0835   REF   2  LAST  215   26,3707  3 5011 1            CAF     OCT62
 0836   REF 215  LAST 1442   26,3710  0 4636 0            TC      BANKCALL
 0837   REF  11  LAST  786   26,3711   21067 0            CADR    GOPERF1
 0838                       26,3712  1 3707 0            TCF     -3
 0839                       26,3713  1 3707 0            TCF     -4
 0840                       26,3714  1 3707 0            TCF     -5

 08405  REF  10  LAST 1066     5011              OCT62    EQUALS  .5SEC           DEC 50 = OCT 62
```

L IMU MODE SWITCHING ROUTINES

```
R0841   THE LOW 5 BITS OF THE SCALER READS 10000 FOR THE FIRST INTERVAL AFTER A
R0842   T1 INCREMENT. IF SCALPREP DETECTS THIS INTERVAL THE T1,T2 AND SCALER
R0843   DATA ARE NOT COMPATABLE AND RETURN IS TO L+1 FOR ANOTHER READING OF THE
R0844   DATA. OTHERWISE, THE RETURN IS TO L+2 TO PROCEED. ROUTINE ALSO PREPARES
R0845   THE SCALER READING FOR COMPUTATION OF THE INCREMENT TO UPDATE T1T2. (THE
R0846   10 MS BIT (BIT 6) OF THE SCALER IS INCREMENTED 5 MS OUT OF PHASE FROM
R0847   T1.) ADDITION OF 5 MS (BIT 5) TO THE SCALER READING HAS THE EFFECT OF
R0848   ADJUSTING BIT 6 IN THE SCALER TO BE IN PHASE WITH BIT 1 OF T1. THE LOW 5
R0849   BITS OF THE SCALER READING ARE THEN SET TO ZERO, TO TRUNCATE THE SCALER
R0850   DATA TO 10 MS. RESULTS ARE STORED IN MPAC, +1.

 0851                          26,3715  0 0006 1  SCALPREP EXTEND
 0852   REF 679  LAST 1442     26,3716  22 156 0          QXCH   MPAC     +2
 0853   REF   2  LAST  432     26,3717  0 4511 0          TC     FINETIME +1
 0854                          26,3720  0 0003 1          RELINT
 0855   REF 680  LAST 1443     26,3721  52 155 1          DXCH   MPAC
 0856   REF  34  LAST 1419     26,3722  3 4764 0          CA     BIT5             ADD 5 MS TO THE SCALER READING
 0857   REF 190  LAST 1431     26,3723  54 001 1          TS     L
 0858   REF 260  LAST 1436     26,3724  3 4772 1          CA     ZERO
 0859   REF 681  LAST 1443     26,3725  20 155 1          DAS    MPAC
 0860   REF   9  LAST 1201     26,3726  4 4342 1          CS     LOW5             SET LOW 5 BITS OF (SCALER+5MS) TO ZERO
 0861   REF 682  LAST 1443     26,3727  7 0155 1          MASK   MPAC     +1       AND STORE RESULTS IN MPAC,+1
 0862   REF 683  LAST 1443     26,3730  56 155 0          XCH    MPAC     +1
 0863   REF  10  LAST 1443     26,3731  7 4342 1          MASK   LOW5             TEST LOW 5 BITS OF SCALER FOR THE FIRST
 0864                                                                            INTERVAL AFTER THE T1 INCREMENT
 0865                                                                            (NOW = 00000, SINCE BIT 5 ADDED)
 0866   REF 381  LAST 1440     26,3732  10 000 0          CCS    A                IS IT 1ST INTERVAL AFTER T1 INCREMENT
 0867   REF 684  LAST 1443     26,3733  24 156 0          INCR   MPAC +2          NO
 0868   REF 685  LAST 1443     26,3734  0 0156 0          TC     MPAC +2          YES

R0869   POSTAND RECOVERS TIME AFTER STANDBY.THE SCALER IS SNAPSHOTTED AND THE
R0870   TIME1 TIME2 COUNTER IS SET TO ZERO. THE LOW 5 BITS OF THE SCALER ARE
R0871   INSPECTED TO INSURE COMPATABILITY BETWEEN THE SCALER READING AND THE
R0872   CLEARING OF THE TIME COUNTER. IT THEN COMPUTES THE DIFFERENCE IN SCALER
R0873   VALUES (IN DP) AND ADDS THIS TO THE PREVIOUSLY SNAPSHOTTED VALUES OF
R0874   TIME1 TIME2 AND PLACES THIS NEW TIME INTO THE TIME1 TIME2 COUNTER.

 0875   REF   1                                    COUNT* $$/P05

 0876   REF  33  LAST 1442     26,3735  4 4756 0  POSTAND  CS     BIT11            RECOVER TIME AFTER STANDBY.
 0877                          26,3736  0 0006 1           EXTEND
 0878   REF  17  LAST 1442     26,3737  03 013 0          WAND   CHAN13           CLEAR STANDBY ENABLE BIT
 0879                          26,3740  0 0004 0    +3    INHINT
 0880   REF 261  LAST 1443     26,3741  3 4772 1          CA     ZERO
 0881   REF 191  LAST 1443     26,3742  54 001 1          TS     L
 0882   REF  38  LAST 1442     26,3743  52 025 1          DXCH   TIME2            CLEAR TIME1TIME2
 0883   REF   2  LAST 1442     26,3744  0 3715 1          TC     SCALPREP         STORE SCALER IN MPAC, MPAC+1
 0884   REF   2  LAST 1442     26,3745  0 3740 1          TC     POSTAND +3       T1,T2,SCALER NOT COMPATIBLE
 0885                          26,3746  0 0006 1          EXTEND                  T1,T2 AND SCALER OK
 0886   REF   3  LAST 1442     26,3747  4 1011 1          DCS    SCALSAVE
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 28 E2 S3

```
0887   REF 686  LAST 1443   26,3750  20 155 1            DAS     MPAC      FORM DP DIFFERENCE OF POSTSTANDBY SCALER
0888   REF  35  LAST 1432   26,3751  3 4757 0            CAF     BIT10     MINUS PRESTANDBY SCALER AND SHIFT RIGHT
0889   REF   9  LAST  386   26,3752  0 7256 1            TC      SHORTMP   5 TO ALIGN BITS WITH TIME1TIME2
0892   REF   9  LAST 1427   26,3753  0 7224 1            TC      DPAGREE
0893   REF 687  LAST 1444   26,3754  10 154 0            CCS     MPAC
0894   REF   1              26,3755  0 3762 1            TC      POSTCOM   IF DP DIFF NET +, NO SCALER OVERFLOW
0895   REF   2  LAST 1444   26,3756  0 3762 1            TC      POSTCOM   BETWEEN PRE AND POST STANDBY.
0896                        26,3757  0 3760 0            TC      +1        IF DP DIFF NET -, SCALER OVERFLOWED. ADD
0897   REF  36  LAST 1444   26,3760  3 4757 0            CAF     BIT10     BIT 10 TO HIGH DIFF TO CORRECT.
0898   REF 688  LAST 1444   26,3761  26 154 0            ADS     MPAC
0899                        26,3762  0 0006 1  POSTCOM    EXTEND            C(MPAC,+1) IS MAGNITUDE OF DELTA SCALER.
0900   REF   4  LAST 1442   26,3763  3 1007 1            DCA     TIME2SAV  PRESTANDBY TIME1TIME2
0901   REF 689  LAST 1444   26,3764  20 155 1            DAS     MPAC
0902   REF   6  LAST 1329   26,3765  0 7226 0            TC      TPAGREE   FORCE SIGN AGREEMENT
0903   REF 690  LAST 1444   26,3766  52 155 1            DXCH    MPAC      UPDATED VALUE FOR T1,T2.
0904   REF  39  LAST 1443   26,3767  20 025 1            DAS     TIME2     LOAD UPDATED VALUE INTO T1,T2, WITH
09045  REF  67  LAST 1442   26,3770  0 5561 0            TC      DOWNFLAG  CLEAR NODOFLAG
09046  REF   6  LAST 1442   26,3771   00054 0            ADRES   NODOFLAG

0905   REF  55  LAST 1440   26,3772  0 4103 1  TCGOPOOH   TC      GOTOPOOH
```

L KEYRUPT, UPRUPT USER'S PAGE NO. 1 ED 53

```
0002   REF   1                07,2000                    SETLOC  KEYRUPT
0003                            07,3666                    BANK
0004   REF   1                                           COUNT*  $$/KEYUP

0005   REF  25  LAST 1232   07,3666  54 016 1  KEYRUPT1  TS      BANKRUPT
0006   REF 301  LAST 1435   07,3667  56 002 0            XCH     Q
0007   REF  20  LAST 1232   07,3670  54 012 0            TS      QRUPT
0008   REF   2  LAST  365   07,3671   0 4366 0            TC      LODSAMPT      TIME IS SNATCHED IN RUPT FOR NOUN 65.
0009   REF  11  LAST 1443   07,3672   3 4342 0            CAF     LOW5
0010                        07,3673   0 0006 1            EXTEND
0011   REF   2  LAST  202   07,3674   02 015 1            RAND    MNKEYIN       CHECK IF KEYS 5M-1M ON
0012   REF   6  LAST 1408   07,3675  54 073 1  KEYCOM    TS      RUPTREG4
0013   REF  15  LAST  952   07,3676   4 0101 0            CS      FLAGWRD5
0014   REF   2  LAST  143   07,3677   7 4752 1            MASK    DSKYBIT
0015   REF  16  LAST 1445   07,3700  26 101 0            ADS     FLAGWRD5

0016   REF   5  LAST 1402   07,3701   0 5120 1  ACCEPTUP  TC      NOVAC30       (NOTE: RUPTREG4 = KEYTEMP1)
0018   REF  52  LAST  391       1202                     EBANK=  DSPCOUNT
0019   REF   1                07,3702    02000 0          2CADR   CHARIN
0019   REF   1                07,3703    60102 1
0020   REF   7  LAST 1445   07,3704   3 0073 0            CA      RUPTREG4
0021   REF  22  LAST 1436   07,3705  50 064 0            INDEX   LOCCTR
0022   REF 691  LAST 1444   07,3706  54 154 0            TS      MPAC          LEAVE 5 BIT KEY CDE IN MPAC FOR CHARIN
0023   REF  46  LAST 1099   07,3707   0 5323 0            TC      RESUME
```

L KEYRUPT, UPRUPT USER'S PAGE NO. 2 EO S3

P0024 UPRUPT PROGRAM

```
 0025   REF  26  LAST 1445   07,3710  54 016 1  UPRUPT   TS      BANKRUPT
 0026   REF 302  LAST 1445   07,3711  56 002 0           XCH     Q
 0027   REF  21  LAST 1445   07,3712  54 012 0           TS      QRUPT
 0028   REF   3  LAST 1445   07,3713  0 4366 0           TC      LODSAMPT        TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0029   REF 262  LAST 1443   07,3714  3 4772 1           CAF     ZERO
 0030   REF   2  LAST  204   07,3715  56 045 0           XCH     INLINK
 0031   REF   1               07,3716  54 073 1           TS      KEYTEMP1
 00311  REF  42  LAST 1423   07,3717  3 0075 0           CA      FLAGWRD1
 00312  REF   3  LAST  443   07,3720  7 4755 0           MASK    NOP16BIT        IF = , MISSION IS IN
 00313  REF 382  LAST 1443   07,3721  10 000 0           CCS     A               PRELAUNCH AND UPLINK DATA SUM IS ENABLED
 00314                        07,3722  1 3726 0           TCF     +4              IF FLAGWORD1 BIT 12 =1, IT IS NOT
 00315  REF   2  LAST 1446   07,3723  3 0073 0           CA      KEYTEMP1        ALLOWED.
 00316  REF   1               07,3724  27'116 1           ADS     UPSUM
 00317  REF   2  LAST 1446   07,3725  25'117 1           INCR    UPSUM +1
 0032   REF  43  LAST 1393   07,3726  3 4766 1           CAF     BIT3            TURN ON UPACT LIGHT
 0033                        07,3727  0 0006 1           EXTEND                  (BIT 3 OF CHANNEL 11)
 0034   REF  28  LAST 1435   07,3730  05 011 1           WOR     DSALMOUT
 0035   REF  12  LAST 1445   07,3731  3 4342 0  UPRPT1   CAF     LOW5            TEST FOR TRIPLE CHAR REDUNDANCY
 0036   REF   3  LAST 1446   07,3732  7 0073 1           MASK    KEYTEMP1        LOW5 OF WORD
 0037   REF   4  LAST 1446   07,3733  56 073 0           XCH     KEYTEMP1        LOW5 INTO KEYTEMP1
 0038                        07,3734  0 0006 1           EXTEND
 0039   REF  37  LAST 1444   07,3735  7 4757 1           MP      BIT10           SHIFT RIGHT 5
 0040   REF   1               07,3736  55'137 1           TS      KEYTEMP2
 0041   REF  13  LAST 1446   07,3737  7 4342 1           MASK    LOW5            MID 5
 0042   REF   1               07,3740  6 3774 0           AD      HI10
 0043   REF   1               07,3741  0 3771 0           TC      UPTEST
 0044   REF  38  LAST 1446   07,3742  3 4757 0           CAF     BIT10
 0045                        07,3743  0 0006 1           EXTEND
 0046   REF   2  LAST 1446   07,3744  7 1137 1           MP      KEYTEMP2        SHIFT RIGHT 5
 0047   REF  14  LAST 1446   07,3745  7 4342 1           MASK    LOW5            HIGH 5
 0048                        07,3746  4 0000 0           COM
 0049   REF   2  LAST 1446   07,3747  0 3771 0           TC      UPTEST

 0050   REF   1               07,3750  4 5000 0  UPOK     CS      ELRCODE         CODE IS GOOD. IF CODE = 'ERROR RESET',
 0051   REF   5  LAST 1446   07,3751  6 0073 0           AD      KEYTEMP1        CLEAR UPLOCKFL(SET BIT4 OF FLAGWRD7 = 0)
 0052                        07,3752  0 0006 1           EXTEND                  IF CODE DOES NOT = 'ERROR RESET', ACCEPT
 0053   REF   1               07,3753  1 3761 0           BZF     CLUPLOCK        CODE ONLY IF UPLOCKFL IS CLEAR (=0).

 0054   REF   1               07,3754  3 4765 1           CAF     UPLOCBIT        TEST UPLOCKFL FOR 0 OR 1
 0055   REF  20  LAST  827   07,3755  7 0103 1           MASK    FLAGWRD7
 0056   REF 383  LAST 1446   07,3756  10 000 0           CCS     A
 0057   REF  47  LAST 1445   07,3757  0 5323 0           TC      RESUME          UPLOCKFL = 1
 0058   REF   1               07,3760  0 3701 1           TC      ACCEPTUP        UPLOCKFL = 0

 0059   REF   2  LAST 1446   07,3761  4 4765 0  CLUPLOCK CS      UPLOCBIT        CLEAR UPLOCKFL (I.E., SET BIT 4 OF
 0060   REF  21  LAST 1446   07,3762  7 0103 1           MASK    FLAGWRD7        FLAGWRD7 = 0)
 0061   REF  22  LAST 1446   07,3763  54 103 1           TS      FLAGWRD7
 0062   REF   2  LAST 1446   07,3764  0 3701 1           TC      ACCEPTUP
```

```
A0063                                                                  CODE IS BAD
 0064   REF  23  LAST 1446   07,3765  4 0103 1  TMFAIL2  CS     FLAGWRD7  LOCK OUT FURTHER UPLINK ACTIVITY
 0065   REF   3  LAST 1446   07,3766  7 4765 0            MASK   UPLOCBIT  (BY SETTING UPLOCKFL = 1) UNTIL
 0066   REF  24  LAST 1447   07,3767  26 103 1           ADS    FLAGWRD7  'ERROR RESET' IS SENT VIA UPLINK.
 0067   REF  48  LAST 1446   07,3770  0 5323 0           TC     RESUME
 0069   REF   6  LAST 1446   07,3771  6 0073 0  UPTEST   AD     KEYTEMP1
 0070   REF 384  LAST 1446   07,3772  10 000 0           CCS    A
 0071   REF   1              07,3773  0 3765 0           TC     TMFAIL2
 0072                        07,3774   77740 1  HI10     OCT    77740
 0073   REF   2  LAST 1447   07,3775  0 3765 0           TC     TMFAIL2
 0074   REF 303  LAST 1446   07,3776  0 0002 0           TC     Q

 0075   REF   2  LAST  224      5000              ELRCODE  EQUALS OCT22
R0076   'UPLINK ACTIVITY LIGHT' IS TURNED OFF BY .....
R0077           1.     VBRELDSP
R0078           2.     ERROR RESET
R0079           3.     UPDATE PROGRAM(P27) ENTERED BY V70,V71,V72,AND V73.


R0080
R0081   THE RECEPTION OF A BAD CODE(I.E  CCC FAILURE) LOCKS OUT FURTHER UPLINK ACTIVITY BY SETTING BIT4 OF FLAGWRD7 = 1.
R0083   THIS INDICATION WILL BE TRANSFERRED TO THE GROUND BY THE DOWNLINK WHICH DOWNLINKS ALL FLAGWORDS.
R0085   WHEN UPLINK ACTIVITY IS LOCKED OUT ,IT CAN BE ALLOWED WHEN THE GROUND UPLINKS AND 'ERROR RESET' CODE.
R0087   (IT IS RECOMMENDED THAT THE 'ERROR LIGHT RESET' CODE IS PRECEEDED BY 16 BITS THE FIRST OF WHICH IS 1 FOLLOWED
R0089   BY 15 ZEROES. THIS WILL ELIMINATE EXTRANEOUS BITS FROM INLINK WHICH MAY HAVE BEEN LEFT OVER FROM THE ORIGINAL
R0091   FAILURE)
R0092   UPLINK ACTIVITY IS ALSO ALLOWED(UNLOCKED) DURING FRESH START WHEN FRESH START SETS BIT4 OF FLAGWRD7 = 0.
```

L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 1 EP S3

R0001 DISPLAYS CAN BE CLASSIFIED INTO THE FOLLOWING CATEGORIES-

R0002 1. PRIORITY DISPLAYS- DISPLAYS WHICH TAKE PRIORITY OVER ALL OTHER DISPLAYS. USUALLY THESE DISPLAYS ARE SENT
R0004 OUT UNDER CRITICAL ALARM CONDITIONS.
R0005 2. EXTENDED VERB DISPLAYS- ALL EXTENDED VERBS AND MARK ROUTINES SHOULD USE EXTENDED VERB (MARK) DISPLAYS.
R0007 3. NORMAL DISPLAYS- ALL MISSION PROGRAM DISPLAYS WHICH INTERFACE WITH THE ASTRONAUT DURING THE NORMAL
R0009 SEQUENCE OF EVENTS.
R0010 4. MISC. DISPLAYS- ALL DISPLAYS NOT HANDLED BY THE DISPLAY INTERFACEROUTINES. THESE INCLUDE SUCH DISPLAYS AS
R0012 MM DISPLAYS AND SPECIAL PURPOSE DISPLAYS HANDLED BY PINBALL.

R0013 5. ASTRONAUT INITIATED DISPLAYS- ALL DISPLAYS INITIATED EXTERNALLY.
R0014 THE FOLLOWING TERMS ARE USED TO DESCRIBE THE STATUS OF DISPLAYS-

R0015 1. ACTIVE-THE DISPLAY WHICH IS (1) BEING DISPLAYED TO THE ASTRONAUT AND WAITING FOR A RESPONSE OR
R0017 (2) WAITING FIRST IN LINE FOR THE ASTRONAUT TO FINISH USING THE DSKY OR (3) BEING DISPLAYED ON THE DSKY
R0019 BUT NOT WAITING FOR A RESPONSE.
R0020 2. INACTIVE -A DISPLAY WHICH HAS (1) BEEN ACTIVE BUT WAS INTERRUPTEDBY A DISPLAY OF HIGHER PRIORITY,
R0022 (2) BEEN PUT INTO THE WAITING LIST AT TIME IT WAS REQUESTED DUE TO THE FACT A HIGHER PRIORITY DISPLAY
R0024 WAS ALREADY GOING, (3) BEEN INTERRUPTED BY THE ASTRONAUT (CALLED A PINBRANCH CONDITION, SINCE THIS TYPE
R0026 OF INACTIVE DISPLAY IS USUALLY REACTIVATED ONLY BY PINBALL) OR (4) A DISPLAY WHICH HAS FINISHED BUT STILL
R0028 HAS INFO SAVED FOR RESTART PURPOSES.

R0029 DISPLAY PRIORITIES WORK AS FOLLOWS-

R0030 INTERRUPTS-
R0031 1. THE ASTRONAUT CAN INTERRUPT ANY DISPLAY WITH AN EXTERNAL DISPLAY REQUEST.
R0033 2. INTERNAL DISPLAYS CAN NOT BE SENT OUT WHEN THE ASTRONAUT IS USING THE DSKY.
R0035 3. PRIORITY DISPLAYS INTERRUPT ALL OTHER TYPES OF INTERNAL DISPLAYS. A PRIORITY DISPLAY INTERRUPTING ANOTHER
R0037 PRIORITY DISPLAY WILL CAUSE AN ABORT UNLESS BIT14 IS SET FOR THE LINUS ROUTINE.
R0039 4. A MARK DISPLAY INTERRUPTS ANY NORMAL DISPLAY.
R0040 5. A MARK THAT INTERRUPTS A MARK COMPLETELY REPLACES IT.

R0041 ORDER OF WAITING DISPLAYS-
R0042 1. ASTRONAUT EXTERNAL USE
R0043 2. PRIORITY
R0044 3. INTERRUPTED MARK
R0045 4. INTERRUPTED NORMAL

R0046 5. MARK TO BE REQUESTED (SEE DESCRIPTION OF ENDMARK)
R0047 6. MARK WAITING
R0048 7. NORMAL WAITING

L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 2 E0 S3

P0049 THE DISPLAY ROUTINES ARE INTENDED TO SERVE AS AN INTERFACE BETWEEN THE USER AND PINBALL. THE
R0051 FOLLOWING STATEMENTS CAN BE MADE ABOUT NORMAL DISPLAYS AND PRIORITY DISPLAYS (A DESCRIPTION OF MARK ROUTINES
R0053 WILL FOLLOW LATER):

R0054 1. ALL ROUTINES THAT END IN R HAVE AN IMMEDIATE RETURN TO THE USER. FOR ALL FLASHING DISPLAYS THIS RETURN
R0056 IS TO THE USERS CALL CADR +4. FOR THE ONLY NON FLASHING IMMEDIATE RETURN DISPLAY (GODSPR) THIS RETURN
R0058 IS TO THE USERS CALLING LOC +1.
R0059 2. ALL ROUTINES NOT ENDING IN R DO NOT DO AN IMMEDIATE RETURN TO THE USER.
R0061 3. ALL ROUTINES THAT END IN R START A SEPARATE JOB (MAKEPLAY) WITH USERS JOB PRIORITY.
R0063 4. ALL ROUTINES NOT ENDING IN R BRANCH DIRECTLY TO MAKEPLAY WHICH MAKES THESE DISPLAYS A PART OF THE
R0065 USERS JOB.
R0066 5. ALL DISPLAY ROUTINES ARE CALLED VIA BANKCALL.
R0067 6. TO RESTART A DISPLAY THE USER WILL GENERALLY USE A PHASE OF ONE WITH DESIRED RESTART GROUP (SEE
R0069 DESCRIPTION OF RESTARTS).
R0070 7. ALL FLASHING DISPLAYS HAVE 3 RETURNS TO THE USER FROM ASTRONAUT RESPONSES. A TERMINATE (V34) BRANCHES
R0072 TO THE USERS CALL CADR +1. A PROCEED (V33) BRANCHES TO THE USERS CALL CADR +2. AN ENTER OR RECYCLE
R0074 (V32) BRANCHES TO THE USERS CALL CADR +3.
R0075 8. ALL ROUTINES MUST BE USED UNDER EXECUTIVE CONTROL.

R0076 A DESCRIPTION OF EACH ROUTINE WITH AN EXAMPLE FOLLOWS:

R0085 GODSPR IS THE SAME AS GODSP ONLY RETURN IS TO THE USER.

```
A0086                           CAF     VXXNYY
A0087                           TC      BANKCALL
A0088                           CADR    GODSPR

A0089                           ...     ...             IMMEDIATE RETURN OF GODSPR
```

R0090 GOFLASH DISPLAYS A FLASHING VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0092 THE ASTRONAUT (SEE NO. 7 ABOVE).

```
A0093                           CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN.
A0094                           TC      BANKCALL
A0095                           CADR    GOFLASH
A0096                           ...     ...             TERMINATE RETURN
A0097                           ...     ...             PROCEED RETURN
A0098                           ...     ...             ENTER OR RECYCLE RETURN
```

R0099 GOPERF1 IS ENTERED WITH DESIRED CHECKLIST VALUE IN A. GOPERF1 WILL DISPLAY THIS VALUE IN R1 BY MEANS OF A
R0101 V01 N25. A FLASHING PLEASE PERFORM ON CHECKLIST (V50 N25) IS THEN DISPLAYED. NO IMMEDIATE RETURN IS MADE TO
R0103 USER (SEE NO. 7 ABOVE).

R0104 GOPERF1 BLANKS REGISTERS R2 AND R3

```
A0105                           CAF     OCTXX           CODE FOR CHECKLIST VALUE XX
A0106                           TC      BANKCALL
A0107                           CADR    GOPERF1
A0108                           ...     ...             TERMINATE RETURN
A0109                           ...     ...             PROCEED RETURN
```

```
A0110                                   ...     ...             ENTER RETURN

R0123   GOPERF3 IS USED FOR A PLEASE PERFORM ON A PROGRAM NUMBER.  THE DESIRED PROGRAM NO. IS ENTERED IN A.  GOPERF3
R0125   DISPLAYS THE NO. BY MEANS OF A V06 N07 FOLLOWED BY A FLASHING V50 N07 FOR A PLEASE PERFORM. NO IMMEDIATE RETURN
R0127   IS MADE TO THE USER (SEE NO. 7 ABOVE).

R0128   GOPERF3 BLANKS REGISTERS R2 AND R3

A0129                                   CAF     DECXX           REQUEST PERFORM ON PXX
A0130                                   TC      BANKCALL
A0131                                   CADR    GOPERF3
A0132                                   ...     ...             TERMINATE RETURN
A0133                                   ...     ...             PROCEED RETURN
A0134                                   ...     ...             ENTER RETURN

R0135   GOPERF4 IS USED FOR A PLEASE PERFORM ON AN OPTION. THE DESIRED OPTION ISENTERED IN A AND STORED IN OPTION1.
R0137   GOPERF4 DISPLAYS R1 AND R2 BY MEANS OF A V04N06 FOLLOWED BY A FLASHING  V50N06 FOR A PLEASE PERFORM. NO
R0139   IMMEDIATE RETURN IS MADE TO THE USER (SEE NO. 7 ABOVE).

A0140                                   CAF     OCTXX           REQUEST PERFORM ON OPTION XX
A0141                                   TC      BANKCALL
A0142                                   CADR    GOPERF4
A0143                                   ...     ...             TERMINATE RETURN
A0144                                   ...     ...             PROCEED RETURN
A0145                                   ...     ...             ENTER RETURN

R0146   GOPERF4 BLANKS REGISTER R3

R0147   GODSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN TO THE USER AFTER THE DISPLAY HAS BEEN SENT
R0149   OUT.

A0150                                   CAF     VXXNYY
A0151                                   TC      BANKCALL
A0152                                   CADR    GODSPRET

A0153                                   ...     ...             RETURN TO USER

R0154   REGODSP IS USED TO DISPLAY A VERB NOUN ARRIVING IN A.  REGODSP IS THE SAME AS GODSP ONLY REGODSP REPLACES ANY
R0156   ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

A0157                                   CAF     VXXNYY
A0158                                   TC      BANKCALL
A0159                                   CADR    REGODSP

R0160   REFLASH IS THE SAME AS GOFLASH ONLY REFLASH REPLACES ANY ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

A0162                                   CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN
A0163                                   TC      BANKCALL
A0164                                   CADR    REFLASH
A0165                                   ...     ...             TERMINATE RETURN
```

```
A0166                                   ...     ...     PROCEED RETURN
A0167                                   ...     ...     ENTER RETURN

R0168   GOFLASHR IS SAME AS GOFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

A0170                                   CAF     VXXNYY
A0171                                   TC      BANKCALL
A0172                                   CADR    GOFLASHR
A0173                                   ...     ...     TERMINATE RETURN
A0174                                   ...     ...     PROCEED RETURN
A0175                                   ...     ...     ENTER OR RECYCLE RETURN

A0176                                   ...     ...     IMMEDIATE RETURN FROM GOFLASHR

R0177   GOPERF1R IS THE SAME AS GOPERF1 ONLY GOPERF1R HAS AN IMMEDIATE RETURN TOUSERS CALL CADR +4.

R0179   GOPERF1R BLANKS REGISTERS R2 AND R3

A0180                                   CAF     OCTXX   CODE FOR CHECKLIST VALUE XX.
A0181                                   TC      BANKCALL
A0182                                   CADR    GOPERF1R
A0183                                   ...     ...     TERMINATE RETURN
A0184                                   ...     ...     PROCEED RETURN
A0185                                   ...     ...     ENTER RETURN

A0186                                   ...     ...     IMMEDIATE RETURN FROM GOPERF1R

R0197   GOPERF3R IS THE SAME AS GOPERF3 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

R0199   GOPERF3R BLANKS REGISTERS R2 AND R3

A0200                                   CAF     PROGXX  PERFORM PROGRAM XX
A0201                                   TC      BANKCALL
A0202                                   CADR    GOPERF3R
A0203                                   ...     ...     TERMINATE RETURN
A0204                                   ...     ...     PROCEED RETURN
A0205                                   ...     ...     ENTER RETURN

A0206                                   ...     ...     GOPERF3R IMMEDIATELY RETURNS HERE

R0207   GOPERF4R IS THE SAME AS GOPERF4 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

A0209                                   CAF     OCTXX   REQUEST PERFORM ON OPTIONXX
A0210                                   TC      BANKCALL
A0211                                   CADR    GOPERF4R
A0212                                   ...     ...     TERMINATE RETURN
A0213                                   ...     ...     PROCEED RETURN
A0214                                   ...     ...     ENTER RETURN

A0215                                   ...     ...     IMMEDIATE RETURN TO USER
```

R0216 GOPERF4R BLANKS REGISTER R3

R0217 REFLASHR IS THE SAME AS REFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

```
A0219                   CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN
A0220                   TC      BANKCALL
A0221                   CADR    REFLASHR
A0222                   ...     ...             TERMINATE RETURN
A0223                   ...     ...             PROCEED RETURN
A0224                   ...     ...             ENTER RETURN
A0225                   ...     ...             IMMEDIATE RETURN TO USER
```

R0226 REGODSPR IS THE SAME AS REGODSP ONLY A RETURN (IMMEDIATE) IS MADE TO THE USER.

```
A0228                   CAF     VXXNYY
A0229                   TC      BANKCALL
A0230                   CADR    REGODSPR
A0231                   ...     ...             IMMEDIATE RETURN TO USER
```

```
R0232   GOMARK IS USED TO DISPLAY A MARK VERB NOUN ARRIVING IN A. NO RETURN IS MADE TO THE USER.

R0238   GOMARKR IS THE SAME AS GOMARK ONLY RETURN IS TO THE USER.

R0244   GOMARKF DISPLAYS A FLASHING MARK VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0246   THE ASTRONAUT (SEE NO. 7 ABOVE ).

R0247   GOXDSPF = GOMARKF

A0248                           CAF     VXXNYY          VXXNYY WILL BE A FLASHING MARK VERB NOUN
A0249                           TC      BANKCALL
A0250                           CADR    GOMARKF         OTHER EXTENDED VERBS USE CADR GOXDSPF
A0251                           ...     ...             TERMINATE RETURN
A0252                           ...     ...             PROCEED RETURN
A0253                           ...     ...             ENTER OR RECYCLE RETURN

R0254   GOMARKFR IS THE SAME AS GOMARKF ONLY AN IMMEDIATE RETURN IS MADE TO THE USER CALL CADR +4.

R0264   GOMARK1 IS USED FOR A PLEASE PERFORM ON A MARK REQUEST WITH ONLY 1 ASTRONAUT RETURN TO THE USER. NO IMMEDIATE
R0266   RETURN IS MADE. THE DESIRED MARK PLEASE PERFORM VERB AND DESIRED NOUN ISENTERED IN A. GOMARK1 DISPLAYS R1, R2, R
R0268   MEANS OF A V05NYY FOLLOWED BY A FLASHING V5XNYY FOR A PLEASE PERFORM. THE ASTRONAUT WILL RESPOND WITH A MARK
R0270   OR MARK REJECT OR AN ENTER. THE ENTER IS THE ONLY ASTRONAUT RESPONSE THAT WILL COME BACK TO THE USER.

A0272                           CAF     V5XNYY          X=1,2,3,4   Y= NOUN
A0273                           TC      BANKCALL
A0274                           CADR    GOMARK1

A0275                           ...     ...             ENTER RETURN

R0276   *** IF BLANKING DESIRED ON NON R ROUTINES, NOTIFY DISPLAYER.

R0277   GOMARK1R IS THE SAME AS A GOMARK1 ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +2.
A0279                           CAF     V5XNYY          X=1,2,3,4    YY = NOUN
A0280                           TC      BANKCALL
A0281                           CADR    GOMARK1R

A0282                           ...     ...             ASTRONAUT ENTER RETURN
A0283                           ...     ...             IMMEDIATE RETURN TO USER

R0284   GOMARK2 IS THE SAME AS GOMARK1 ONLY 3 RETURNS ARE MADE TO THE USER FROM THE ASTRONAUT.
A0286                           CAF     V5XNYY          X=1,2,3,4   YY=NOUN
A0287                           TC      BANKCALL
A0288                           CADR    GOMARK2
A0289                           ...     ...             TERMINATE RETURN
A0290                           ...     ...             PROCEED RETURN
A0291                           ...     ...             ENTER RETURN
R0313   GOMARK4 IS THE SAME AS GOMARK3 ONLY R2 AND R3 ARE BLANKED AND R1 IS DISPLAYED IN OCTAL.

A0315                           CAF     V5XNYY          X=1,2,3,4 YY=NOUN
A0316                           TC      BANKCALL
```

```
A0317                           CADR    GOMARK4
A0318                           ...     ...         TERMINATE RETURN
A0319                           ...     ...         PROCEED RETURN
A0320                           ...     ...         ENTER RETURN

R0321   EXDSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN MADE TO THE USER AFTER THE DISPLAY HAS BEEN
R0323   SENT OUT.

A0324                           CAF     VXXNYY
A0325                           TC      BANKCALL
A0326                           CADR    EXDSPRET

A0327                           ...     ...         RETURN TO USER

R0328   KLEENEX CLEANS OUT ALL MARK DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER THE MARK DISPLAYS
R0330   HAVE BEEN CLEANED OUT.

A0331                           TC      BANKCALL
A0332                           CADR    KLEENEX

A0333                           ...     ...         RETURN TO USER

R0334   MARKBRAN IS A SPECIAL PURPOSE ROUTINE USED FOR SAVING JOB VAC AREAS (SEE DESCRIPTION OF MARKBRAN BELOW).

A0336                           TC      BANKCALL
A0337                           CADR    MARKBRAN

A0338                           ...     ...         BAD RETURN IF MARK DISPLAY NOT ACTIVE

A0339                                               (GOOD RETURN TO IMMEDIATE RETURN LOC OF
A0340                                               LAST FLASHING MARK R ROUTINE)

R0341   PINBRNCH REESTABLISHES THE LAST ACTIVE FLASHING DISPLAY. IF THERE IS NO ACTIVE FLASHING DISPLAY, THE DSKY IS
R0343   BLANKED AND CONTROL IS SENT TO ENDOFJOB.

A0344                           TC      POSTJUMP
A0345                           CADR    PINBRNCH

R0346   PRIODSP IS USED AS A PRIORITY DISPLAY.  IT WILL DISPLAY A GOFLASH TYPE DISPLAY WITH THREE POSSIBLE RETURNS FROM
R0348   THE ASTRONAUT(SEE NO.7 ABOVE).

R0349       THE MAIN PURPOSE OF PRIODSP IS TO REPLACE THE PRESENT DISPLAY WITH A DISPLAY OF HIGHER PRIORITY AND TO
R0351   PROVIDE A MEANS FOR RESTORING THE OLD DISPLAY WHEN THE PRIORITY DISPLAY
R0352   IS RESPONDED TO BY THE ASTRONAUT.

R0353       THE FORMER DISPLAY IS RESTORED BY AN AUTOMATIC BRANCH TO WAKE UP THE DISPLAY THAT WAS INTERRUPTED BY THE
R0355   PRIO DISPLAY.

A0356                           CAF     VXXNYY      VXXNYY WILL BE A FLASHING VERB NOUN
A0357                           TC      BANKCALL
```

```
A0358                           CADR    PRIODSP
A0359                           ...     ...         TERMINATE RETURN
A0360                           ...     ...         PROCEED RETURN
A0361                           ...     ...         ENTER OR RECYCLE RETURN

R0362  PRIODSPR IS THE SAME AS PRIODSPONLY AN IMMEDIATE RETURN IS MADE TO THE  USERS CALL CADR +4.

A0364                           CAF     VXXNYY      VXXNYY WILL BE A FLASHING VERB NOUN
A0365                           TC      BANKCALL
A0366                           CADR    PRIODSPR
A0367                           ...     ...         TERMINATE RETURN
A0368                           ...     ...         PROCEED RETURN
A0369                           ...     ...         ENTER OR RECYCLE RETURN

A0370                           ...     ...         IMMEDIATE RETURN

R0371  PRIOLARM DOES A V05N09 PRIODSPR.
R0372  CLEANDSP CLEANS OUT ALL NORMAL DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER NORMAL
R0374  DISPLAYS ARE CLEANED OUT.

A0375                           TC      BANKCALL
A0376                           CADR    CLEANDSP

A0377                           ...     ...         RETURN TO USER
```

GENERAL INFORMATION

ALARM OR ABORT EXIT MODES--

```
                        PRIOBORT TC     ABORT
                                 OCT    1502
```

PRIOBORT IS BRANCED TO WHEN (1) A NORMAL DISPLAY IS REQUESTED AND ANOTHER NORMAL DISPLAY IS ALREADY ACTIVE (REFLASH AND REGODSP ARE EXCEPTIONS) OR (2) A PRIORITY DISPLAY IS REQUESTED WHEN ANOTHER PRIORITY DISPLAY IS ALREADY ACTIVE (A PRIORITY WITH LINUS BIT14 IS AN EXCEPTION).

ERASABLE INITIALIZATION REQUIRED--

ACCOMPLISHED BY FRESH START- 1. FLAGWRD4 (USED EXCLUSIVELY BY DISPLAY INTERFACE ROUTINES)
2. NVSAVE = NORMAL VERB AND NOUN REGISTER.
3. EBANKTEM = NORMAL INACTIVE FLAGWORD(ALSO CONTAINS NORMALS EBANK).

5. RISAVE = MARKBRAN CONTROL WORD
4. RESTREG = PRIORITY 30 AND SUPERBANK 3.

OUTPUT--

NVWORD = PRIO VERB AND NOUN
NVWORD +1(MARKNV) = MARK VERB AND NOUN
NVWORD +2(NVSAVE) = NORMAL VERB AND NOUN

DSPFLG(EBANKSAV) = PRIO FLAGWORD (INCLUDING EBANK)
DSPFLG +1(MARKEBAN) = MARK FLAGWORD (INCLUDING EBANK)
DSPFLG +2(EBANKTEM) = NORMAL FLAGWORD (INCLUDIG EBANK)

CADRFLSH = PRIO USERS CALL CADR +1 LOCATION
CADRFLSH +1(MARKFLSH) = MARK USERS CALL CADR +1 LOCATION
CADRFLSH +2(TEMPFLSH) = NORMAL USERS CALL CADR +1 LOCATION

PRIOTIME = TIME EACH PRIO REQUEST FIRST SENT OUT
OPTION1 = DESIRED OPTION FROM GOPERF4
FLAGWRD4 = BIT INFO FOR CONTROL OF ALL DISPLAY ROUTINES
DSPTEM1 = R1 INFO FOR ASTRONAUT FROM PERFORM DISPLAYS(NORMAL)

SUBROUTINES USED-- NVSUB, FLAGUP, FLAGDOWN, ENDOFJOB, BLANKSUB, ABORT, JOBWAKE, JOBSLEEP, FINDVAC, PRIOCHNG, JAMTERM, NVSUBUSY, FLASHON, ENDIDLE, CHANG1, BANKJUMP, MAKECADR, NOVAC,

DEBRIS-- (STORED INTO)

TEMPORARY TEMPORARIES- A, Q, L, MPAC +2, MPAC +3, MPAC +4, MPAC +5, MPAC +6, RUPTREG2, RUPTREG3, CYL, EBANK, RUPTREG4, LOC, BANKSET, MODE, MPAC, MPAC +1 4, FACEREG

ERASABES(SHARED AND USED WITH OTHER PROGRAMS) CADRSTOR, DSPLIST, LOC, DSPTEM1, OPTION1

ERASABLES(USED ONLY BY DISPLAY ROUTINES)- NVWORD,+1,+2, DSPFLG,+1,+2, CADRFLSH,+1,+2, PRIOTIME, FLAGWRD4,

R0424 R1SAVE, MARK2PAC,

R0425 DEBRIS-- (USED BUT NOT STORED INTO)- NOUNREG, VERBREG, LOCCTR, MONSAVE1
R0426 FLAGWORD DESCRIPTIONS--
R0427 FLAGWRD4- SEE DESCRIPTION UNDER LOG SECTION ERASABLE ASSIGNMENTS

R0428 DSPFLG, DSPFLG+1, DSPFLG +2-
R0429 ---------------------------
R0430 BITS 1 BLANK R1
R0431 2 BLANK R2
R0432 3 BLANK R3
R0433 4 FLASHING DISPLAY REQUESTED
R0434 5 PERFORM DISPLAY REQUESTED
R0435 6 ----- EXDSPRET GODSPRET
R0436 7 PRIO DISPLAY ----- -----
R0437 8 ----- MARK MONITOR PERF -----
R0438 9 EBANK
R0439 10 EBANK
R0440 11 EBANK
R0441 12 ----- ----- V99PASTE
R0442 13 2ND PART OF PERFORM
R0443 14 REFLASH OF REDO ----- REFLASH OR REDO
R0444 15 ----- MARK REQUEST -----

R0445 RESTARTING DISPLAYS--

R0446 RULES FOR THE DSKY OPERATOR--

R0447 1. PROCEED AND TERMINATE SERVE AS RESPONSES TO REQUESTS FOR OPERATOR RESPONSE (FLASHING V/N). AS LONG
R0449 AS THERE IS ANY REQUEST AWAITING OPERATOR RESPONSE, ANY USE OF PROCEED OR TERMINATE WILL SERVE AS
R0451 RESPONSES TO THAT REQUEST. CARE SHOULD BE EXERCISED IN ATTEMPTING TO KILL AN OPERATOR INITIATED MONITOR
R0453 WITH PROCEED AND TERMINATE FOR THIS REASON.
R0454 2. THE ASTRONAUT MUST RESPOND TO A PRIORITY DISPLAY NO SOONER THAN 5 SECS FROM THE TIME THE MISSION
R0456 PROGRAM SENT OUT THE REQUEST FOR OPERATOR RESPONSE (THE ASTRONAUT WOULD SEE THIS DISPLAY FOR LESS TIME
R0458 DUE TO TIME IT TAKES TO GET DISPLAY SENT OUT.) IF THE ASTRONAUT RESPONDS TOO SOON, THE PRIORITY DISPLAY
R0460 IS SENT OUT AGAIN---AND AGAIN UNTIL AN ACCUMULATED 5 SECS FROM TIME THE FIRST PRIORITY DISPLAY WAS SENT
R0462 OUT. THE SAME 5 SEC. DELAY WILL OCCUR AT 163.84 SECS OR IN ANY MULTIPLE OF THAT TIME DUE TO PROGRAM
R0464 CONSIDERATION.
R0465 3. KEY RELEASE BUTTON-
R0466 A) IF THE KEY RELEASE LIGHT IS ON, IT SIMPLY RELEASES THE KEYBOARD AND DISPLAY FOR INTERNAL USE.
R0468 B) IF THE KEY RELEASE LIGHT IS OFF, AND IF SOME REQUEST FOR OPERATOR RESPONSE (FLASHING V/N) IS STILL
R0470 AWAITING RESPONSE THEN IT RE-ESTABLISHES THE DISPLAYS THAT ORIGINALLY REQUESTED RESPONSE.
R0472 IF AN OPERATOR WANTS THEREFORE TO RE-ESTABLISH BUT CONDITION (A) IS ENCOUNTERED, A SECOND DEPRESSION OF
R0474 KEY RELEASE BUTTON MAY BE NECESSARY.
R0475 4. IT IS IMPORTANT TO ANSWER ALL REQUESTS FOR OPERATOR RESPONSE.
R0476 5. IT IS ALWAYS GOOD PRACTICE TO TERMINATE AN EXTENDED VERB BEFORE ASKING FOR ANOTHER ONE OR THE SAME ONE
R0478 OVER AGAIN.

R0479 SPECIAL CONSIDERATIONS--

R0480 1. MPAC +2 SAVED ONLY IN MARK DISPLAYS
R0481 2. GODSP(R),REGODSP(R),GOMARK(R) ALWAYS TURN ON THE FLASH IF ENTERED WITH A PASTE VERB REQUEST.
R0483 3. ALL NORMAL DISPLAYS ARE RESTARTABLE EXCEPT GODSP(R), REGODSP(R)
R0484 4. ALL EXTENDED VERBS WITH DISPLAYS SHOULD START WITH A TC TESTXACT AND FINISH WITH A TC ENDEXT.
R0486 5. GODSP(R) AND REGODSP(R) MUST BE IN THE SAME EBANK AND SUPERBANK AS THE LAST NORMAL DISPLAY RESTARTED
R0488 BY A .1 RESTART PHASE CHANGE.
R0489 6. IN ORDER TO SET UP A NON DISPLAY .1 RESTART POINT, THE USER MUST MAKE CERTAIN THAT RESTREG CONTAINS THE
R0491 CORRECT PRIORITY AND SUPERBANK AND THAT EBANKTEM CONTAINS THE CO
R04911 7. IF CLEANDSP IS RESTARTED VIA A .1 PHASE CHANGE, CAF ZERO SHOULD BE EXECUTED BEFORE THE TC BANKCALL

L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 12 E S3

```
P0492   CALLING SEQUENCE FOR BLANKING
A0493                                           CAF     BITX            X=1,2,3 BLANK R1,R2,R3 RESPECTIVELY
A0494                                           TC      BLANKET
A0495                                           ...     ...             RETURN TO USER HERE

R0496   IN ORDER TO USE BLANKET CORRECTLY THE USER MUST USE A DISPLAY ROUTINE THAT ENDS IN R FIRST FOLLOWED BY THE CALL
R0498   TO BLANKET AT THE IMMEDIATE RETURN LOC.

 0500   REF   1                 4000                            SETLOC  FFTAG4
 0501                           5516                            BANK

 0502   REF   1                                                 COUNT*  $$/DSPLA
 0503   REF 692  LAST 1445      5516  54 162 0  BLANKET         TS      MPAC +6
 0504   REF   1                 5517  4 0160 1                  CS      PLAYTEM4
 0505   REF 693  LAST 1459      5520  7 0162 0                  MASK    MPAC +6
 0506   REF 694  LAST 1459      5521  50 161 1                 INDEX   MPAC +5
 0507   REF   2  LAST 1459      5522  26 160 1                  ADS     PLAYTEM4

 0508   REF 304  LAST 1447      5523  0 0002 0                  TC      Q

 0510   REF   9  LAST  793      5524  0 5527 1  ENDMARK         TC      CLEARMRK
 0511   REF  57  LAST 1395      5525  0 4655 0                  TC      POSTJUMP
 0512   REF   1                 5526   21643 0                  CADR    MARKOVER

 05121  REF 263  LAST 1446      5527  3 4772 1  CLEARMRK        CAF     ZERO
 05122  REF  17  LAST  941      5530  55'247 0                  TS      EXTVBACT

 05124  REF   1                 5531  4 4770 1                  CS      XDSPBIT
 05125  REF   6  LAST  590      5532  7 0100 1                  MASK    FLAGWRD4
 05126  REF   7  LAST 1459      5533  54 100 1                  TS      FLAGWRD4

 05128  REF 305  LAST 1459      5534  0 0002 0                  TC      Q
R0513   ***ALL EXTENDED VERB ROUTINES THAT HAVE AT LEAST ONE FLASHING DISPLAY MUST TCF ENDMARK OR TCF ENDEXT WHEN
R0515   FINISHED.

 0516   REF 192  LAST 1443      5535  56 001 0  VNFLASH         XCH     L
 0517   REF   1                 5536  3 5545 0                  CAF     VNCADR
 0518   REF   1                 5537  1 5542 0                  TCF     VNGODSP

 0519   REF 193  LAST 1459      5540  56 001 0  VNFLASHR        XCH     L
 0520   REF   1                 5541  3 5546 0                  CAF     VNRCADR
 0521   REF 306  LAST 1459      5542  24 002 0  VNGODSP         INCR    Q               BECAUSE OF RESTARTS
 0522   REF   1                 5543  22 155 0                  LXCH    PLAYTEM1
 0523   REF   3  LAST 1195      5544  1 4642 1                  TCF     SWCALL

 0524   REF   1                 5545   20732 0  VNCADR         CADR    VNFLSH
 0525   REF   1                 5546   20735 1  VNRCADR        CADR    VNFLSHR

 0527   REF   1             10,2000                             SETLOC  DISPLAYS
 0528                       10,2575                             BANK
```

```
 0529   REF   1                                          COUNT* $$/DSPLA
R0530   NTERONLY IS USED TO DIFFERENTIATE THE MARK ROUTINE WITH ONLY ONE RETURN TO THE USER FROM THE MARKING ROUTINE WIT
R0532   3 RETURNS TO THE USER. THIS ROUTINE IS ONLY USED BY GOMARK1 AND GOMARK1R.

 0534   REF 264  LAST 1459   10,2575  3 4772 1  KLEENEX  CAF    ZERO        CLEAN OUT EXTENDED VERBS
 0535   REF   2  LAST 1459   10,2576  54 155 1  GOMARKF  TS     PLAYTEM1    ENTRANCE FOR MARK GOFLASH

 0536   REF   1              10,2577  3 7664 1           CAF    MARKFMSK    MARK,FLASH
 0537   REF   1              10,2600  1 2745 1           TCF    GOFLASH2

 0538   REF   3  LAST 1460   10,2601  54 155 1  GOMARK2  TS     PLAYTEM1    MARK GOPERFS-3 AST. RETURNS
 0539   REF   1              10,2602  3 3733 0  MARKFORM CAF    MPERFMSK    MARK, PERFORM, FLASH
 0540   REF   2  LAST 1460   10,2603  1 2745 1           TCF    GOFLASH2

 0541   REF   4  LAST 1460   10,2604  54 155 1  GOMARK4  TS     PLAYTEM1
 0542   REF   1              10,2605  3 3723 1           CAF    MARK4MSK    MARK,PERFORM,FLASH,BLANK
 0543   REF   3  LAST 1460   10,2606  1 2745 1           TCF    GOFLASH2

 0544   REF   5  LAST 1460   10,2607  54 155 1  GOMARKFR TS     PLAYTEM1    ENTRANCE FOR MARK GOFLASHR

 0545   REF   2  LAST 1460   10,2610  3 7664 1           CAF    MARKFMSK
 0546   REF   1              10,2611  1 3103 1           TCF    GODSPRS

 05462  REF   6  LAST 1460   10,2612  54 155 1  MARKMONR TS     PLAYTEM1    USED FOR MARK MONITOR
 05463  REF   1              10,2613  3 3754 1           CAF    MARK3MSK
 05464  REF   4  LAST 1460   10,2614  1 2745 1           TCF    GOFLASH2
 0547   REF 153  LAST 1428   10,2615  3 4770 0  MAKEMARK CAF    ONE
 0548   REF   1              10,2616  0 3172 0           TC     COPIES

 0549   REF   8  LAST 1459   10,2617  3 0100 0           CA     FLAGWRD4    IS NORM OR PRIO BUSY OR WAITING
 0550   REF   1              10,2620  7 3734 0           MASK   OCT34300
 0551   REF 385  LAST 1447   10,2621  10 000 0           CCS    A
 0552   REF   1              10,2622  1 2670 0           TCF    CHKPRIO

 0553   REF   9  LAST 1460   10,2623  3 0100 0           CA     FLAGWRD4    IS MARK SLEEPING DUE TO ASTRO BUSY
 0554   REF   1              10,2624  7 4760 0           MASK   MRKNVBIT
 0555                        10,2625  0 0006 1           EXTEND
 0556   REF   1              10,2626  1 2630 1           BZF    MARKPLAY    NO

 0557   REF  91  LAST 1314   10,2627  1 5205 1           TCF    ENDOFJOB

 0558   REF  28  LAST 1393   10,2630  4 4773 1  MARKPLAY CS     FIVE        RESET MARK OVER NORM, SET MARK
 0559   REF  10  LAST 1460   10,2631  7 0100 1           MASK   FLAGWRD4
 0560   REF   2  LAST 1459   10,2632  6 4770 0           AD     XDSPBIT
 0561   REF  11  LAST 1460   10,2633  54 100 1           TS     FLAGWRD4
 0562                        10,2634  22 007 0  GOGOMARK ZL                 PERFORM
 05621  REF   1              10,2635  4 1274 0           CS     MARKFLAG
 05622  REF   1              10,2636  7 4761 1           MASK   DCMKPERF
 05623  REF 386  LAST 1460   10,2637  10 000 0           CCS    A
 05624                       10,2640  1 2645 0           TCF    +5
```

```
05625  REF   1                 10,2641  3 0367 0                CA     MARKNV
05626  REF   3  LAST  366      10,2642  7 4171 0                MASK   MID7
05627  REF 194  LAST 1459      10,2643  54 001 1                TS     L
05628                           10,2644  1 2651 0                TCF    +5
05629  REF   2  LAST 1460      10,2645  4 1274 0                CS     MARKFLAG
0563   REF   1                 10,2646  7 4764 1                MASK   PERFRQST
0564   REF 387  LAST 1460      10,2647  10 000 0                CCS    A
0565   REF   1                 10,2650  1 2653 1                TCF    MARKCOP
0566   REF   2  LAST 1461      10,2651  4 0367 1                CS     MARKNV
0567   REF   3  LAST 1461      10,2652  54 367 1                TS     MARKNV

0568   REF 154  LAST 1460      10,2653  3 4770 0  MARKCOP       CAF    ONE          MARK INDEX
0569   REF   1                 10,2654  54 164 0                TS     COPINDEX
0569S  REF   1                 10,2655  1 3316 1                TCF    NVDSP +1
0570   REF   1                 10,2656  3 0165 0  COPYTOGO      CA     MPAC2SAV
0571   REF 695  LAST 1459      10,2657  54 156 1                TS     MPAC +2

0572   REF   2  LAST 1461      10,2660  50 164 1  COPYPACS      INDEX  COPINDEX
0573   REF   1                 10,2661  3 3740 1                CAF    PRIODCT
0574   REF   1                 10,2662  54 162 0                TS     GENMASK

0575   REF   3  LAST 1461      10,2663  50 164 1                INDEX  COPINDEX
0576   REF   2  LAST   83      10,2664  3 1273 0                CAF    EBANKSAV
0577   REF   1                 10,2665  54 160 1                TS     TEMPORZ      ACTIVE EBANK AND FLAG

0578   REF  46  LAST 1432      10,2666  54 003 0                TS     EBANK

0579   REF 307  LAST 1459      10,2667  0 0002 0                TC     Q

R0580  PINCHEK CHECKS TO SEE IF THE CURRENT MARK REQUEST IS MADE BY THE ASTRONAUT WHILE INTERRUPTING A GOPLAY DISPLAY
R0582  (A NORMAL OR A PRIO). IF THE ASTRONAUT TRIES TO MARK DURING A PRIO, THE CHECK FAIL LIGHT GOES ON AND THE MARK
R0584  REQUEST IS ENDED. IF HE TRIES TO MARK DURING A NORM, THE MARK IS ALLOWED. IN THIS CASE THE NORM IS PUT TO SLEEP
R0586  UNTIL ALL MARKING IS FINISHED.

R0587        IF THE MARK REQUEST COMES FROM THE PROGRAM DURING A TIME THE ASTRONAUT IS NOT INTERRUPTING A NORMAL OR A
R0589  PRIO, THE MARK REQUEST IS PUT TO SLEEP UNTIL THE +RESENT ACTIVE DISPLAY IS RESPONDED TO BY THE ASTRONAUT.

0591   REF  12  LAST 1460      10,2670  3 0100 0  CHKPRIO       CA     FLAGWRD4     MARK ATTEMPT DURING PRIO
0592   REF   2  LAST  250      10,2671  7 7646 0                MASK   14,12,7
0593   REF 388  LAST 1461      10,2672  10 000 0                CCS    A
0594   REF   1                 10,2673  1 3676 1                TCF    MARSLEEP

0595   REF   1                 10,2674  3 4766 1                CAF    MKOVBIT      SET MARK OVER NORM
0596   REF   1                 10,2675  0 3755 0                TC     UPENT2

0597   REF   1                 10,2676  1 3000 0                TCF    SETNORM

0598   REF   4  LAST 1461      10,2677  3 0367 0  MARKPERF      CA     MARKNV
0599   REF   1                 10,2700  7 4171 0                MASK   VERBMASK
0600   REF   1                 10,2701  1 3350 0                TCF    NV50DSP
```

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 06001  REF   7  LAST 1460   10,2702  54 155 1  GODSP     TS      PLAYTEM1

 06002  REF   1              10,2703  3 4772 1  GODSP2    CAF     DSPONLY
 06003  REF   5  LAST 1460   10,2704  1 2745 1            TCF     GOFLASH2

 0601   REF   8  LAST 1462   10,2705  54 155 1  GODSPRET  TS      PLAYTEM1        ENTRANCE FOR A GODSP WITH A PASTE

 0602   REF   1              10,2706  3 4763 1            CAF     RETDSPY         SET BIT 6 TO RETURN TO USER AFTER NVSUB
 0603   REF   6  LAST 1462   10,2707  1 2745 1            TCF     GOFLASH2

 0604   REF   9  LAST 1462   10,2710  54 155 1  GODSPR    TS      PLAYTEM1

 0605   REF   2  LAST 1462   10,2711  3 4772 1  GODSPR1   CAF     DSPONLY
 0606   REF   3  LAST 1459   10,2712  54 160 1  GODSPR2   TS      PLAYTEM4

 0607   REF 265  LAST 1460   10,2713  3 4772 1            CAF     ZERO            * DONT MOVE
 0608   REF   1              10,2714  1 3105 1            TCF     GODSPRS1

R0609         CLEANDSP IS USED FOR CLEARING OUT A NORMAL DISPLAY THAT IS PRESENTLY ACTIVE OR A NORMAL DISPLAY THAT IS
R0611    SET UP TC BE STARTED OR RESTARTED.

R0612         NORMALLY THE USER WILL NOT NEED TO USE THIS ROUTINE SINCE A NEW NORMAL DISPLAY AUTOMATICALLY CLEARS OUT AN
R0614    OLD DISPLAY.

R0615         CALLING SEQUENCE FOR CLEANDSP-

A0616                                                    TC      BANKCALL
A0617                                                    CADR    CLEANDSP

 0618   REF 266  LAST 1462   10,2715  3 4772 1  CLEANDSP  CAF     ZERO
 0619   REF  10  LAST 1462   10,2716  54 155 1  REFLASH   TS      PLAYTEM1

 0620   REF   1              10,2717  3 3722 0            CAF     REDOMASK        FLASH AND PERMIT
 0621   REF   7  LAST 1462   10,2720  1 2745 1            TCF     GOFLASH2

 0622   REF  11  LAST 1462   10,2721  54 155 1  REGODSP   TS      PLAYTEM1

 0623   REF   1              10,2722  3 4753 1            CAF     REFLSH
 0624   REF   8  LAST 1462   10,2723  1 2745 1            TCF     GOFLASH2

 0625   REF  12  LAST 1462   10,2724  54 155 1  REGODSPR  TS      PLAYTEM1

 0626   REF   2  LAST 1462   10,2725  3 4753 1            CAF     REFLSH
 0627   REF   1              10,2726  1 2712 0            TCF     GODSPR2

 0628   REF  13  LAST 1462   10,2727  54 155 1  CLOCPLAY  TS      PLAYTEM1
 0629   REF   1              10,2730  3 3750 0            CAF     CLOCKCON
 0630   REF   9  LAST 1462   10,2731  1 2745 1            TCF     GOFLASH2
 0631   REF  73  LAST 1442   10,2732  0 5547 1  VNFLSH    TC      UPFLAG
 0632   REF   1              10,2733   00111 0            ADRES   VNFLAG
```

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0633   REF  27  LAST  907   10,2734  1 2744 0          TCF     GOFLASH +1

0634   REF  74  LAST 1462   10,2735  0 5547 1  VNFLSHR TC      UPFLAG
0635   REF   2  LAST 1462   10,2736  00111 0           ADRES   VNFLAG
0636   REF   1              10,2737  3 4765 1          CAF     FLSHRQST
0637   REF   4  LAST 1462   10,2740  54 160 1          TS      PLAYTEM4        IT'S A FLASHING DISPLAY
0638   REF 267  LAST 1462   10,2741  3 4772 1          CAF     ZERO            RETURN TO CALLER'S Q +1
0639   REF   2  LAST 1462   10,2742  1 3105 1          TCF     GODSPRS1

0640   REF  14  LAST 1462   10,2743  54 155 1  GOFLASH TS      PLAYTEM1

0641   REF   2  LAST 1463   10,2744  3 4765 1    +1    CAF     FLSHRQST        LEAVE ONLY FLASH BIT SET
0642   REF   5  LAST 1463   10,2745  54 160 1  GOFLASH2 TS     PLAYTEM4

0643   REF   1              10,2746  0 3157 1          TC      SAVELOCS

0644   REF   1              10,2747  1 3012 0          TCF     MAKEPLAY        BRANCH DIRECT WITH NO SEPARATE JOB CALL

0645   REF  15  LAST 1463   10,2750  54 155 1  PRIODSPR TS     PLAYTEM1

0646   REF   1              10,2751  3 5013 0          CAF     BITS7+4
0647   REF   2  LAST 1460   10,2752  1 3103 1          TCF     GODSPRS

0648   REF  16  LAST 1463   10,2753  54 155 1  PRIODSP TS      PLAYTEM1

0649   REF   2  LAST 1463   10,2754  3 5013 0  SETPRIO CAF     BITS7+4
0650   REF  10  LAST 1462   10,2755  1 2745 1          TCF     GOFLASH2

0651   REF 268  LAST 1463   10,2756  3 4772 1  MAKEPRIO CAF    ZERO
0652   REF   4  LAST 1461   10,2757  54 164 0          TS      COPINDEX

0653   REF   1              10,2760  0 3623 0          TC      LINUSCHR
0654   REF   1              10,2761  1 2766 0          TCF     HIPRIO          LINUS RETURN
0655   REF  13  LAST 1461   10,2762  3 0100 0          CA      FLAGWRD4
0656   REF   1              10,2763  7 3747 1          MASK    BIT14+7         IS PRIO IN ENDIDLE OR BUSY
0657   REF 389  LAST 1461   10,2764  10 000 0          CCS     A
0658   REF   1              10,2765  1 3041 0          TCF     PRIOBORT        YES, ABORT

0659   REF  14  LAST 1463   10,2766  3 0100 0  HIPRIO  CA      FLAGWRD4        MARK ACTIVE
0660   REF   1              10,2767  7 7716 1          MASK    BIT15+9
0661                        10,2770  0 0006 1          EXTEND
0662   REF   1              10,2771  1 2774 0          BZF     ASKIFNRM        NO

0663   REF 269  LAST 1463   10,2772  3 4772 1  SETMARK CAF     ZERO
0664   REF   1              10,2773  1 3226 0          TCF     JOBXCHS

0665   REF  15  LAST 1463   10,2774  3 0100 0  ASKIFNRM CA     FLAGWRD4        NORMAL ACTIVE
0666   REF   1              10,2775  7 3745 0          MASK    BIT13+8
0667                        10,2776  0 0006 1          EXTEND
0668   REF   1              10,2777  1 3002 1          BZF     OKTOCOPY        NO
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0669   REF 155  LAST 1461   10,3000  3 4770 0  SETNORM  CAF    ONE
0670   REF   2  LAST 1463   10,3001  1 3226 0           TCF    JOBXCHS

0671   REF   1              10,3002  0 3171 0  OKTOCOPY TC     COPYNORM
0672   REF   1              10,3003  0 3431 1           TC     WITCHONE

0673   REF   9  LAST 1436   10,3004  0 5167 1           TC     JOBWAKE

0674   REF   1              10,3005  0 3445 1           TC     XCHTOEND

0675   REF  26  LAST 1412   10,3006  3 0025 0  REDOPRIO CA     TIME1          SAVE TIME PRIODSP SENT OUT
0676   REF   1              10,3007  55'005 1           TS     PRIOTIME

0677   REF 270  LAST 1463   10,3010  3 4772 1  KEEPPRIO CAF    ZERO           START UP PRIO DISPLAY
0678   REF   1              10,3011  1 3062 1           TCF    PRIOPLAY

0679   REF  28  LAST 1218   10,3012  3 0167 1  MAKEPLAY CA     PRIORITY       SAVE USERS PRIORITY
0680   REF   3  LAST  374   10,3013  7 7660 1           MASK   PRIO37
0681   REF   1              10,3014  54 163 1           TS     USERPRIO

0682   REF   1              10,3015  3 7655 0           CAF    PRIO33         RAISE PRIORITY FOR FAST JOBS AFTER WAKE
0683   REF  16  LAST  941   10,3016  0 5176 1           TC     PRIOCHNG

0684   REF   6  LAST 1463   10,3017  3 0160 0           CA     PLAYTEM4       IS IT MARK OR PRIO OR NORM
0685   REF   1              10,3020  7 3735 1           MASK   BITS15+7
0686   REF 390  LAST 1463   10,3021  10 000 0           CCS    A
0687   REF   1              10,3022  1 2756 0           TCF    MAKEPRIO       ITS PRIO
0688   REF   1              10,3023  1 3025 1           TCF    IFLEGAL
0689   REF   1              10,3024  1 2615 0           TCF    MAKEMARK       ITS MARK

0690   REF  68  LAST 1427   10,3025  3 4767 0  IFLEGAL  CAF    TWO
0691   REF   5  LAST 1463   10,3026  54 164 0           TS     COPINDEX

0692   REF   2  LAST 1463   10,3027  0 3623 0           TC     LINUSCHR

0693   REF   1              10,3030  1 3043 1           TCF    OKTOPLAY       LINUS RETURN
0694   REF   3  LAST  212   10,3031  4 1275 1           CS     EBANKTEM
0695   REF   3  LAST 1463   10,3032  7 4765 0           MASK   FLSHRQST
0696   REF 391  LAST 1464   10,3033  10 000 0           CCS    A
0697   REF   2  LAST 1464   10,3034  1 3043 1           TCF    OKTOPLAY       NO

0698   REF  16  LAST 1463   10,3035  3 0100 0           CA     FLAGWRD4       WAS NORM ASLEEP
0699   REF   1              10,3036  7 3727 1           MASK   NBUSMASK       ARE ANY NORMS ASLEEP
0700                        10,3037  0 0006 1           EXTEND
0701   REF   3  LAST 1464   10,3040  1 3043 1           BZF    OKTOPLAY       NO

0702   REF  10  LAST 1438   10,3041  0 5726 1  PRIOBORT TC     PODOO
0703                        10,3042  21502 0            OCT    21502          ILLEGAL FLASHING DISPLAY

0704   REF   1              10,3043  0 3173 1  OKTOPLAY TC     COPIES2
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L DISPLAY INTERFACE ROUTINES

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0705   REF   2  LAST 1464   10,3044  3 0163 0          CA      USERPRIO
0706                        10,3045  0 0006 1          EXTEND
0707   REF  22  LAST 1407   10,3046  04 007 1          ROR     SUPERBNK
0708   REF   3  LAST  209   10,3047  54 365 0          TS      RESTREG

0709   REF  17  LAST 1464   10,3050  3 0100 0          CA      FLAGWRD4      PRIO OR MARK GOING
0710   REF   1              10,3051  7 3730 1          MASK    PRIOMASK
0711   REF 392  LAST 1464   10,3052  10 000 0          CCS     A
0712   REF   1              10,3053  1 3210 0          TCF     GOSLEEPS      YES

0713                        10,3054  1 3056 0          TCF     +2
0714   REF   2  LAST 1465   10,3055  1 3210 0          TCF     GOSLEEPS      MARK GOING

R0715  COULD PUT NORM BUSY CHECK HERE TO SAVE TIME
0716   REF   2  LAST 1464   10,3056  0 3431 1          TC      WITCHONE      IS IT NVSUB BUSY, ENDIDLE OR NOONE
0717   REF  10  LAST 1464   10,3057  0 5167 1          TC      JOBWAKE

0718   REF   2  LAST 1464   10,3060  0 3445 1          TC      XCHTOEND

0719   REF  69  LAST 1464   10,3061  3 4767 0  PLAYJUM1 CAF     TWO
0720   REF   6  LAST 1464   10,3062  54 164 0  PRIOPLAY TS      COPINDEX

0721   REF   1              10,3063  1 3315 1          TCF     GOPLAY

0722   REF  17  LAST 1463   10,3064  54 155 1  EXOSPRET TS      PLAYTEM1

0723   REF   2  LAST  167   10,3065  3 7667 1          CAF     BIT15+6
0724   REF  11  LAST 1463   10,3066  1 2745 1          TCF     GOFLASH2

0725   REF   2  LAST  769   10,3067  55'250 0  GOPERF1  TS      NORMTEM1      STORE DESIRED CHECKLIST VALUE
0726   REF   1              10,3070  3 3720 1          CAF     V01N25        USED TO DISPLAY CHECKLIST VALUE IN R1

0727   REF  18  LAST 1465   10,3071  54 155 1  GOPERF3  TS      PLAYTEM1

0728   REF   1              10,3072  3 3717 0          CAF     PERFMASK      LEAVE ONLY FLASH, PERFORM, BLANKING
0729   REF  12  LAST 1465   10,3073  1 2745 1          TCF     GOFLASH2

0730   REF   6  LAST  903   10,3074  54 775 0  GOPERF4  TS      OPTION1       DESIRED OPTION CODE

0731   REF   2  LAST  906   10,3075  3 4537 1          CAF     V04N06
0732   REF  19  LAST 1465   10,3076  54 155 1          TS      PLAYTEM1

0733   REF   1              10,3077  3 5775 1          CAF     PERF4MSK      FLASH, PERFORM, AND BLANK R3
0734   REF  13  LAST 1465   10,3100  1 2745 1          TCF     GOFLASH2

0735   REF  20  LAST 1465   10,3101  54 155 1  GOFLASHR TS      PLAYTEM1

0736   REF   4  LAST 1464   10,3102  3 4765 1          CAF     FLSHRQST      LEAVE ONLY FLASH BIT SET
0737   REF   7  LAST 1464   10,3103  54 160 1  GODSPRS  TS      PLAYTEM4
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0738   REF  50  LAST 1432   10,3104  3 6214 0          CAF     THREE

0739                        10,3105  0 0004 0  GODSPRS1 INHINT                 IMMEDIATE RETURN IS CALL CADR +4
0740   REF   9  LAST 1436   10,3106  54 072 0          TS      RUPTREG3

0741   REF  29  LAST 1464   10,3107  3 0167 1          CA      PRIORITY        MAKE DISPLAY ONE HIGHER THAN USER
0742   REF   4  LAST 1464   10,3110  7 7660 1          MASK    PRIO37
0743   REF  11  LAST 1217   10,3111  54 063 0          TS      NEWPRIO

0744   REF   8  LAST 1465   10,3112  3 0160 0          CA      PLAYTEM4        IS THIS A FLASHING R DISPLAY
0745   REF   5  LAST 1465   10,3113  7 4765 0          MASK    FLSHRQST
0746   REF 393  LAST 1465   10,3114  10 000 0          CCS     A
0747   REF   1               10,3115  1 3123 0          TCF     VACDSP          YES, MAKE DSPLAY JOB A VAC
0748   REF  12  LAST 1466   10,3116  3 0063 1          CA      NEWPRIO         NO, MAKE DSPLAY JOB A NOVAC
0749   REF  22  LAST 1225   10,3117  0 5121 0          TC      NOVAC
0750   REF  10  LAST  790   E7,1777                    EBANK=  WHOCARES
0751   REF   2  LAST 1463   10,3120   03012 1          2CADR   MAKEPLAY
0751                        10,3121   20067 1
0752   REF   1               10,3122  1 3131 0          TCF     BOTHJOBS

0753   REF  32  LAST 1408   10,3123  3 0006 1  VACDSP  CA      BBANK
0754                        10,3124  0 0006 1          EXTEND
0755   REF  23  LAST 1465   10,3125  04 007 1          ROR     SUPERBNK
0756   REF 195  LAST 1461   10,3126  54 001 1          TS      L
0757   REF   1               10,3127  3 3744 0          CAF     MAKEGEN
0758   REF   2  LAST  221   10,3130  0 5146 1          TC      SPVAC

0759   REF   2  LAST 1463   10,3131  0 3157 1  BOTHJOBS TC      SAVELOCS        COPY TEMPS INTO PERMANENT REGISTERS

0760                        10,3132  0 0006 1          EXTEND                  SAVE NVWORD AND USERS MPAC +2
0761   REF 696  LAST 1461   10,3133  3 0156 0          DCA     MPAC +1
0762   REF  23  LAST 1445   10,3134  50 064 0          INDEX   LOCCTR
0763   REF 697  LAST 1466   10,3135  52 156 1          DXCH    MPAC +1

0764                        10,3136  0 0006 1          EXTEND                  SAVE USERS CADR, FLAGS AND EBANK
0765   REF 698  LAST 1466   10,3137  3 0160 0          DCA     MPAC +3
0766   REF  24  LAST 1466   10,3140  50 064 0          INDEX   LOCCTR
0767   REF 699  LAST 1466   10,3141  52 160 1          DXCH    MPAC +3

0768   REF  25  LAST 1466   10,3142  3 0064 0          CA      LOCCTR
0769   REF 700  LAST 1466   10,3143  54 161 0          TS      MPAC +5

0770   REF   1               10,3144  0 3164 1          TC      SAVELOCR
0771                        10,3145  0 0003 1          RELINT

0772   REF   9  LAST 1402   10,3146  1 4660 1          TCF     BANKJUMP        CALL CADR +4

0773   REF   3  LAST 1465   10,3147  55'250 0  GOPERFIR TS      NORMTEM1        DESIRED CHECKLIST VALUE

0774   REF   2  LAST 1465   10,3150  3 3720 1          CAF     V01N25          DISPLAYS CHECKLIST VALUE IN R1
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0775   REF  21  LAST 1465   10,3151  54 155 1  GOPERFRS TS      PLAYTEM1

0776   REF   2  LAST 1465   10,3152  3 3717 0            CAF     PERFMASK        LEAVE ONLY FLASH, PERFORM, BLANKING
0777   REF   3  LAST 1463   10,3153  1 3103 1            TCF     GODSPRS

0778   REF  22  LAST 1467   10,3154  54 155 1  GOPERF2R TS      PLAYTEM1        DESIRED VERB-NOUN TO DISPLAY R1,R2,R3

0779   REF   1              10,3155  3 5001 0            CAF     PERF2MSK
0780   REF   4  LAST 1467   10,3156  1 3103 1            TCF     GODSPRS

0781                        10,3157  0 0004 0  SAVELOCS INHINT

0782   REF   4  LAST  713   10,3160  4 5046 1            CS      EBANK7          GETS ALL EBANK BITS OFF
0783   REF   9  LAST 1466   10,3161  7 0160 1            MASK    PLAYTEM4
0784   REF  47  LAST 1461   10,3162  6 0003 1            AD      EBANK
0785   REF  10  LAST 1467   10,3163  54 160 1            TS      PLAYTEM4

0786   REF 308  LAST 1461   10,3164  22 002 0  SAVELOCR LXCH    Q

0787   REF   5  LAST 1438   10,3165  0 4665 0            TC      MAKECADR
0788   REF   1              10,3166  54 157 0            TS      PLAYTEM3

0789   REF  10  LAST 1466   10,3167  6 0072 1            AD      RUPTREG3        NOT USED FOR NON R ROUTINES
0790   REF 196  LAST 1466   10,3170  0 0001 0            TC      L

0791   REF 271  LAST 1464   10,3171  3 4772 1  COPYNORM CAF     ZERO
0792   REF   7  LAST 1465   10,3172  54 164 0  COPIES   TS      COPINDEX

0793   REF  11  LAST 1467   10,3173  3 0160 0  COPIES2  CA      PLAYTEM4        FLAGWORD
0794   REF   8  LAST 1467   10,3174  50 164 1            INDEX   COPINDEX
0795   REF   3  LAST 1461   10,3175  55'273 1            TS      EBANKSAV        EQUIV TO DSPFLG

0796   REF   1              10,3176  7 5004 1            MASK    CADRMASK        FLASH AND GODSPRET
0797                        10,3177  0 0006 1            EXTEND

0798   REF   1              10,3200  1 3204 0            BZF     SKIPADD

0799   REF   2  LAST 1467   10,3201  3 0157 1            CA      PLAYTEM3
0800   REF   9  LAST 1467   10,3202  50 164 1            INDEX   COPINDEX
0801   REF   2  LAST  136   10,3203  54 371 0            TS      CADRFLSH

0802   REF  23  LAST 1467   10,3204  3 0155 0  SKIPADD  CA      PLAYTEM1        VERB NOUN
0803   REF  10  LAST 1467   10,3205  50 164 1            INDEX   COPINDEX
0804   REF   1              10,3206  54 366 0            TS      NVWORD

0805   REF   1              10,3207  1 3454 0            TCF     RELINTQ

0806   REF  11  LAST 1467   10,3210  50 164 1  GOSLEEPS INDEX   COPINDEX
0807   REF   2  LAST 1461   10,3211  3 3740 1            CA      PRIODCT
0808   REF   1              10,3212  7 5045 1            MASK    WAITMASK
0809   REF   2  LAST 1461   10,3213  0 3755 0            TC      UPENT2
0810   REF 156  LAST 1464   10,3214  4 4770 1            CS      ONE
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0811   REF  12  LAST 1467   10,3215  6 0164 1            AD      COPINDEX
0812   REF   1               10,3216  54 154 0            TS      FACEREG

0813   REF   2  LAST 1468   10,3217  50 154 1  XCHSLEEP  INDEX   FACEREG
0814   REF   1               10,3220  3 3725 1            CAF     WAKECADR
0815   REF  11  LAST 1465   10,3221  0 5167 1            TC      JOBWAKE        FIND CADR IN JOB AREA

0816   REF   3  LAST 1465   10,3222  0 3445 1            TC      XCHTOEND       CAUSES AWAKENED JOB TO GO TO ENDOFJOB

0817   REF   3  LAST 1468   10,3223  50 154 1            INDEX   FACEREG        REPLACE SAME CADR BUT NEW JOB AREA
0818   REF   2  LAST 1468   10,3224  3 3725 1            CAF     WAKECADR
0819   REF   5  LAST 1438   10,3225  1 5163 1            TCF     JOBSLEEP

0820   REF   4  LAST 1468   10,3226  54 154 0  JOBXCHS   TS      FACEREG        CONTROLS TYPE OF DISPLAY PUT TO SLEEP
0821   REF   3  LAST 1465   10,3227  0 3431 1            TC      WITCHONE
0822   REF  12  LAST 1468   10,3230  0 5167 1            TC      JOBWAKE
0823   REF   5  LAST 1468   10,3231  3 0154 1            CA      FACEREG
0824   REF  26  LAST 1466   10,3232  50 064 0            INDEX   LOCCTR
0825   REF   6  LAST 1468   10,3233  54 154 0            TS      FACEREG

0826   REF   1               10,3234  3 3752 1            CAF     XCHQADD
0827   REF   1               10,3235  0 3446 1            TC      XCHNYLOC

0828   REF   7  LAST 1468   10,3236  50 154 1            INDEX   FACEREG
0829   REF   1               10,3237  3 3741 0            CA      MARKOCT
0830   REF   1               10,3240  7 3743 0            MASK    IDLESLEP
0831   REF   1               10,3241  0 3762 1            TC      DOWNENT2
0832   REF   8  LAST 1468   10,3242  50 154 1            INDEX   FACEREG        BIT SHOWS PRIO INTERRUPTED NORM OR MARK
0833   REF   1               10,3243  3 4764 0            CA      MRUPTBIT       BIT5 FOR MARK, BIT4 FOR NORMAL
0834   REF   3  LAST 1467   10,3244  0 3755 0            TC      UPENT2
0835   REF  18  LAST 1465   10,3245  3 0100 0            CA      FLAGWRD4
0836   REF   2  LAST 1461   10,3246  7 4766 0            MASK    MKOVBIT        IF BIT 3 THEN MARK OVER NORM
0837   REF 394  LAST 1466   10,3247  10 000 0            CCS     A
0838   REF   2  LAST 1460   10,3250  0 2630 0  GENMARK   TC      MARKPLAY       USED AS GENADR FOR JOBWAKE
0839   REF   2  LAST 1463   10,3251  1 3002 1            TCF     CKTOCOPY

0840   REF 272  LAST 1467   10,3252  3 4772 1  MARKWAKE  CAF     ZERO
0841   REF   2  LAST 1461   10,3253  54 160 1  WAKEPLAY  TS      TEMPOR2

0842   REF   3  LAST 1468   10,3254  50 160 0            INDEX   TEMPOR2
0843   REF   1               10,3255  3 3736 0            CA      BITS5+11
0844   REF   2  LAST 1468   10,3256  0 3762 1            TC      DOWNENT2
0845   REF   4  LAST 1468   10,3257  50 160 0            INDEX   TEMPOR2
0846   REF   3  LAST 1468   10,3260  3 3725 1            CAF     WAKECADR
0847   REF  13  LAST 1468   10,3261  0 5167 1            TC      JOBWAKE

0848   REF   1               10,3262  1 3555 0            TCF     ENDRET

R0849        ALL .1 RESTARTS BRANCH DIRECTLY TO INITDSP. NORMAL DISPLAYS ARE THEONLY DISPLAYS ALLOWED TO USE .1 RESTARTS
R0851   INITDSP FIRST RESTORES THE EBANK AND THE SUPERBANK TO THE MOST RECENT NORMAL EBANK AND SUPERBANK.
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L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 22 E0 S3

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R0853       IF THE MOST RECENT NORMAL DISPLAY REQUEST WAS NOT FINISHED, CONTROL IS SENT BACK TO THE LAST NORMAL USER.
R0855  OTHERWISE THE NORMAL DISPLAY SET UP IN THE NORMAL DISPLAY REGS IS STARTED UP IMMEDIATELY.

 0857   REF   4  LAST 1464   10,3263  3 1275 0  INITDSP  CA      EBANKTEM        RESTORE MOST RECECT NORMAL EBANK
 0858   REF  48  LAST 1467   10,3264  54 003 0           TS      EBANK

 0859   REF   4  LAST 1465   10,3265  3 0365 1           CA      RESTREG         SUPERBANK AND JOB PRIORITY
 0860                        10,3266  0 0006 1           EXTEND                  RESTORE SUPERBANK
 08605  REF  24  LAST 1466   10,3267  01 007 1           WRITE   SUPERBNK        CHAN 07
 0861   REF   5  LAST 1466   10,3270  7 7680 1           MASK    PRIO37
 0862   REF  17  LAST 1464   10,3271  0 5176 1           TC      PRIOCHNG

 0863   REF  51  LAST 1466   10,3272  4 6214 1           CS      THREE
 0864   REF   5  LAST  632   10,3273  6 0373 0           AD      TEMPFLSH
 0865   REF  10  LAST 1466   10,3274  1 4660 1           TCF     BANKJUMP

 0866                        10,3275  0 0003 1  PINBRNCH RELINT                  FOR GOPIN USERS
 0867   REF   1              10,3276  3 1276 0           CA      MARK2PAC        NEEDED TO SAVE MPAC +2 FOR MARK USERS
 0868   REF 701  LAST 1466   10,3277  54 156 1           TS      MPAC +2         ONLY

 0869   REF  19  LAST 1468   10,3300  3 0100 0           CA      FLAGWRD4        PINBRANCH CONDITION
 0870   REF   1              10,3301  7 7673 0           MASK    PINMASK
 0871   REF 395  LAST 1468   10,3302  10 000 0           CCS     A
 0872                        10,3303  1 3306 0           TCF     +3
 0873   REF   1              10,3304  1 3713 0           TCF     ERASER          * NOTHING IN ENDIDLE
 0874   REF   3  LAST 1468   10,3305  1 2630 1           TCF     MARKPLAY

 0875   REF  75  LAST 1463   10,3306  0 5547 1  NORMBNCH TC      UPFLAG          SET PINBRANCH BIT
 0876   REF   1              10,3307   00105 0           ADRES   PINBRFLG

 0877   REF   1              10,3310  3 4753 1           CAF     PRIODBIT        PRIO INTERRUPTED
 0878   REF  20  LAST 1469   10,3311  7 0100 1           MASK    FLAGWRD4
 0879   REF 396  LAST 1469   10,3312  10 000 0           CCS     A
 0880   REF   1              10,3313  1 3010 1           TCF     KEEPPRIO

 0881   REF   1              10,3314  1 3061 1           TCF     PLAYJUM1

 0882                        10,3315  22 007 0  NVDSP    ZL
 C8825  REF   1              10,3316  0 2660 0           TC      COPYPACS
 0883   REF   5  LAST 1468   10,3317  3 0160 0           CA      TEMPORZ         SET UP BLANK BITS FOR NVMONOPT IN CASE
 0884   REF  21  LAST 1430   10,3320  7 4774 0           MASK    SEVEN           USER REQUESTS BLANKING MONITOR
 0885   REF 197  LAST 1467   10,3321  26 001 1           ADS     L
 0886   REF   1              10,3322  4 4754 1           CS      2NDPERF
 0887   REF  13  LAST 1468   10,3323  50 164 1           INDEX   COPINDEX
 0888   REF   1              10,3324  7 1273 1           MASK    DSPFLG
 0889   REF  14  LAST 1469   10,3325  50 164 1           INDEX   COPINDEX
 0890   REF   2  LAST 1469   10,3326  55'273 1           TS      DSPFLG

 0891   REF   2  LAST 1460   10,3327  7 4761 1           MASK    DCMKPERF
 C8912  REF 397  LAST 1469   10,3330  10 000 0           CCS     A
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0891   REF   1                    10,3331  3 5044 1                CA     OCT2600
0892   REF   5  LAST 1175         10,3332  54 141 1                TS     TEM1

0893   REF 702  LAST 1469         10,3333  3 0156 0                CA     MPAC +2
0894   REF   2  LAST 1461         10,3334  54 165 1                TS     MPAC2SAV

0895   REF   2  LAST 1469         10,3335  55'276 1                TS     MARK2PAC       * FOR DISK ONLY *
0896   REF  15  LAST 1469         10,3336  50 164 1                INDEX  COPINDEX
0897   REF   2  LAST 1467         10,3337  10 366 0                CCS    NVWORD
0898   REF   1                    10,3340  1 3347 0                TCF    NVDSP1
0899   REF   1                    10,3341  1 3455 1                TCF    CLEANEND
0900   REF   5  LAST 1461         10,3342  4 0367 1                CS     MARKNV
0901   REF   6  LAST 1470         10,3343  54 367 1                TS     MARKNV         IN CASE MARKPLAY AWAKENED AFTER SLEEPING
0902   REF  12  LAST 1434         10,3344  7 6043 1                MASK   LOW7
0903   REF   1                    10,3345  6 3731 1                AD     VQSNODM1
0904   REF   6  LAST 1470         10,3346  6 0141 0                AD     TEM1
0905   REF 157  LAST 1467         10,3347  6 4770 0  NVDSP1        AD     ONE
0906   REF   1                    10,3350  0 4203 1  NV50DSP       TC     NVMONOPT
0907   REF   1                    10,3351  1 3467 0                TCF    REST           IF BUSY
0908   REF   6  LAST  391         10,3352  0 4417 1                TC     FLASHOFF       IN CASE OF EXTENDED VERB NON FLASH

0909   REF   1                    10,3353  0 2656 0                TC     COPYTOGO       MPACS DESTROYED BY NVSUB
0910   REF   1                    10,3354  3 3732 1                CAF    OCT700
0911   REF   3  LAST 1468         10,3355  0 3762 1                TC     DOWNENT2

0912   REF   6  LAST 1469         10,3356  3 0160 0  BLANKCHK      CA     TEMPOR2        BLANK BITS 1,2,3 IF SET
0913   REF   2  LAST  366         10,3357  0 4264 0                TC     BLANKSUB
0914   REF   2  LAST 1461         10,3360  1 3315 1                TCF    NVDSP
0915   REF   2  LAST 1461         10,3361  3 4764 0  PERFCHEK      CAF    PERFRQST       BIT5 FOR PERFORM
0916   REF   7  LAST 1470         10,3362  7 0160 1                MASK   TEMPOR2
0917   REF 398  LAST 1469         10,3363  10 000 0                CCS    A              IS THIS A GOPERF DISPLAY
0918   REF   1                    10,3364  1 3407 0                TCF    ISTOR2ND       YES

0919   REF   6  LAST 1466         10,3365  3 4765 1  GOANIDLE      CAF    FLSHRQST
0920   REF   8  LAST 1470         10,3366  7 0160 1                MASK   TEMPOR2
0921   REF 399  LAST 1470         10,3367  10 000 0                CCS    A
0922   REF   1                    10,3370  1 3504 1                TCF    FLASHSUB       IT IS

0923   REF   9  LAST 1470         10,3371  4 0160 1                CS     TEMPOR2        IS THIS A GODSPRET
0924   REF   2  LAST 1462         10,3372  7 4763 0                MASK   RETDSPY
0925   REF 400  LAST 1470         10,3373  10 000 0                CCS    A
0926   REF   1                    10,3374  1 3401 0                TCF    ISITNO2

0927   REF  16  LAST 1470         10,3375  50 164 1                INDEX  COPINDEX
0928   REF   3  LAST 1467         10,3376  3 0371 1                CA     CADRFLSH
0929   REF 703  LAST 1470         10,3377  54 157 0                TS     MPAC +3
0930   REF   1                    10,3400  1 3602 1                TCF    ENDIT

0931   REF  17  LAST 1470         10,3401  50 164 1  ISITNO2       INDEX  COPINDEX       IS THIS A PASTE
0932   REF   3  LAST 1470         10,3402  3 0366 1                CA     NVWORD
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0933   REF  13  LAST 1470   10,3403  7 6043 1          MASK    LOW7          CHECK MADE FOR PINBRNCH AND PRIO ON MARK
0934                        10,3404  0 0006 1          EXTEND
0935   REF   2  LAST 1470   10,3405  1 3504 1          BZF     FLASHSUB      YES, ASSUME PASTE ALWAYS ON FLASH

0936   REF  92  LAST 1460   10,3406  1 5205 1          TCF     ENDOFJOB      NOT FLASH, NOT GOPERF, THERFORE EXIT

0937   REF  10  LAST 1470   10,3407  3 0160 0  1STOR2ND CA      TEMPOR2
0938   REF   2  LAST 1469   10,3410  7 4754 1          MASK    2NDPERF
0939   REF 401  LAST 1470   10,3411  10 000 0          CCS     A
0940   REF   1              10,3412  1 3365 0          TCF     GOANIDLE      SECOND

0941   REF   3  LAST 1471   10,3413  3 4754 0          CA      2NDPERF
0942   REF  18  LAST 1470   10,3414  50 164 1          INDEX   COPINDEX
0943   REF   3  LAST 1469   10,3415  27'273 1          AUS     DSPFLG

0944                        10,3416  22 007 0          ZL
0945                        10,3417  0 0006 1          EXTEND                IS IT MARK
0946   REF   1              10,3420  6 2677 0          BZMF    MARKPERF      YES

0947   REF   1              10,3421  7 4755 0          MASK    V99PSTE
0948                        10,3422  0 0006 1          EXTEND
0949   REF   1              10,3423  1 3427 1          BZF     V50PASTE
0950   REF  23  LAST  738   10,3424  4 0777 1          CS      NVWORD1       NVOWRD1= -0 IS V97  NVWORD1= -400 IS V99
0951   REF   1              10,3425  6 3746 1          AD      V97N00
0952   REF   2  LAST 1461   10,3426  1 3350 0          TCF     NV50DSP
0953   REF   1              10,3427  3 3721 0  V50PASTE CAF     V50N00
0954   REF   3  LAST 1471   10,3430  1 3350 0          TCF     NV50DSP       DISPLAY SECOND PART OF GOPERF

0955   REF  35  LAST 1443   10,3431  4 4764 1  WITCHONE CS      BIT5          TURN OFF KEY RELEASE LIGHT
0956                        10,3432  0 0006 1          EXTEND
0957   REF  29  LAST 1446   10,3433  03 011 1          WAND    DSALMOUT

0958   REF  21  LAST 1469   10,3434  3 0100 0          CA      FLAGWRD4
0959   REF   1              10,3435  7 3732 0          MASK    NVBUSMSK      IS IT NVSUB ASLEEP
0960   REF 402  LAST 1471   10,3436  10 000 0          CCS     A
0961   REF 158  LAST 1470   10,3437  3 4770 0          CAF     ONE
0962   REF 198  LAST 1469   10,3440  54 001 1          TS      L
0963   REF 273  LAST 1468   10,3441  3 4772 1          CAF     ZERO
0964   REF 199  LAST 1471   10,3442  50 001 0          INDEX   L
0965   REF  10  LAST  383   10,3443  57'245 0          XCH     CADRSTOR

0966   REF 309  LAST 1467   10,3444  0 0002 0          TC      Q

0967   REF   6  LAST  374   10,3445  3 4170 0  XCHTOEND CAF     ENDINST       TC ENDOFJOB REPLACES GENADR IN LOC FOR
0968   REF  27  LAST 1468   10,3446  56 064 0  XCHNYLOC XCH     LOCCTR        WAS THIS ADDRESS SLEEPING
0969                        10,3447  0 0006 1          EXTEND
0970   REF   2  LAST 1467   10,3450  6 3454 1          BZMF    RELINTQ       NO
0971   REF  28  LAST 1471   10,3451  56 064 0          XCH     LOCCTR        YES
0972   REF  29  LAST 1471   10,3452  50 064 0          INDEX   LOCCTR
0973   REF  41  LAST 1436   10,3453  54 164 0          TS      LOC
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0974   REF   3  LAST  333   10,3454  1 5642 0  RELINTQ  TCF     REQ          BACK TO USER
0976   REF   2  LAST  827   10,3455  3 7654 1  CLEANEND CAF     PRIO32       ONE LOWER THAN DISPLAYS SLEEPING
0977   REF  38  LAST 1411   10,3456  0 5135 0           TC      FINDVAC
0978   REF   2  LAST  195      0370                     EBANK=  NVSAVE
0979   REF   1                10,3457   04247 1         2CADR   JAMTERM
0979   REF   1                10,3460   04060 0

0980   REF   3  LAST 1471   10,3461  1 3505 0           TCF     FLASHSUB +1

0981   REF  22  LAST 1471   10,3462  3 0100 0  ISITPRIO CA      FLAGWRD4
0982   REF   1                10,3463  7 7667 0           MASK    ITISMASK     IS PINBRFLG, MARKIDFLG SET
0983                          10,3464  0 0006 1           EXTEND
0984   REF   2  LAST 1463   10,3465  1 3041 0           BZF     PRIOBORT
0985   REF  93  LAST 1471   10,3466  1 5205 1           TCF     ENDOFJOB

0986   REF  11  LAST 1471   10,3467  11'245 1  REST     CCS     CADRSTOR     IS SOMEONE IN ENDIDLE
0987   REF  94  LAST 1472   10,3470  1 5205 1           TCF     ENDOFJOB     YES
0988   REF   1                10,3471  1 3473 0           TCF     RESTSLEP

0989   REF  95  LAST 1472   10,3472  1 5205 1           TCF     ENDOFJOB

0990   REF   2  LAST 1461   10,3473  3 0162 1  RESTSLEP CA      GENMASK      SET NVSLEEP BITS
0991   REF   2  LAST 1471   10,3474  7 3732 0           MASK    NVBUSMSK
0992   REF   4  LAST 1468   10,3475  0 3755 0           TC      UPENT2
0993   REF   1                10,3476  0 4240 0  NVSUBUSY TC      ISCADR+0
0994   REF   3  LAST  366   10,3477  0 4356 0           TC      RELDSPON
0995   REF  19  LAST 1471   10,3500  50 164 1           INDEX   COPINDEX
0996   REF   1                10,3501  3 3724 0           CAF     NVCADR
0997   REF   6  LAST  388   10,3502  55'246 1           TS      DSPLIST
0998   REF   6  LAST 1468   10,3503  0 5163 0           TC      JOBSLEEP
0999   REF   4  LAST  373   10,3504  0 4360 0  FLASHSUB TC      FLASHON

1000   REF  20  LAST 1472   10,3505  3 0164 1    +1     CA      COPINDEX     COPINDEX DESTROYED BY ENDIDLE
1001   REF   1                10,3506  54 157 0           TS      COPMPAC

1002   REF   3  LAST 1472   10,3507  3 0162 1           CA      GENMASK
1003   REF   1                10,3510  7 7675 0           MASK    IDLEMASK
1004   REF   5  LAST 1472   10,3511  0 3755 0           TC      UPENT2
1010   REF  12  LAST 1472   10,3512  11'245 1           CCS     CADRSTOR     SEE IF SOMEONE ALREADY IN ENDIDLE
1011   REF   1                10,3513  1 3462 0           TCF     ISITPRIO
1012                          10,3514  1 3516 1           TCF     +2
1013   REF   2  LAST 1472   10,3515  1 3462 0           TCF     ISITPRIO

1014   REF   2  LAST 1472   10,3516  0 4240 0  ENDIDLE  TC      ISCADR+0
1015   REF   1                10,3517  3 3557 0           CA      ENDIDRET
1016   REF  13  LAST 1472   10,3520  55'245 1           TS      CADRSTOR
1017   REF   7  LAST 1472   10,3521  0 5163 0           TC      JOBSLEEP
1018   REF   1                10,3522  4 4354 0  IDLERET1 CS      LOWLOAD
1019   REF 704  LAST 1470   10,3523  6 0154 1           AD      MPAC         VERBREG
1020                          10,3524  0 0006 1           EXTEND
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1021   REF 403  LAST 1471   10,3525  26 000 0            DIM     A
1022                        10,3526  0 0006 1            EXTEND
1023   REF   1              10,3527  1 3703 1            BZF     LOADITIS        V21 OR V22 OR V23 ON DSKY
1024   REF  23  LAST 1472   10,3530  3 0100 0  OKTDENT    CA      FLAGWRD4        CHECK NATURE OF ENDIDLE RETURN
1025   REF   3  LAST  366   10,3531  7 4076 0            MASK    BIT15/14
1026   REF 404  LAST 1473   10,3532  10 000 0            CCS     A
1027   REF   1              10,3533  1 3536 0            TCF     TIMECHEK        PRIO ENDIDLE RETURN
1028   REF   1              10,3534  1 3651 1            TCF     NORMRET         NORMAL ENDIDLE RETURN
1029   REF   1              10,3535  1 3640 1            TCF     MARKRET         MARK ENDIDLE RETURN

10295  REF   4  LAST 1470   10,3536  3 0366 1  TIMECHEK  CA      NVWORD
10296                       10,3537  0 0006 1            EXTEND
10297  REF   2  LAST 1473   10,3540  1 3651 1            BZF     NORMRET

1030   REF  27  LAST 1464   10,3541  4 0025 1            CS      TIME1
1031   REF   2  LAST 1464   10,3542  6 1005 0            AD      PRIOTIME
1032   REF 405  LAST 1473   10,3543  10 000 0            CCS     A
1033                        10,3544  4 0000 0            COM
1034   REF   7  LAST 1412   10,3545  6 7663 0            AD      OCT37776
1035   REF 159  LAST 1471   10,3546  6 4770 0            AD      ONE
1036   REF   1              10,3547  6 3774 0            AD      -2SEC
1037                        10,3550  0 0006 1            EXTEND
1038   REF   2  LAST 1469   10,3551  6 3010 0            BZMF    KEEPPRIO

1039   REF   3  LAST 1473   10,3552  1 3651 1            TCF     NORMRET

1040   REF 160  LAST 1473   10,3553  3 4770 0  NORMWAKE  CAF     ONE
1041   REF   1              10,3554  1 3253 1            TCF     WAKEPLAY

1042   REF   4  LAST  380   10,3555  11'217 0  ENDRET    CCS     LOADSTAT        -0=V32 OR E, -1=V33 OR PRO, -2=V34
1043   REF  96  LAST 1472   10,3556  1 5205 1            TCF     ENDOFJOB        +1=ENDMARK
1044   REF   1              10,3557   21522 1  ENDIDRET  CADR    IDLERET1        CANNOT GET HERE
1045                        10,3560  1 3561 1            TCF     +1
1046   REF  24  LAST 1473   10,3561  3 0100 0            CA      FLAGWRD4        IS IT A VNFLASH
1047   REF   1              10,3562  7 4767 1            MASK    VNBIT             (BIT2)
1048   REF   2  LAST 1472   10,3563  6 0157 1            AD      COPMPAC         AND A NORMAL DISPLAY
1049   REF   4  LAST 1394   10,3564  6 6061 0            AD      NEG4
1050                        10,3565  0 0006 1            EXTEND
1051   REF   1              10,3566  1 3607 1            BZF     VNRET
1052   REF   5  LAST 1473   10,3567  3 1217 1            CA      LOADSTAT
1053   REF  70  LAST 1465   10,3570  6 4767 0            AD      TWO
1054   REF   3  LAST 1473   10,3571  50 157 1  ENDRET1   INDEX   COPMPAC
1055   REF   4  LAST 1470   10,3572  6 0371 1            AD      CADRFLSH
1056   REF 705  LAST 1472   10,3573  54 157 0  ENDRET2   TS      MPAC +3

1057   REF   4  LAST 1472   10,3574  3 0162 1            CA      GENMASK         REMOVE ENDIDLE AND PINBRANCH BITS
1058   REF   1              10,3575  7 3751 0            MASK    PINIDMSK
1059   REF   4  LAST 1470   10,3576  0 3762 1            TC      DOWNENT2
1060   REF  52  LAST 1469   10,3577  4 6214 1            CS      THREE           BLANK EVERYTHING EXCEPT MM
1061   REF   2  LAST  250   10,3600  0 4202 0            TC      NVSUB
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 1062                          10,3601  1 3602 1           TCF    +1

 1063   REF   3  LAST 1465    10,3602  3 0163 0  ENDIT    CA     USERPRIO       RETURN TO USERS PRIORITY
 1064   REF   6  LAST 1469    10,3603  7 7660 1           MASK   PRIO37
 1065   REF  18  LAST 1469    10,3604  0 5176 1           TC     PRIOCHNG
 1066   REF 706  LAST 1473    10,3605  3 0157 1           CA     MPAC +3
 1067   REF  11  LAST 1469    10,3606  1 4660 1           TCF    BANKJUMP

 1068   REF  68  LAST 1444    10,3607  0 5561 0  VNRET    TC     DOWNFLAG
 1069   REF   3  LAST 1463    10,3610    00111 0           ADRES  VNFLAG
 1070   REF   6  LAST 1473    10,3611  3 1217 1           CA     LOADSTAT
 1071   REF 161  LAST 1473    10,3612  6 4770 0           AD     ONE
 1072   REF 406  LAST 1473    10,3613  10 000 0           CCS    A
 1073   REF   6  LAST 1432    10,3614  3 7700 1           CAF    NEG3           LOADOSTAT.-0
 1074   REF   1               10,3615  1 3571 0           TCF    ENDRET1        CANNOT GET HERE VIA CCS
 1075   REF   1               10,3616  1 3621 0           TCF    TERMFLSH       LOADSTAT=-2
 1076   REF 162  LAST 1474    10,3617  4 4770 1           CS     ONE            COMPENSATE FOR INCREMENTED Q IN LEAD-IN
 1077   REF   2  LAST 1474    10,3620  1 3571 0           TCF    ENDRET1        LOADSTAT=-1
 1078   REF   1               10,3621  3 3753 0  TERMFLSH CAF    GOPOOCAD
 1079   REF   1               10,3622  1 3573 1           TCF    ENDRET2
R1080

 1090   REF  12  LAST 1467    10,3623  4 0160 1  LINUSCHR CS     PLAYTEM4       IS THIS A LINUS
 1091   REF   3  LAST 1462    10,3624  7 4753 0           MASK   REFLSH
 1092   REF 407  LAST 1474    10,3625  10 000 0           CCS    A
 1093   REF   5  LAST 1402    10,3626  1 6706 1           TCF    Q+1            NO
 1094   REF   3  LAST 1467    10,3627  4 0157 0           CS     PLAYTEM3       YES, IS IT ALREADY IN ENDIDLE
 1095   REF  21  LAST 1472    10,3630  50 164 1           INDEX  COPINDEX
 1096   REF   5  LAST 1473    10,3631  6 0371 1           AD     CADRFLSH
 1097                          10,3632  0 0006 1           EXTEND
 1098                          10,3633  1 3635 0           BZF    +2             YES

 1099   REF 310  LAST 1471    10,3634  0 0002 0           TC     Q              NO
 1100   REF   9  LAST  392    10,3635  11'215 1           CCS    DSPLOCK        IS THE ASTRONAUT BUSY
 1101   REF  97  LAST 1473    10,3636  0 5205 0           TC     ENDOFJOB       END THE NEW DISPLAY, ITS ALREADY ACTIVE
 1102   REF 311  LAST 1474    10,3637  0 0002 0           TC     Q

R1103   MORE LOGIC COULD BE INCORPORATED HERE TO MAKE SURE A RECYCLE IS A RECYCLAND CONVERSLY THAT A LOAD IS A LOAD.
R1105        LASTPLAY CHECKS TO SEE IF (1) THE LAST NORMAL DISPLAY WAS EITHER INTERRUPTED BY A PRIO OR A MARK (MARK
R1107   COULD ONLY HAPPEN DURING PINBRANCH) OR IF (2) THE LAST NORMAL DISPLAY WAS REQUESTED WHILE A HIGHER PRIORITY
R1109   DISPLAY WAS GOING RESULTING IN THE NORMAL BEING PUT TO SLEEP.

R1110        IF EITHER OF THE ABOVE 2 CONDITIONS EXISTS , THE NORMAL DISPLAY IS AWAKENED TO GO TO PLAYJUM1 WHICH STARTS
R1112   UP THE MOST RECENT VALID NORMAL DISPLAY. IF THESE 2 CONDITIONS DO NOT EXIST, CONTROL GOES TO PLAYJUM1 WHICH IS
R1114   STARTED IMMEDIATELY WITH THE ASSUMPTION THAT THE MOST RECENT NORMAL DISPLAY IS ALREADY IN-ENDIDLE(DURING A
R1116   PINBRANCH) OR THAT A RESTART HAS OCCURRED AND THE DISPLAY CAN BE STARTED AS A .1 RESTART.

 1118   REF   3  LAST 1468    10,3640  3 4766 1  MARKRET  CAF    MKOVBIT
 1119   REF   5  LAST 1473    10,3641  0 3762 1           TC     DOWNENT2
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1120   REF   2  LAST 1468   10,3642  1 3555 0            TCF     ENDRET

1121   REF 163  LAST 1474   10,3643  3 4770 0  MARKOVER  CAF     ONE
1122   REF   7  LAST 1474   10,3644  55'217 0            TS      LOADSTAT
1123   REF  25  LAST 1473   10,3645  3 0100 0            CA      FLAGWRD4        IS ENDIDFLG SET
1124   REF   1              10,3646  7 4346 0            MASK    BIT13-14        IS NORMAL OR PRIO IN ENDIDLE
1125   REF 408  LAST 1474   10,3647  10 000 0            CCS     A
1126   REF   1              10,3650  1 3306 0            TCF     NORMBNCH

1127   REF  26  LAST 1475   10,3651  3 0100 0  NORMRET   CA      FLAGWRD4        IS MARK SLEEPING
1128   REF   2  LAST 1468   10,3652  7 3736 1            MASK    BITS5+11        OR WAITING
1129   REF 409  LAST 1475   10,3653  10 000 0            CCS     A
1130   REF   1              10,3654  1 3252 0            TCF     MARKWAKE

1131   REF  27  LAST 1475   10,3655  3 0100 0            CA      FLAGWRD4        NO
1132   REF   1              10,3656  7 3737 0            MASK    BITS4+10        IS NORMAL INTERRUPTED OR WAITING
1133   REF 410  LAST 1475   10,3657  10 000 0            CCS     A
1134   REF   1              10,3660  1 3553 0            TCF     NORMWAKE        YES

1135   REF   7  LAST 1470   10,3661  3 4765 1            CAF     FLSHRQST        NO, WAS IT FLASH REQUEST
11355  REF   3  LAST 1470   10,3662  6 4763 1            AD      RETDSPY         OR GODSPRET
1136   REF   5  LAST 1469   10,3663  7 1275 1            MASK    EBANKTEM
1137   REF 411  LAST 1475   10,3664  10 000 0            CCS     A
1138   REF   3  LAST 1475   10,3665  1 3555 0            TCF     ENDRET          YES
1139   REF   3  LAST 1472   10,3666  3 0370 0            CA      NVSAVE
1140                        10,3667  0 0006 1            EXTEND
1141   REF   4  LAST 1475   10,3670  1 3555 0            BZF     ENDRET

1142   REF   3  LAST  741   10,3671  3 5054 0            CAF     PRIO15
1143   REF  23  LAST 1466   10,3672  0 5121 0            TC      NOVAC
1144   REF   5  LAST 1473      0366                     EBANK=  NVWORD
1145   REF   2  LAST 1469   10,3673   03061 0           2CADR   PLAYJUM1
1145                        10,3674   20060 0

1146   REF   5  LAST 1475   10,3675  1 3555 0            TCF     ENDRET

1147   REF  28  LAST 1475   10,3676  3 0100 0  MARSLEEP  CA      FLAGWRD4        IS MARK ALREADY IN
1148   REF   3  LAST 1475   10,3677  7 3736 1            MASK    BITS5+11
1149   REF 412  LAST 1475   10,3700  10 000 0            CCS     A
1150   REF  98  LAST 1474   10,3701  1 5205 1            TCF     ENDOFJOB        YES
1151   REF   3  LAST 1465   10,3702  1 3210 0            TCF     GOSLEEPS

1152   REF   4  LAST 1473   10,3703  50 157 1  LOADITIS  INDEX   COPMPAC
1153   REF   6  LAST 1475   10,3704  3 0366 1            CA      NVWORD
1154   REF  14  LAST 1471   10,3705  7 6043 1            MASK    LOW7
1155                        10,3706  4 0000 0            COM
1156   REF 707  LAST 1474   10,3707  6 0155 0            AD      MPAC +1         NOUNREG
1157                        10,3710  0 0006 1            EXTEND
1158   REF   1              10,3711  1 3530 0            BZF     OKTOENT         NO, THEN LOAD IS VALID
1159   REF   6  LAST  453   10,3712  1 3275 0            TCF     PINBRNCH        YES, ACCEPT LOAD BUT ASK FOR LAST AGAIN
```

L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 29 E0 S3

```
1160   REF  53  LAST 1473   10,3713  4 6214 1  ERASER   CS      THREE      BLANK EVERYTHINGEXCEPT MM
1161   REF   3  LAST 1473   10,3714  0 4202 0           TC      NVSUB
1162   REF  99  LAST 1475   10,3715  1 5205 1           TCF     ENDOFJOB
1163   REF 100  LAST 1476   10,3716  1 5205 1           TCF     ENDOFJOB

1164                        10,3717    00036 1  PERFMASK OCT     0036       FLASH,PERFORM,BLANK R2 AND R3
1165                        10,3720    00231 1  V01N25   VN      00125
1166                        10,3721    14400 0  V50N00   VN      5000
1167   REF  10  LAST 1439     5001             PERF2MSK EQUALS  BITS4&5    (OCTAL 30)   FLASH, PERFORM
1168   REF   5  LAST 1439     5775             PERF4MSK EQUALS  OCT14      FLASH, BLANK R3
1169                        10,3722    20010 1  REDOMASK OCT     20010      BITS 4 AND 14
1170                        10,3723    40036 0  MARK4MSK OCT     40036      MARK,PERFORM,FLASH,BLANK 2 AND 3
1171   REF   1              10,3724    21006 1  NVCADR   CADR    REDOPRIO
1172   REF   4  LAST 1469   10,3725    20630 0  WAKECADR CADR    MARKPLAY
1173   REF   3  LAST 1475   10,3726    21061 0           CADR    PLAYJUM1

1174                        10,3727    11210 1  NBUSMASK OCT     1121
1175                        10,3730    66521 1  PMMASK   OCT     66521
1176   REF   4  LAST 1461     4171             VERBMASK =       MID7       (OCT 37600)
1177                        10,3731    01177 1  V05N00M1 OCT     1177       V05 MINUS ONE
1178   REF   5  LAST  569   10,2576             GOXDSPF  EQUALS  GOMARKF
1179   REF   2  LAST  570     5524             ENDEXT   EQUALS  ENDMARK
1180   REF  14  LAST 1216      0165            MPAC2SAV EQUALS  BANKSET
1181                        10,3732    00700 0  NVBUSMSK OCT     700
1182                        10,3733    40030 0  MPERFMSK OCT     40030      BIT 15,5,4 FOR MARK,PERFORM,FLASH
1183                        10,3734    34300 0  OCT34300 OCT     34300
1184                        10,3735    40100 1  BITS15+7 OCT     40100
1189                        10,3736    02020 1  BITS5+11 OCT     2020       * DONT MOVE
1190                        10,3737    01010 1  BITS4+10 OCT      1010      * DONT MOVE
1191   REF   4  LAST  375     4354             LOWLOAD  EQUALS  V8SP2LD
1192   REF  11  LAST 1439     5004             CADRMASK EQUALS  OCT50
1193   REF   7  LAST 1422     7673             PINMASK  EQUALS  13,14,15
1194   REF   3  LAST 1470   10,3315             GOPLAY   EQUALS  NVDSP
A1195                                          PRIOSAVE EQUALS  RISAVE
1196   REF 708  LAST 1475      0157            COPMPAC  EQUALS  MPAC +3
1197   REF 709  LAST 1476      0160            TEMPOR2  EQUALS  MPAC +4
1199   REF  42  LAST 1471      0164            COPINDEX EQUALS  LOC
1200   REF  26  LAST 1182      0163            USERPRIO EQUALS  MODE
1201   REF 710  LAST 1476      0162            GENMASK  EQUALS  MPAC +6
1202                        10,3740    20144 1  PRIOOCT  OCT     20144      PRIO
1203                        10,3741    42424 0  MARKOCT  OCT     42424      MARK
1204                        10,3742    11254 1           OCT     11254      NORM

1205                        10,3743    74700 0  IDLESLEP OCT     74700
1206   REF  13  LAST  941     5516             LINUS    EQUALS  BLANKET
1207   REF 711  LAST 1476      0154            FACEREG  EQUALS  MPAC
1208   REF 712  LAST 1476      0155            PLAYTEM1 EQUALS  MPAC +1
1209   REF 713  LAST 1476      0157            PLAYTEM3 EQUALS  MPAC +3
1210   REF 714  LAST 1476      0160            PLAYTEM4 EQUALS  MPAC +4
1211   REF   3  LAST 1466   10,3744    03012 1  MAKEGEN  GENADR  MAKEPLAY
```

```
1212                          10,3745   10200 1  BIT13+8  OCT     10200
1213                          10,3746   30200 0  V97N00   VN      09700      PASTE FOR V97 OR V99
1214                          10,3747   20100 1  BIT14+7  OCT     20100
1215                          10,3750   24030 1  CLOCKCON OCT     24030      FLASH, PERFORM, V99 OR V97 PASTE,REFLASH
1216                          10,3751   74040 0  PINIDMSK OCT     74040
1217  REF   3  LAST 1129        7675            IDLEMASK EQUALS  HIGH4
1219  REF   3  LAST 1465        7667            ITISMASK EQUALS  BIT15+6    *** ENDIDLE ALLOW ***
1220  REF   3  LAST 1423        7664            MARKFMSK EQUALS  OT40010
1221  REF   1                10,3752   03217 0  XCHQADD  GENADR  XCHSLEEP
1222  REF   3  LAST 1204        5045            WAITMASK EQUALS  PRIO3      (OCTAL 30000)
1223  REF   3  LAST 1472     10,3732            OCT700   EQUALS  NVBUSMSK
1224  REF   1                10,3753   55772 0  GOPOOCAD CADR    TCGOPOOH
1225                         10,3754   40210 0  MARK3MSK OCT     40210
1226  REF  48  LAST 1425        4752            MKRQST   =       BIT15
1227  REF  69  LAST 1433        4753            REFLSH   =       BIT14
1228  REF  43  LAST 1430        4754            2NDPERF  =       BIT13
1229  REF  31  LAST 1410        4755            V99PSTE  =       BIT12
1230  REF  35  LAST 1439        4761            DCMKPERF =       BIT8
1231  REF  40  LAST 1407        4762            PRIODSPY =       BIT7
1232  REF  39  LAST 1427        4763            RETDSPY  =       BIT6
1233  REF  36  LAST 1471        4764            PERFRQST =       BIT5
1234  REF  43  LAST 1440        4765            FLSHRQST =       BIT4
1235  REF  44  LAST 1446        4766            BLNKR3   =       BIT3
1236  REF  41  LAST 1432        4767            BLNKR2   =       BIT2
1237  REF  66  LAST 1435        4770            BLNKR1   =       BIT1
1238  REF 274  LAST 1471        4772            DSPONLY  =       ZERO
```

L SERVICE ROUTINES USER'S PAGE NO. 1 ED S3

```
0038   REF   2  LAST 1459    10,2000                        SETLOC DISPLAYS
0039                         10,3755                        BANK
0040  *REF   2 LAST 1460 TO 1478:    624    624*           COUNT* $$/DSPLA
0049   REF 200  LAST 1471    10,3755  54 001 1  UPENT2      TS     L
0050   REF  29  LAST 1475    10,3756  4 0100 1               CS     FLAGWRD4
0051   REF 201  LAST 1478    10,3757  7 0001 1               MASK   L
0053   REF  30  LAST 1478    10,3760  26 100 1               ADS    FLAGWRD4
0056   REF 312  LAST 1474    10,3761  0 0002 0               TC     Q              RETURN

0063                         10,3762  4 0000 0  DOWNENT2     COM                   START TO PROCESS INFORMATION
0066   REF  31  LAST 1478    10,3763  7 0100 1               MASK   FLAGWRD4
0068   REF  32  LAST 1478    10,3764  54 100 1               TS     FLAGWRD4
0071   REF 313  LAST 1478    10,3765  0 0002 0               TC     Q              RETURN

0072   REF  22  LAST 1469       4774             OCT7       EQUALS SEVEN
```

```
PC074
RC075       UPFLAG AND DOWNFLAG ARE ENTIRELY GENERAL FLAG SETTING AND CLEARING SUBROUTINES.  USING THEM, WHETHER OR
RC077   NOT IN INTERRUPT, ONE MAY SET OR CLEAR ANY SINGLE, NAMED BIT IN ANY ERASABLE REGISTER, SUBJECT OF COURSE TO
RC079   EBANK SETTING.  A "NAMED" BIT, AS THE WORD IS USED HERE, IS ANY BIT WITH A NAME FORMALLY ASSIGNED BY THE YUL
RC081   ASSEMBLER.

RC082       AT PRESENT THE ONLY NAMED BITS ARE THOSE IN THE FLAGWORDS.  ASSEMBLER CHANGES WILL MAKE IT POSSIBLE TO
RC084   NAME ANY BIT IN ERASABLE MEMORY.

RC085       CALLING SEQUENCES ARE AS FOLLOWS:-

RC086                          TC     UPFLAG                    TC     DOWNFLAG
RC087                          ADRES  NAME OF FLAG              ADRES  NAME OF FLAG

RC088       RETURN IS TO THE LOCATION FOLLOWING THE "ADRES" ABOUT .58 MS AFTER THE "TC".

RC090       UPON RETURN A CONTAINS THE CURRENT FLAGWRD SETTING.

 0092   REF   9  LAST 1410      4000                      SETLOC FFTAG1
 0093                           5547                      BANK
 0094   REF   1                                          COUNT* $$/FLAG

 0095   REF 314  LAST 1478      5547  3 0002 0  UPFLAG    CA     Q
 0096   REF   3  LAST  278      5550  0 5565 1            TC     DEBIT
 0097                           5551  4 0000 0            COM                    +(15 - BIT)
 0098                           5552  0 0006 1            EXTEND
 0099   REF  16  LAST 1132      5553  04 001 1            ROR    LCHAN           SET BIT
 0100   REF  36  LAST 1433      5554  50 061 0  COMFLAG    INDEX  ITEMP1
 0101   REF  21  LAST 1021      5555  54 074 0            TS     FLAGWRD0
 0102   REF   4  LAST 1408      5556  22 063 1            LXCH   ITEMP3
 0103                           5557  0 0003 1            RELINT
 0104   REF 202  LAST 1478      5560  0 0001 0            TC     L

 0105   REF 315  LAST 1479      5561  3 0002 0  DOWNFLAG  CA     Q
 0106   REF   4  LAST 1479      5562  0 5565 1            TC     DEBIT
 0107   REF 203  LAST 1479      5563  7 0001 1            MASK   L               RESET BIT
 0108   REF   1                 5564  1 5554 1            TCF    COMFLAG

 0109   REF 164  LAST 1475      5565  6 4770 0  DEBIT     AD     ONE             GET DE BITS
 0110                           5566  0 0004 0            INHINT
 0111   REF   5  LAST 1479      5567  54 063 0            TS     ITEMP3
 0112   REF   6  LAST 1197      5570  3 4777 1            CA     LOW4            DEC15
 0113   REF  37  LAST 1479      5571  54 061 1            TS     ITEMP1
 0114   REF   6  LAST 1479      5572  50 063 1            INDEX  ITEMP3
 0115                           5573  2'7777 0            CA     0 -1            ADRES
 0116   REF 204  LAST 1479      5574  54 001 1            TS     L
 0117   REF 275  LAST 1477      5575  3 4772 1            CA     ZERO
 0118                           5576  0 0006 1            EXTEND
```

L SERVICE ROUTINES USER'S PAGE NO. 3 E0 S3

0119	REF 38 LAST 1479	5577	10 0061 1	DV	ITEMP1	A = FLAGWRD, L = (15 - BIT)
0120	REF 39 LAST 1480	5600	52 0062 1	DXCH	ITEMP1	
0121	REF 40 LAST 1480	5601	50 0061 0	INDEX	ITEMP1	
0122	REF 22 LAST 1479	5602	3 0074 1	CA	FLAGWRD0	
0123	REF 205 LAST 1479	5603	54 0001 1	TS	L	CURRENT STATE
0124	REF 24 LAST 1432	5604	50 0062 0	INDEX	ITEMP2	
0125	REF 49 LAST 1477	5605	4 4752 1	CS	BIT15	-(15 - BIT)
0126	REF 316 LAST 1479	5606	0 0002 0	TC	6	

```
P0127   DELAYJOB- A GENERAL ROUTINE TO DELAY A JOB A SPECIFIC AMOUNT OF TIME BEFORE PICKING UP AGAIN.

R0129   ENTRANCE REQUIREMENTS...
A0130                                                   CAF     DT              DELAY JOB FOR DT CENTISECS
A0131                                                   TC      BANKCALL
A0132                                                   CADR    DELAYJOB

 0134   REF   1               00,2000                  SETLOC  DLAYJOB
 0135                         00,3730                  BANK

R0136   THIS MUST REMAIN IN BANK 0 ****************************************
 0137   REF   1                                         COUNT*  $$/DELAY
 0137A  REF  13  LAST  788    00,3730  3 5016 0  1SECDELY CAF     1SEC
 0138                         00,3731  0 0004 0  DELAYJOB INHINT
 0139   REF 317  LAST 1480    00,3732  54 002 1           TS      Q               STORE DELAY DT IN Q FOR DLY -1 IN

 0140   REF   1               00,3733  3 6214 0          CAF     DELAYNUM        WAITLIST
 0141   REF  42  LAST 1434    00,3734  54 070 1  DELLOOP  TS      RUPTREG1
 0142   REF 413  LAST 1475    00,3735  50 000 1           INDEX   A
 0143   REF   5  LAST  204    00,3736  3 1000 0           CA      DELAYLOC        IS THIS DELAYLOC AVAILABLE
 0144                         00,3737  0 0006 1           EXTEND
 0145   REF   1               00,3740  1 3745 0           BZF     OK2DELAY        YES

 0146   REF  43  LAST 1481    00,3741  10 070 1           CCS     RUPTREG1        NO, TRY NEXT DELAYLOC
 0147   REF   1               00,3742  1 3734 0           TCF     DELLOOP

 0148   REF   5  LAST 1229    00,3743  0 7706 1           TC      BAILOUT         NO AVAILABLE LOCS AVAILABLE.
 0149                         00,3744  31104 0            OCT     31104

 0150   REF   1               00,3745  3 3765 0  OK2DELAY CA      TCSLEEP         SET WAITLIST IMMEDIATE RETURN
 0151   REF   5  LAST 1224    00,3746  54 061 1           TS      WAITEXIT

 0152   REF  30  LAST 1210    00,3747  3 0004 0           CA      FBANK
 0153   REF  44  LAST 1481    00,3750  6 0070 0           AD      RUPTREG1        STORE BBANK FOR TASK CALL
 0154   REF 206  LAST 1480    00,3751  54 001 1           TS      L

 0155   REF   1               00,3752  3 3766 0          CAF     WAKECAD         STORE CADR FOR TASK CALL
 0156   REF   2  LAST 1224    00,3753  1 5243 0           TCF     DLY2 -1         DLY IS IN WAITLIST ROUTINE

 0157   REF   6  LAST 1467    00,3754  0 4665 0  TCGETCAD TC      MAKECADR        GET CALLERS FCADR

 0158   REF  45  LAST 1481    00,3755  50 070 0           INDEX   RUPTREG1
 0159   REF   6  LAST 1481    00,3756  55'000 1           TS      DELAYLOC        SAVE DELAY CADRS

 0160   REF   8  LAST 1472    00,3757  0 5163 0           TC      JOBSLEEP

 0161   REF 276  LAST 1479    00,3760  3 4772 1  WAKER    CAF     ZERO
 0162   REF  33  LAST 1466    00,3761  50 006 1           INDEX   BBANK
 0163   REF   7  LAST 1481    00,3762  57'000 0           XCH     DELAYLOC        MAKE DELAYLOC AVAILABLE
 0164   REF  14  LAST 1468    00,3763  0 5167 1           TC      JOBWAKE
```

```
0165   REF  67  LAST 1436   00,3764  0 5314 1            TC      TASKOVER

0166   REF   1              00,3765   03752 1  TCSLEEP   GENADR  TCGETCAD -2
0167   REF   1              00,3766   03760 0  WAKECAD   GENADR  WAKER
```

```
P0169   GENTRAN, A BLOCK TRANSFER ROUTINE.

R0170   WRITTEN BY D. EYLES
R0171   MOD 1 BY KERNAN                                        UTILITYM REV 17 11/18/67

R1722   MOD 2 BY SCHULENBERG  (REMOVE RELINT)   SKIPPER REV 4 2/28/68

R0173           THIS ROUTINE IS USEFULL FOR TRANSFERING N CONSECUTIVE ERASABLE OR FIXED QUANTITIES TO SOME OTHER N
R0175   CONSECUTIVE ERASABLE LOCATIONS.  IF BOTH BLOCKS OF DATA ARE IN SWITCHABLE EBANKS, THEY MUST BE IN THE SAME ONE.

R0177           GENTRAN IS CALLABLE IN A JOB AS WELL AS A RUPT.  THE CALLING SEQUENCE IS:

A0179                                   I       CA      N-1             # OF QUANTITIES MINUS ONE.
A0180                                   I +1    TC      GENTRAN         IN FIXED-FIXED.
A0181                                   I +2    ADRES   L               STARTING ADRES OF DATA TO BE MOVED.
A0182                                   I +3    ADRES   M               STARTING ADRES OF DUPLICATION BLOCK.
A0183                                   I +4                            RETURNS HERE.

R0184           GENTRAN TAKES 25 MCT'S (300 MICROSECONDS) PER ITEM + 5 MCT'S (60 MICS) FOR ENTERING AND EXITING.

R0186           A, L AND ITEMP1 ARE NOT PRESERVED.

 0188   REF   2 LAST 1459      4000                    SETLOC FFTAG4
 0189                          5607                    BANK

 0190   REF  41 LAST 1480      0061                    EBANK= ITEMP1

 0191   REF   1                                        COUNT* $$/TRAN

 0192                          5607  0 0004 0  GENTRAN  INHINT
 0193   REF  42 LAST 1483      5610  54 061 1    +1    TS      ITEMP1          SAVE N-1
 0194   REF 318 LAST 1481      5611  50 002 0          INDEX   Q               C(Q) = ADRES L.
 0195                          5612  6 0000 1          AD      0               ADRES (L + N - 1).
 0196   REF 414 LAST 1481      5613  50 000 1          INDEX   A
 0197                          5614  3 0000 1          CA      0               C(ABOVE).
 0198   REF 207 LAST 1481      5615  54 001 1          TS      L               SAVE DATA.
 0199   REF  43 LAST 1483      5616  3 0061 0          CA      ITEMP1
 0200   REF 319 LAST 1483      5617  50 002 0          INDEX   Q
 0201                          5620  6 0001 0          AD      1               ADRES (M + N - 1).
 0202   REF 415 LAST 1483      5621  50 000 1          INDEX   A
 0203                          5622  22 000 1          LXCH    0               STUFF IT.
 0204   REF  44 LAST 1483      5623  10 061 1          CCS     ITEMP1          LOOP UNTIL N-1 = 0.
 0205   REF  11 LAST  836      5624  1 5610 1          TCF     GENTRAN +1
 0207   REF   8 LAST 1402      5625  1 6710 0          TCF     Q+Z             RETURN TO CALLER.
```

L SERVICE ROUTINES USER'S PAGE NO. 7 ED S3

```
P0208   B5OFF   ZERO BIT 5 OF EXTVBACT, WHICH IS SET BY TESTXACT.
R0209           MAY BE USED AS NEEDED BY ANY EXTENDED VERB WHICH HAS DONE TESTXACT

 0211   REF   1                                        COUNT* $$/EXTVB

 0212   REF  37  LAST 1477     5626  4 4764 1  B5OFF   CS      BIT5
 0213   REF  18  LAST 1459     5627  7 1247 0          MASK    EXTVBACT
 0214   REF  19  LAST 1484     5630  55'247 0          TS      EXTVBACT
 0215   REF 101  LAST 1476     5631  0 5205 0          TC      ENDOFJOB
```

P0216 SUBROUTINES TO TURN OFF AND TURN ON TRACKER FAIL LIGHT.

```
02165  REF   2 LAST 1459 TO 1460:     25     25*          COUNT* $$/DSPLA
0217                          5632  0 0004 0  TRFAILOF INHINT
0218   REF   1                5633  4 7670 0           CS     OCT40200        TURN OFF TRACKER LIGHT
0219   REF  44  LAST 1425     5634  7 1241 0           MASK   DSPTAB +11D
0220   REF  50  LAST 1480     5635  6 4752 0           AD     BIT15
0221   REF  45  LAST 1485     5636  55'241 0           TS     DSPTAB +11D
02215  REF  32  LAST  392     5637  4 1337 0           CS     OPTMODES        TO INSURE THAT OCDU FAIL WILL GO ON
02216  REF   5  LAST  392     5640  7 4762 1           MASK   OCDUFBIT        AGAIN IF IT WAS ON IN ADDITION TO
02217  REF  33  LAST 1485     5641  27'337 0           ADS    OPTMODES        TRACKER FAIL.

0222                          5642  0 0003 1  REQ      RELINT
0223   REF 320  LAST 1483     5643  0 0002 0           TC     Q

0224                          5644  0 0004 0  TRFAILON INHINT
0225   REF  46  LAST 1485     5645  4 1241 0           CS     DSPTAB +11D     TURN ON
0226   REF   2  LAST 1485     5646  7 7670 0           MASK   OCT40200
0227   REF  47  LAST 1485     5647  27'241 0           ADS    DSPTAB +11D
0228   REF   4  LAST 1472     5650  1 5642 0           TCF    REQ

0229   REF 416  LAST 1483     5651  10 000 0  INCRQCK  CCS    A
0230   REF 321  LAST 1485     5652  24 002 0           INCR   Q
0231   REF 322  LAST 1485     5653  0 0002 0           TC     Q
02315  REF   1                                        COUNT* $$/CFAIL
0232   REF 208  LAST 1483     5654  54 001 1  C31BTCHK TS     L               SAVE MASK
0233   REF   5  LAST  187     5655  3 0374 1           CA     C31FLWRD
0234   REF   1                5656  7 4346 0           MASK   FAILBIT
0235   REF 417  LAST 1485     5657  10 000 0           CCS    A
0236   REF   1                5660  1 5667 1           TCF    USEFLBTS
0237                          5661  0 0006 1           EXTEND
0238   REF   6  LAST 1038     5662  00 031 0           READ   CHAN31
0239   REF 209  LAST 1485     5663  7 0001 1  C31CMCHK MASK   L
0240                          5664  0 0006 1           EXTEND
0241   REF   9  LAST  363     5665  1 6711 1           BZF    TCQ             BITS SET
0242   REF   6  LAST 1474     5666  1 6706 1           TCF    Q+1             BITS NOT SET

0243   REF   6  LAST 1485     5667  3 0374 1  USEFLBTS CA     C31FLWRD
0244   REF   1                5670  1 5663 0           TCF    C31CMCHK

0245   REF  14  LAST 1325     4346              FAILBIT  =     PRIO30
```

L ALARM AND ABORT USER'S PAGE NO. 1 EO S3

```
R0001           THE FOLLOWING SUBROUTINE MAY BE CALLED TO DISPLAY A NON-ABORTIVE ALARM CONDITION. IT MAY BE CALLED
R0003   EITHER IN INTERRUPT OR UNDER EXECUTIVE CONTROL.

R0004           CALLING SEQUENCE IS AS FOLLOWS:

R0005           TC      ALARM
R0006           OCT     NNNNN
R0007                                   (RETURNS HERE)
 0009   REF   1                4000                    SETLOC FFTAG7
 0010                          5671                    BANK

 0011   REF   9 LAST  393      0375                    EBANK= FAILREG

 0012   REF   1                                        COUNT* $$/ALARM
R0013   ALARM TURNS ON THE PROGRAM ALARM LIGHT, BUT DOES NOT DISPLAY.

 0014                          5671  0 0004 0  ALARM   INHINT

 0015   REF 323 LAST 1485      5672  3 0002 0          CA      Q
 0016   REF   5 LAST 1394      5673  55'363 1  ALARM2  TS      ALMCADR
 0017   REF 324 LAST 1486      5674  50 002 0          INDEX   Q
 0018                          5675  3 0000 1          CA      0
 0019   REF 210 LAST 1485      5676  54 001 1  BORTENT TS      L

 0020   REF  34 LAST 1481      5677  3 0006 1  PRIOENT CA      BBANK
 00202                         5700  0 0006 1   +1     EXTEND
 00204  REF  25 LAST 1469      5701  04 007 1          ROR     SUPERBNK        ADD SUPER BITS.
 0021   REF   6 LAST 1486      5702  55'364 0          TS      ALMCADR +1

 0022   REF 325 LAST 1486      5703  3 0002 0  LARMENT CA      Q               STORE RETURN FOR ALARM
 0023   REF  45 LAST 1483      5704  54 061 1          TS      ITEMP1

 0024   REF  10 LAST 1486      5705  10 375 1  CHKFAIL1 CCS    FAILREG         IS ANYTHING IN FAILREG
 0025   REF   1                5706  1 5712 1          TCF     CHKFAIL2        YES TRY NEXT REG
 0026   REF 211 LAST 1486      5707  3 0001 0          CA      L
 00265  REF  11 LAST 1486      5710  54 375 1          TS      FAILREG
 0027   REF   1                5711  1 5716 0          TCF     PROGLARM        TURN ALARM LIGHT ON FOR FIRST ALARM

 0028   REF  12 LAST 1486      5712  10 376 1  CHKFAIL2 CCS    FAILREG +1
 0029   REF   2 LAST 1486      5713  1 5716 0          TCF     PROGLARM
 0030   REF 212 LAST 1486      5714  3 0001 0          CA      L
 0031   REF  13 LAST 1486      5715  54 376 1          TS      FAILREG +1

 0037   REF  14 LAST 1486      5716  22 377 1  PROGLARM LXCH   FAILREG +2      STORE AS "MOST RECENT" ALARM CODE

 0038   REF  48 LAST 1485      5717  4 1241 0          CS      DSPTAB +11D     TURN ON PROGRAM ALARM IF OFF
 0039   REF   2 LAST 1463      5720  7 7716 1          MASK    BIT15+9
 0040   REF  49 LAST 1486      5721  27'241 0          ADS     DSPTAB +11D

 0041   REF  46 LAST 1486      5722  56 061 0  MULTEXIT XCH    ITEMP1          OBTAIN RETURN ADDRESS IN A
```

```
0042                                5723  0 0003 1            RELINT
0043   REF 418  LAST 1485           5724  50 000 1            INDEX  A
0044                                5725  0 0001 0            TC     1

R0049  PRIOLARM DISPLAYS V05N09 VIA PRIODSPR WITH 3 RETURNS TO THE USER FROM THE ASTRONAUT AT CALL LOC +1,+2,+3 AND
R0051  AN IMMEDIATE RETURN TO THE USER AT CALL LOC +4. EXAMPLE FOLLOWS,
A0052                                                       CAF    OCTXX          ALARM CODE
A0053                                                       TC     BANKCALL
A0054                                                       CADR   PRIOLARM

A0055                                                       ...    ...
A0056                                                       ...    ...
A0057                                                       ...    ...            ASTRONAUT RETURN
A0058                                                       TC     PHASCHNG       IMMEDIATE RETURN TO USER. RESTART
A0059                                                       OCT    X.1            PHASE CHANGE FOR PRIO DISPLAY

0061   REF   3 LAST 1478   10,2000                         SETLOC DISPLAYS
0062                       10,3766                         BANK

0063   REF   3 LAST 1478 TO 1479:     9   633*            COUNT* $$/DSPLA
0064                       10,3766  0 0004 0  PRIOLARM     INHINT                 * * * KEEP IN DISPLAY ROUTINES BANK
0065   REF 213  LAST 1486  10,3767  54 001 1               TS     L               SAVE ALARM CODE

0066   REF  23  LAST 1438  10,3770  3 0133 0               CA     BUF2           2 CADR OF PRIOLARM USER
0067   REF   7  LAST 1486  10,3771  55'363 1               TS     ALMCADR
0068   REF  24  LAST 1487  10,3772  3 0134 1               CA     BUF2 +1
0069   REF   1             10,3773  0 5700 0               TC     PRIOENT +1     * LEAVE L ALONE
0071                       10,3774   77467 1  -2SEC        DEC    -200           *** DONT MOVE
0072   REF   7  LAST  907  10,3775  3 5023 0               CAF    V05N09
0073   REF   1             10,3776  1 2750 0               TCF    PRIODSPR

0075   REF   1                6000                         SETLOC FFTAG13
0076                          7706                         BANK

0077   REF   1                                             COUNT* $$/ALARM
0078                          7706  0 0004 0  BAILOUT       INHINT
0079   REF 326  LAST 1486     7707  3 0002 0               CA     Q
0080   REF   8  LAST 1487     7710  55'363 1               TS     ALMCADR

00801  REF 216  LAST 1442     7711  0 4636 0               TC     BANKCALL
00802  REF   2  LAST  198     7712   40000 0               CADR   VAC5STOR

0081   REF   9  LAST 1487     7713  51'363 0               INDEX  ALMCADR
0082                          7714  3 0000 1               CAF    0
0083   REF   1                7715  0 5676 0               TC     BORTENT
0084                          7716   40400 1  BIT15+9      OCT    40400

00845                         7717  0 0004 0  -1           INHINT
0085   REF  71  LAST 1473     7720  3 4767 0  WHIMPER      CA     TWO
00851  REF  15  LAST 1402     7721  6 0005 1               AD     Z
```

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C08852  REF   1                  7722  54 017 0          TS      BRUPT
C08853                           7723  5 0017 1          RESUME
C08854  REF  58  LAST 1459       7724  0 4655 0          TC      POSTJUMP      RESUME SENDS CONTROL HERE
C08541  REF   2  LAST  270       7725   12712 0          CADR    ENEMA

C08543  REF   2  LAST 1486       4000                     SETLOC  FFTAG7
C08544  REF   2 LAST 1486 TO 1487:    29    29*          COUNT*  $$/ALARM
C08545                           5726                     BANK

C08546                           5726  0 0004 0  POODOO   INHINT
C08547  REF 327  LAST 1487       5727  3 0002 0          CA      Q
C08548  REF  10  LAST 1487       5730  55'363 1          TS      ALMCADR

C08549  REF 217  LAST 1487       5731  0 4636 0          TC      BANKCALL
C0855   REF   3  LAST 1487       5732   40000 0          CADR    VAC5STOR      STORE ERASABLES FOR DEBUGGING PURPOSES.

C08555  REF  11  LAST 1488       5733  51'363 0          INDEX   ALMCADR
C08556                           5734  3 0000 1          CAF     0
C08557  REF   2  LAST 1487       5735  0 5676 0  ABORT2  TC      BORTENT

C08558                           5736   77770 1  OCT77770 OCT     77770         DONT MOVE
C0856   REF   3  LAST  827       5737  3 4763 1          CA      V37FLBIT      IS AVERAGE G ON
C08561  REF  25  LAST 1447       5740  7 0103 1          MASK    FLAGWRD7
C08562  REF 419  LAST 1487       5741  10 000 0          CCS     A
C08563  REF   1                  5742  0 7717 1          TC      WHIMPER -1    YES.  DONT DO POODOO.  DO BAILOUT.

C08564  REF  70  LAST 1477       5743  4 4753 0          CS      BIT14         DISREGARD ENTRY SETTING
C08565  REF  20  LAST 1484       5744  7 1247 0          MASK    EXTVBACT      EXTENDED VBS ACTIVE?
C08566  REF 420  LAST 1488       5745  10 000 0          CCS     A
C08567  REF   2  LAST 1488       5746  1 7717 0          TCF     WHIMPER -1    YES  DONT DO POODOO  DO BAILOUT

C086    REF  69  LAST 1474       5747  0 5561 0          TC      DOWNFLAG
C087    REF   8  LAST 1349       5750   00067 0          ADRES   STATEFLG

C00875  REF  70  LAST 1488       5751  0 5561 0          TC      DOWNFLAG
C00877  REF  18  LAST  748       5752   00236 0          ADRES   AUTOSEQ

C088    REF  71  LAST 1488       5753  0 5561 0          TC      DOWNFLAG
C089    REF   5  LAST 1348       5754   00230 0          ADRES   REINTFLG

C00891  REF  72  LAST 1488       5755  0 5561 0          TC      DOWNFLAG
C00892  REF  12  LAST 1442       5756   00176 1          ADRES   UTFLAG
C00893  REF  73  LAST 1488       5757  0 5561 0          TC      DOWNFLAG
C00894  REF  11  LAST 1442       5760   00010 0          ADRES   RNDVZFLG
C00895  REF  74  LAST 1488       5761  0 5561 0          TC      DOWNFLAG
C00896  REF  14  LAST  744       5762   00031 0          ADRES   TRACKFLG      FORCE STOPRATE
C0090   REF  75  LAST 1488       5763  0 5561 0          TC      DOWNFLAG
C0091   REF   7  LAST 1444       5764   00054 0          ADRES   NODOFLAG

C092    REF 218  LAST 1488       5765  0 4636 0          TC      BANKCALL
```

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0093   REF   2  LAST  195      5766   12536 1            CADR    MR.KLEAN
0094   REF   3  LAST 1488      5767   0 7720 0           TC      WHIMPER

0108   REF 102  LAST 1484      5205              COALARM  EQUALS  ENDOFJOB
R0109  CALLING SEQUENCE FOR VARALARM

A0110                                                   CAF     (ALARM)
A0111                                                   TC      VARALARM

R0112  VARALARM TURNS ON PROGRAM ALARM LIGHT BUT DOES NOT DISPLAY
0113                            5770   0 0004 0  VARALARM INHINT

0114   REF 214  LAST 1487      5771   54 001 1           TS      L               SAVE USERS ALARM CODE

0115   REF 328  LAST 1488      5772   3 0002 0           CA      Q               SAVE USERS Q
0116   REF  12  LAST 1488      5773   55'363 1           TS      ALMCADR

0117   REF   2  LAST 1487      5774   0 5677 1           TC      PRIDENT
0118                            5775    00014 1   OCT14  OCT     14              DONT MOVE

0119   REF  13  LAST 1489      5776   0 1363 0           TC      ALMCADR         RETURN TO USER

0120   REF   6  LAST 1481      7706              ABORT    EQUALS  BAILOUT         *** TEMPORARY UNTIL ABORT CALLS OUT
```

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R0001 PROGRAM NAME: P27
R0002 WRITTEN BY: KILROY/ DE WOLF

R0003 MOD NO: 6
R0004 MOD BY: KILROY
R0005 DATE: 01DEC67

R0006 LOG SECTION: UPDATE PROGRAM.

R0007 FUNCT. DESCR: P27 (THE UPDATE PROGRAM) PROCESSES COMMANDS AND DATA
R0008 INSERTIONS REQUESTED BY THE GROUND VIA UPLINK.
R0009 THE P27 PROGRAM WILL ACCEPT UPDATES
R0010 ONLY DURING P00 FOR THE LM, AND ONLY DURING P00,
R0011 P02, AND FRESH START FOR THE CSM

R0012 CALLING SEQ: PROGRAM IS INITIATED BY UPLINK ENTRY OF VERBS 70, 71, 72 AND 73.

R0014 SUBROUTINES: TESTXACT, NEWMODEX, NEWMODEX +3, GOXDSPF, BANKCALL, FINDVAC, INTPRET, INTSTALL, TPAGREE,
R0016 INTWAKEU, ENDEXT, POSTJUMP, FALTON, NEWPHASE, PHASCHNG

R0017 NORMAL EXIT: TC ENDEXT

R0018 ALARM/ABORT: TC FALTON FOLLOWED BY TC ENDEXT

R0019 RESTARTS: P27 IS RESTART PROTECTED IN TWO WAYS...
R0020 1. PRIOR TO VERIFLAG INVERSION(WHICH IS CAUSED BY THE GROUND/ASTRONAUT'S VERIFICATION OF UPDATE
R0022 DATA BY SENDING A V33E WHEN V21N02 IS FLASHING)---
R0023 NO PROTECTION EXCEPT PRE-P27 MODE IS RESTORED, COAST + ALIGN DOWNLIST IS SELECTED AND UPLINK
R0025 ACTIVITY LIGHT IS TURNED OFF.(JUST AS IF A V34E WAS SENT DURING P27 DATA LOADS).
R0027 V70,V71,V72 OR V73 WILL HAVE TO BE COMPLETELY RESENT BY USER.
R0029 2. AFTER VERIFLAG INVERSION(WHEN UPDATE OF THE SPECIFIED ERASABLES IS BEING PERFORMED)---
R0031 PROTECTED AGAINST RESTARTS.

R0032 DEBRIS: UPBUFF (20D) TEMP STORAGE FOR ADDRESSES AND CONTENTS.
R0033 UPVERB (1) VERB NUMBER MINUS 70D (E.G. FOR V72, UPVERB = 72D - 70D = 2)
R0035 UPOLDMOD (1) FOR MAJOR MODE INTERRUPTED BY P27.
R0036 COMPNUMB (1) TOTAL NUMBER OF COMPONENTS TO BE TRANSMITTED.
R0038 UPCOUNT (1) ACTUAL NUMBER OF COMPONENTS RECEIVED.
R0039 UPTEMP (1) SCRATCH, BUT USUALLY CONTAINS COMPONENT NUMBER TO BE CHANGED DURING VERIFY CYCLE

R0041 INPUT:

R0042 ENTRY: DESCRIPTION

R0043 V70EXXXXXEXXXXXE (LIFTOFF TIME INCREMENT) DOUBLE PRECISION OCTAL TIME INCREMENT, XXXXX XXXXX,
R0045 IS ADDED TO TEPHEM, SUBTRACTED FROM AGC CLOCK(TIME2,TIME1), SUBTRACTED FROM CSM STATE
R0047 VECTOR TIME(TETCSM) AND SUBTRACTED FROM LEM STATE VECTOR TIME(TETLEM).
R0049 THE DP OCTAL TIME INCREMENT IS SCALED AT 2(28).

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R0050   V71E11EAAAAE     (CONTIGUOUS BLOCK UPDATE) II-2 OCTAL COMPONENTS,XXXXX,
R0051   XXXXXE           ARE LOADED INTO ERASABLE STARTING AT ECADR, AAAA.
R0052 XXXXXE             IT IS .GE. 3 .AND. .LE. 20D.,
R0053                    AND (AAAA + II - 3) DOES NOT PRODUCE AN ADDRESS IN THE
R0054   S NEXT BANK
R0055     .              SCALING IS SAME AS INTERNAL REGISTERS.

R0056   V72E11E          (SCATTER UPDATE) (II-1)/2 OCTAL COMPONENTS,XXXXX, ARE
R0057   AAAAEXXXXXE      LOADED INTO ERASABLE LOCATIONS, AAAA.
R0058   AAAAEXXXXXE      II IS .GE. 3 .AND. .LE. 19D, AND MUST BE ODD.
R0060     .              SCALING IS SAME AS INTERNAL REGISTERS.

R0061   V73EXXXXXEXXXXXE (OCTAL CLOCK INCREMENT) DOUBLE PRECISION OCTAL TIME
R0062                    INCREMENT XXXXX XXXXX, IS ADDED TO THE AGC CLOCK, IN
R0063                    CENTISECONDS SCALED AT (2)28.
R0064                    THIS LOAD IS THE OCTAL EQUIVALENT OF V55.

R0065   OUTPUT:          IN ADDITION TO THE ABOVE REGISTER LOADS, ALL UPDATES
R0066                    COMPLEMENT BIT3 OF FLAGWORD7.

R0067   ADDITIONAL NOTES: VERB 71, JUST DEFINED ABOVE WILL BE USED TO PERFORM BUT NOT LIMITED TO THE FOLLOWING UPDATES--
R0069                    1. CSM/LM STATE VECTOR UPDATE
R0072                    2. REFSMMAT UPDATE

R0073            THE FOLLOWING COMMENTS DELINEATE EACH SPECIAL UPDATE----

R0074   1. CSM/LM STATE VECTOR UPDATE(ALL DATA ENTRIES IN OCTAL)

R0075   ENTRIES:         DATA DEFINITION:                                    SCALE FACTORS:
R0077   V71E             CONTIGUOUS BLOCK UPDATE VERB
R0078      21E           NUMBER OF COMPONENTS FOR STATE VECTOR UPDATE
R0080    AAAAE           ECADR OF 'UPSVFLAG'
R0082   XXXXXE           STATE VECTOR IDENTIFIER: 00001 FOR CSM, 77776 FOR LEM - EARTH SPHERE OF INFLUENCE SCALING
R0083                                              00002 FOR CSM, 77775 FOR LEM - LUNAR SPHERE OF INFLUENCE SCALING
R0084   XXXXXEXXXXXE     X POSITION
R0086   XXXXXEXXXXXE     Y POSITION
R0088   XXXXXEXXXXXE     Z POSITION
R0090   XXXXXEXXXXXE     X VELOCITY
R0092   XXXXXEXXXXXE     Y VELOCITY
R0094   XXXXXEXXXXXE     Z VELOCITY
R0096   XXXXXEXXXXXE     TIME FROM AGC CLOCK ZERO
R0098   V33E             VERB 33 TO SIGNAL THAT THE STATE VECTOR IS READY TO BE STORED.

R0144   2. REFSMMAT(ALL DATA ENTRIES IN OCTAL)
R0145   ENTRIES:         DATA DEFINITIONS:                                   SCALE FACTORS:
```

```
R0147   V71E            CONTIGUOUS BLOCK UPDATE VERB
R0148     24E           NUMBER OF COMPONENTS FOR REFSMMAT UPDATE
R0150    AAAAE          ECADR OF 'REFSMMAT'
R0152   XXXXXEXXXXXE    ROW 1 COLUMN 1                                  2(-1)
R0154   XXXXXEXXXXXE    ROW 1 COLUMN 2                                  2(-1)
R0156   XXXXXEXXXXXE    ROW 1 COLUMN 3                                  2(-1)
R0158   XXXXXEXXXXXE    ROW 2 COLUMN 1                                  2(-1)
R0160   XXXXXEXXXXXE    ROW 2 COLUMN 2                                  2(-1)
R0162   XXXXXEXXXXXE    ROW 2 COLUMN 3                                  2(-1)
R0164   XXXXXEXXXXXE    ROW 3 COLUMN 1                                  2(-1)
R0166   XXXXXEXXXXXE    ROW 3 COLUMN 2                                  2(-1)
R0168   XXXXXEXXXXXE    ROW 3 COLUMN 3                                  2(-1)
R0170   V33E            VERB 33 TO SIGNAL THAT REFSMMAT IS READY TO BE STORED.


 0172   REF   6  LAST  452   43,2000                    SETLOC EXTVERBS
 0173                        43,3656                    BANK

 0174   REF  13  LAST 1331   E3,1706                    EBANK= TEPHEM

 0175   REF   1                                         COUNT* $$/P27
 0176   REF   1              43,3656  3 4772 1  V70UPDAT CAF    UP70          COMES HERE ON V70E
 0177   REF   2  LAST  249   43,3657  1 3665 0          TCF    V73UPDAT +1

 0178   REF   1              43,3660  3 4770 0  V71UPDAT CAF    UP71          COMES HERE ON V71E
 0179   REF   3  LAST 1492   43,3661  1 3665 0          TCF    V73UPDAT +1

 0180   REF   1              43,3662  3 4767 0  V72UPDAT CAF    UP72          COMES HERE ON V72E
 0181   REF   4  LAST 1492   43,3663  1 3665 0          TCF    V73UPDAT +1

 0182   REF   1              43,3664  3 6214 0  V73UPDAT CAF    UP73          COMES HERE ON V73E

 0183   REF   1              43,3665  54 331 1    +1     TS     UPVERBSV      SAVE UPVERB UNTIL IT'S OK TO ENTER P27

 0184   REF  18  LAST  279   43,3666  0 2076 1           TC     TESTXACT      GRAB DISPLAY IF AVAILABLE, OTHERWISE
A0185                                                                       TURN*OPERATOR ERROR* ON AND TERMINATEJOB

 0186   REF  19  LAST 1402   43,3667  3 1214 1           CA     MODREG        CHECK IF UPDATE ALLOWED
 0187                        43,3670  0 0006 1           EXTEND               FIRST CHECK FOR MODREG = +0, -0
 0188   REF   1              43,3671  1 3707 0           BZF    UPDATEOK      FRESH START OR P00
 0189   REF  22  LAST  834   43,3672  4 0104 0           CS     FLAGWRD8
 0190   REF  12  LAST  834   43,3673  7 4760 0           MASK   UTBIT
 0191   REF 421  LAST 1488   43,3674  10 000 0           CCS    A
 0192                        43,3675  1 3702 0           TCF    +5

 0193   REF  20  LAST 1492   43,3676  4 1214 0           CS     MODREG
 0194   REF   8  LAST  710   43,3677  6 4124 1           AD     OCT24
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0195                          43,3700  0 0006 1           EXTEND
0196   REF   2  LAST 1492     43,3701  1 3707 0           BZF     UPDATEOK

0197   REF  72  LAST 1487     43,3702  4 4767 1           CS      TWO
0198   REF  21  LAST 1492     43,3703  7 1214 0           MASK    MODREG
0199                          43,3704  0 0006 1           EXTEND
0200                          43,3705  1 3707 0           BZF     +2              P02
0201   REF   1                43,3706  1 3717 1           TCF     UPERROR
0202   REF  22  LAST 1493     43,3707 31'214 1 UPDATEOK   CAE     MODREG          UPDATE ALLOWED.
0203   REF   4  LAST  188     43,3710 54 301 1           TS      UPOLDMOD        SAVE CURRENT MAJOR MODE

0204   REF   2  LAST 1492     43,3711 30 331 0           CAE     UPVERBSV        SET UPVERB TO INDICATE TO P27
0205   REF   4  LAST  188     43,3712 54 302 1           TS      UPVERB          WHICH EXTENDED VERB CALLED IT.

0206   REF 165  LAST 1479     43,3713  3 4770 0           CAF     ONE
0207   REF   3  LAST  188     43,3714 54 303 0           TS      UPCOUNT         INITIALIZE UPCOUNT TO 1

0208   REF  59  LAST 1488     43,3715  0 4655 0           TC      POSTJUMP        LEAVE EXTENDED VERB BANK AND
0209   REF   1                43,3716   65626 0          CADR    UPPART2         GO TO UPDATE PROGRAM(P27) BANK.


0210   REF  14  LAST  781     43,3717  0 4362 1 UPERROR   TC      FALTON          TURN ON DP. ERROR
0211   REF   3  LAST  596     43,3720  0 4415 0           TC      UPACTOFF        TURN OFF UPLINK ACT LITE
0212   REF  34  LAST  941     43,3721  1 5524 0           TCF     ENDEXT          (RESTART GROUP NOT ESTABLISHED YET)

0213   REF 277  LAST 1481        4772           UP70      EQUALS  ZERO
0214   REF 166  LAST 1493        4770           UP71      EQUALS  ONE
0215   REF  73  LAST 1493        4767           UP72      EQUALS  TWO
0216   REF  54  LAST 1476        6214           UP73      EQUALS  THREE


0218   REF   1                42,2000                    SETLOC  UPDATE3
0219                          42,3626                    BANK

0220   REF   1                                          COUNT*  $$/P27

0221                          42,3626           UPPART2  EQUALS                  UPDATE PROGRAM - PART 2

0222   REF 106  LAST 1442     42,3626  0 5402 1          TC      PHASCHNG        SET RESTART GROUP 6 TO RESTORE OLD MODE
0223                          42,3627  07026 1           OCT     07026           AND DOWNLIST AND EXIT IF RESTART OCCURS.
0224                          42,3630  30000 1           OCT     30000           PRIORITY SAME AS CHRPRIO
0225   REF  12  LAST  187        0304                    EBANK=  UPBUFF
0226   REF   2  LAST 1332     42,3631  03706 0           2CADR   UPOUT +1
0226                          42,3632  56100 0

0227   REF 167  LAST 1493     42,3633  3 4770 0          CAF     ONE
0228   REF  10  LAST 1097     42,3634 54 332 1           TS      DNLSTCOD        DOWNLIST

0229   REF  11  LAST  804     42,3635  0 5344 1          TC      NEWMODEX        SET MAJOR MODE = 27
0230                          42,3636   00033 1          DEC     27
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0231  REF   5  LAST 1493   42,3637  50 302 0            INDEX  UPVERB      BRANCH DEPENDING ON WHETHER THE UPDATE
0232                       42,3640  1 3641 0            TCF    +1          VERB REQUIRES A FIXED OR VARIABLE NUMBER
0233                       42,3641  1 3644 0            TCF    +3          V70 FIXED.                  (OF COMPONENTS.
0234  REF   1              42,3642  1 3647 0            TCF    DHWELL1     V71 VARIABLE - GO GET NO. OF COMPONENTS
0235  REF   2  LAST 1494   42,3643  1 3647 0            TCF    DHWELL1     V72 VARIABLE - GO GET NO. OF COMPONENTS
0236  REF  74  LAST 1493   42,3644  3 4767 0            CA     TWO         V73 (AND V70) FIXED
0237  REF   5  LAST  187   42,3645  54 300 0            TS     COMPNUMB    SET NUMBER OF COMPONENTS TO 2
0238  REF   1              42,3646  1 3672 0            TCF    DHWELL2     GO GET THE TWO UPDATE COMPONENTS

0239  REF   1              42,3647  3 3744 0  DHWELL1   CAF    ADUPBUFF    * REQUEST USER TO SEND NUMBER  *
0240  REF 715  LAST 1476   42,3650  54 156 1            TS     MPAC +2     * OF COMPONENTS PARAMETER(II). *
0241  REF   1              42,3651  3 3746 1   +2       CAF    UPLOADNV    (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
0242  REF 219  LAST 1488   42,3652  0 4636 0            TC     BANKCALL    DISPLAY A FLASHING V21N01
0243  REF  15  LAST  640   42,3653   20576 1            CADR   GOXDSPF     TO REQUEST II.
0244  REF   1              42,3654  1 3733 1            TCF    UPOUT4      V34 TERMINATE UPDATE(P27) RETURN
0245  REF   3  LAST 1494   42,3655  1 3651 1            TCF    DHWELL1 +2
0246  REF   1              42,3656  0 3735 0            TC     CK4V32      DATA OR V32 RETURN
0247  REF  42  LAST 1477   42,3657  4 4767 1            CS     BIT2
0248  REF  13  LAST 1493   42,3660  6 0304 0            AD     UPBUFF      IS II(NUMBER OF COMPONENTS PARAMETER)
0249                       42,3661  0 0006 1            EXTEND             .GE. 3 AND .LE. 20D.
0250  REF   4  LAST 1494   42,3662  6 3651 0            BZMF   DHWELL1 +2
0251  REF  14  LAST 1494   42,3663  4 0304 1            CS     UPBUFF
0252  REF   1              42,3664  6 4353 0            AD     UP21
0253                       42,3665  0 0006 1            EXTEND
0254  REF   5  LAST 1494   42,3666  6 3651 0            BZMF   DHWELL1 +2
0255  REF  15  LAST 1494   42,3667  30 304 0            CAE    UPBUFF
0256  REF   6  LAST 1494   42,3670  54 300 0            TS     COMPNUMB    SAVE II IN COMPNUMB

R0257                UPBUFF LOADING SEQUENCE

0258  REF   4  LAST 1493   42,3671  24 303 1   -1       INCR   UPCOUNT     INCREMENT COUNT OF COMPONENTS RECEIVED
0259  REF   1              42,3672  3 3745 1   DHWELL2  CAF    ADUPBFM1    CALCULATE LOCATION(ECADR) IN UPBUFF
0260  REF   5  LAST 1494   42,3673  6 0303 1            AD     UPCOUNT     WHERE NEXT COMPONENT SHOULD BE STORED.
0261  REF 716  LAST 1494   42,3674  54 156 1   +2       TS     MPAC +2     PLACE ECADR INTO R3.
0262  REF   2  LAST 1494   42,3675  3 3746 1   +3       CAF    UPLOADNV    (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
0263  REF 220  LAST 1494   42,3676  0 4636 0            TC     BANKCALL    DISPLAY A FLASHING V21N01
0264  REF  16  LAST 1494   42,3677   20576 1            CADR   GOXDSPF     TO REQUEST DATA.
0265  REF   2  LAST 1494   42,3700  1 3733 1            TCF    UPOUT4      V34 TERMINATE UPDATE(P27) RETURN.
0266  REF   2  LAST 1494   42,3701  1 3675 1            TCF    DHWELL2 +3  V33 PROCEED RETURN
0267  REF   2  LAST 1494   42,3702  0 3735 0            TC     CK4V32      DATA OR V32 RETURN
0268  REF   6  LAST 1494   42,3703  4 0303 0            CS     UPCOUNT     HAVE WE FINISHED RECEIVING ALL
0269  REF   7  LAST 1494   42,3704  6 0300 1            AD     COMPNUMB    THE DATA WE EXPECTED.
0270                       42,3705  0 0006 1            EXTEND
0271  REF   1              42,3706  6 3710 1            BZMF   UPVERIFY    YES- GO TO VERIFICATION SEQUENCE
0272  REF   3  LAST 1494   42,3707  1 3671 0            TCF    DHWELL2 -1  NO- REQUEST ADDITIONAL DATA.

R0273                VERIFY SEQUENCE
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0274   REF   1                 42,3710  3 3743 1  UPVERIFY CAF     ADUPTEMP        PLACE ECADR WHERE COMPONENT NO. INDEX
0275   REF 717  LAST 1494      42,3711  54 156 1             TS      MPAC +2         IS TO BE STORED INTO R3.
0276   REF   1                 42,3712  3 3747 0             CAF     UPVRFYNV        (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
0277   REF 221  LAST 1494      42,3713  0 4636 0             TC      BANKCALL        DISPLAY A FLASHING V21N02 TO REQUEST
0278   REF  17  LAST 1494      42,3714   20576 1             CADR    GOXDSPF         DATA CORRECTION OR VERIFICATION
0279   REF   3  LAST 1494      42,3715  1 3733 1             TCF     UPOUT4          V34 TERMINATE UPDATE(P27) RETURN
0280   REF   1                 42,3716  1 3750 1             TCF     UPSTORE         V33 DATA SENT IS GOOD. GO STORE IT.
0281   REF   3  LAST 1494      42,3717  0 3735 0             TC      CK4V32          COMPONENT NO. INDEX OR V32 RETURN
0282   REF   1                 42,3720  3 0330 1             CA      UPTEMP          DOES THE COMPONENT NO. INDEX JUST SENT
0283                           42,3721  0 0006 1             EXTEND                  SPECIFY A LEGAL COMPONENT NUMBER?
0284   REF   2  LAST 1494      42,3722  6 3710 1             BZMF    UPVERIFY        NO, IT IS NOT POSITIVE NONZERO
0285   REF   2  LAST 1495      42,3723  4 0330 0             CS      UPTEMP
0286   REF   8  LAST 1494      42,3724  6 0300 1             AD      COMPNUMB
0287   REF  67  LAST 1477      42,3725  6 4770 0             AD      BIT1
0288                           42,3726  0 0006 1             EXTEND
0289   REF   3  LAST 1495      42,3727  6 3710 1             BZMF    UPVERIFY        NO
0290   REF   2  LAST 1494      42,3730  3 3745 1             CAF     ADUPBFM1        YES- BASED ON THE COMPONENT NO. INDEX
0291   REF   3  LAST 1495      42,3731  6 0330 1             AD      UPTEMP          CALCULATE THE ECADR OF LOCATION IN
0292   REF   4  LAST 1494      42,3732  1 3674 0             TCF     DHWELL2 +2      UPBUFF WHICH USER WANTS TO CHANGE

0293   REF  60  LAST 1493      42,3733  0 4655 0  UPOUT4     TC      POSTJUMP        COMES HERE ON V34 TO TERMINATE UPDATE
02935  REF   3  LAST 1493      42,3734   57706 1             CADR    UPOUT +1

R0294          CHECK FOR VERB 32 SEQUENCE

0295   REF 718  LAST 1495      42,3735  4 0154 0  CK4V32     CS      MPAC            ON DATA RETURN FROM 'GOXDSPF'
0296   REF  40  LAST 1477      42,3736  7 4763 0             MASK    BIT6            ON DATA RETURN FROM "GOXDSP"& THE CON-
0297   REF 422  LAST 1492      42,3737  10 000 0             CCS     A               TENTS OF MPAC = VERB.  SO TEST FOR V32.
0298   REF 329  LAST 1489      42,3740  0 0002 0             TC      Q               IT'S NOT A V32, IT'S DATA.  PROCEED.
0299   REF 330  LAST 1495      42,3741  50 002 0             INDEX   Q
0300                           42,3742  7'7771 0             TC      0 -6            V32 ENCOUNTERED - GO BACK AND GET DATA

0301   REF   4  LAST 1495      42,3743    00330 1  ADUPTEMP  ADRES   UPTEMP          ADDRESS OF TEMP STORAGE FOR CORRECTIONS
0302   REF  16  LAST 1494      42,3744    00304 0  ADUPBUFF  ADRES   UPBUFF          ADDRESS OF UPDATE DATA STORAGE BUFFER
03025  REF  17  LAST 1495      42,3745    00303 1  ADUPBFM1  ADRES   UPBUFF -1       SAME AS ADUPBUFF BUT LESS ONE
0303                           42,3746    05201 1  UPLOADNV  VN      2101            VERB 21 NOUN 01
0304                           42,3747    05202 1  UPVRFYNV  VN      2102            VERB 21 NOUN 02
0305   REF   4  LAST 1204        4353             UP21      =       MD1             DEC 21 = MAX NO OF COMPONENTS +1
0306   REF  29  LAST 1460        4773             UPDTPHAS  EQUALS  FIVE

R0307          PRE-STORE AND FAN TO APPROPRIATE BRANCH SEQUENCE

0308                           42,3750             UPSTORE   EQUALS                  GROUND HAS VERIFIED UPDATE. STORE DATA.

0309                           42,3750  0 0004 0             INHINT

0310   REF  26  LAST 1488      42,3751  30 103 0             CAE     FLAGWRD7        INVERT VERIFLAG(BIT3 OF FLAGWRD7) TO
0311   REF 215  LAST 1489      42,3752  56 001 0             XCH     L               INDICATE TO THE GROUND(VIA DOWNLINK)
0312   REF   1                 42,3753  3 4766 1             CAF     VERIFBIT        THAT THE V33(WHICH THE GROUND SENT TO
0313                           42,3754  0 0006 1             EXTEND                  VERIFY THE UPDATE) HAS BEEN SUCCESSFULLY
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0314   REF  17  LAST 1479   42,3755  06 001 0          RXOR    LCHAN          RECEIVED BY THE UPDATE PROGRAM
0315   REF  27  LAST 1495   42,3756  54 103 1          TS      FLAGWRD7

0316   REF 107  LAST 1493   42,3757  0 5402 1          TC      PHASCHNG       SET RESTART GROUP 6 TO REDO THE UPDATE
0317                        42,3760   04026 1          OCT     04026          DATA STORE IF A RESTART OCCURS.
0318                        42,3761  0 0004 0          INHINT                 (BECAUSE PHASCHNG DID A RELINT)

0319   REF  75  LAST 1494   42,3762  4 4767 1          CS      TWO            GO TO UPFNDVAC IF INSTALL IS REQUIRED,
0320   REF   6  LAST 1494   42,3763  6 0302 0          AD      UPVERB         THAT IS, IF IT'S A V70 - V72.
0321                        42,3764  0 0006 1          EXTEND                 GO TO UPEND73 IF IT'S A V73.
0322   REF   1              42,3765  6 3770 1          BZMF    UPFNDVAC

0323   REF  61  LAST 1495   42,3766  0 4655 0          TC      POSTJUMP
0324   REF   1              42,3767   57757 0          CADR    UPEND73

0330   REF   3  LAST 1204   42,3770  3 4346 1  UPFNDVAC CAF     CHRPRIO        (USE EXTENDED VERB PRIORITY)
0331   REF  39  LAST 1472   42,3771  0 5135 0          TC      FINDVAC        GET VAC AREA FOR 'CALL INTSTALL'
0332   REF  14  LAST 1492   E3,1706                    EBANK=  TEPHEM
0333   REF   1              42,3772   03545 0          2CADR   UPJOB          (NOTE: THIS WILL ALSO SET EBANK FOR
0333   REF   1              42,3773   56103 0
0334   REF 103  LAST 1489   42,3774  0 5205 0          TC      ENDOFJOB       'TEPHEM' UPDATE BY V70)

03345  REF   2  LAST 1331   27,2000                    SETLOC  UPDATE2
03346                       27,3545                    BANK
03347  REF   1                                         COUNT*  $$/P27
0335   REF 245  LAST 1367   27,3545  0 6006 1  UPJOB    TC      INTPRET        THIS COULD BE A STATE VECTOR UPDATE--SO
0336                        27,3546   77624 1          CALL                   WAIT(PUT JOB TO SLEEP) IF ORBIT INT(DI)
0337   REF  31  LAST 1328   27,3547   27516 0                   INTSTALL       IS IN PROGRESS--OR--GRAB DI AND RETURN
A0338                                                                        TO UPWAKE IF DI IS NOT IN PROGRESS.

0339                        27,3550   77776 1  UPWAKE   EXIT

0340   REF 108  LAST 1496   27,3551  0 5402 1          TC      PHASCHNG       RESTART PROTECT(GROUP 6)
0341                        27,3552   04026 1          OCT     04026

0342   REF  76  LAST 1469   27,3553  0 5547 1          TC      UPFLAG         SET INTEGRATION RESTART BIT
0343   REF   6  LAST 1488   27,3554   00230 0          ADRES   REINTFLG
0344                        27,3555  0 0004 0          INHINT
0345                        27,3556             UPPART3 EQUALS

0346   REF   7  LAST 1496   27,3556  50 302 0          INDEX   UPVERB         BRANCH TO THE APPROPRIATE UPDATE VERB
0347                        27,3557  1 3560 0          TCF     +1             ROUTINE TO ACTUALLY PERFORM THE UPDATE
0348   REF   1              27,3560  1 3722 1          TCF     UPEND70        V70
0349   REF   1              27,3561  1 3626 1          TCF     UPEND71        V71
0350   REF   1              27,3562  1 3660 0          TCF     UPEND72        V72

R0351          ROUTINE TO INCREMENT CLOCK(TIME2,TIME1) WITH CONTENTS OF DP WORD AT UPBUFF
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0353                                27,3563  0 0006 1  TIMEDIDL EXTEND
0354   REF   5  LAST 1495          27,3564  22 330 1            QXCH   UPTEMP          SAVE Q FOR RETURN
0355   REF 278  LAST 1493          27,3565  3 4772 1            CAF    ZERO            ZERO AND SAVE TIME2,TIME1
0356                                27,3566  22 007 0            ZL
0357   REF  40  LAST 1444          27,3567  52 025 1            DXCH   TIME2
0358   REF  18  LAST 1495          27,3570  52 327 0            DXCH   UPBUFF +18D     STORE IN CASE OF OVERFLOW

0359   REF   1                     27,3571  3 4773 0            CAF    UPDTPHAS        DO
0360   REF 216  LAST 1495          27,3572  54 001 1            TS     L               A
0361                                27,3573  4 0000 0            COM                    QUICK
0362   REF   3  LAST  703          27,3574  53'170 1            DXCH   -PHASE6         PHASCHNG

03625  REF   1                     01,2330                6P5SPT1  =      6.5SPOT
0363                                27,3575  0 0004 0  TIMEDIDR INHINT

0364   REF 279  LAST 1497          27,3576  3 4772 1            CAF    ZERO
0365                                27,3577  22 007 0            ZL                     PICK UP INCREMENTER(AND ZERO
0366   REF 719  LAST 1495          27,3600  54 156 1            TS     MPAC +2         IT IN CASE OF RESTARTS) AND
0367   REF  19  LAST 1497          27,3601  52 315 1            DXCH   UPBUFF +18D     STORE IT
0368   REF 720  LAST 1497          27,3602  52 155 1            DXCH   MPAC           INTO MPAC FOR TPAGREE.

0369                                27,3603  0 0006 1            EXTEND
0370   REF  20  LAST 1497          27,3604  3 0327 1            DCA    UPBUFF +18D
0371   REF 721  LAST 1497          27,3605  20 155 1            DAS    MPAC            FORM SUM IN MPAC
0372                                27,3606  0 0006 1            EXTEND
0373   REF   1                     27,3607  1 3616 1            BZF    DELTATOK        TEST FOR OVERFLOW
0374   REF 280  LAST 1497          27,3610  3 4772 1            CAF    ZERO
0375   REF  21  LAST 1497          27,3611  52 327 0            DXCH   UPBUFF +18D     OVERFLOW, RESTORE OLD VALUE OF CLOCK
0376   REF  41  LAST 1497          27,3612  20 025 1            DAS    TIME2           AND TURN ON OPERATOR ERROR

0377   REF 109  LAST 1496          27,3613  0 5402 1            TC     PHASCHNG        RESTART PROTECT(GROUP 6)
0378                                27,3614   04026 1            OCT    04026

0379   REF   6  LAST 1497          27,3615  0 0330 1            TC     UPTEMP          GO TO ERROR EXIT

0380   REF   7  LAST 1444          27,3616  0 7226 0  DELTATOK  TC     TPAGREE         FORCE SIGN AGREEMENT
0381   REF 722  LAST 1497          27,3617  52 155 1            DXCH   MPAC
0382   REF  42  LAST 1497          27,3620  20 025 1            DAS    TIME2           INCREMENT TIME2,TIME1

0383   REF 110  LAST 1497          27,3621  0 5402 1            TC     PHASCHNG        RESTART PROTECT(GROUP 6)
0384                                27,3622   04026 1            OCT    04026

0385                                27,3623  0 0004 0            INHINT
0386   REF   7  LAST 1497          27,3624  50 330 1            INDEX  UPTEMP          (CODED THIS WAY FOR RESTART PROTECTION)
0387                                27,3625  0 0001 0            TC     1               NORMAL RETURN
RC388                VERB 71 BRANCH

0389   REF  22  LAST 1497          27,3626  30 305 1  UPEND71   CAE    UPBUFF +1       SET EBANK
0390   REF  49  LAST 1469          27,3627  54 003 0            TS     EBANK              AND
0391   REF  17  LAST 1432          27,3630  7 4350 1            MASK   LOW8            CALCULATE
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0392   REF   8  LAST 1497   27,3631  54 330 0            TS      UPTEMP      S-REG VALUE OF RECEIVING AREA

0393   REF   7  LAST 1474   27,3632  6 7700 1            AD      NEG3        IN THE PROCESS OF
0394   REF   9  LAST 1495   27,3633  6 0300 1            AD      COMPNUMB    PERFORMING
0395                        27,3634  0 0006 1            EXTEND              THIS UPDATE
0396   REF   1              27,3635  1 3643 1            BZF     STORLP71    WILL WE
0397   REF  31  LAST 1434   27,3636  7 4760 0            MASK    BIT9        OVERFLOW
0398   REF 423  LAST 1495   27,3637  10 000 0            CCS     A           INTO THE NEXT EBANK....
0399   REF   1              27,3640  1 3656 0            TCF     UPERROUT    YES

0400   REF   8  LAST 1498   27,3641  3 7700 1            CA      NEG3        NO- CALCULATE NUMBER OF
0401   REF  10  LAST 1498   27,3642  6 0300 1            AD      COMPNUMB    WORDS TO BE STORED MINUS ONE
0402   REF 723  LAST 1497   27,3643  54 154 0  STORLP71  TS      MPAC        SAVE NO. OF WORDS REMAINING MINUS ONE
0403   REF 424  LAST 1498   27,3644  50 000 1            INDEX   A           TAKE NEXT UPDATE WORD FROM
0404   REF  23  LAST 1497   27,3645  3 0306 1            CA      UPBUFF +2   UPBUFF AND
0405   REF 217  LAST 1497   27,3646  54 001 1            TS      L           SAVE IT IN L
0406   REF 724  LAST 1498   27,3647  3 0154 1            CA      MPAC        CALCULATE NEXT
0407   REF   9  LAST 1498   27,3650  6 0330 1            AD      UPTEMP      RECEIVING ADDRESS
0408   REF 425  LAST 1498   27,3651  50 000 1            INDEX   A
0409                        E3,1400                      EBANK=  1400
0410                        27,3652  23'400 1            LXCH    1400        UPDATE THE REGISTER  BY CONTENTS OF L
0411   REF  15  LAST 1496   E3,1706                      EBANK=  TEPHEM
0412   REF 725  LAST 1498   27,3653  10 154 0            CCS     MPAC        ARE THERE ANY WORDS LEFT TO BE STORED
0413   REF   2  LAST 1498   27,3654  1 3643 1            TCF     STORLP71    YES
0414   REF   4  LAST 1495   27,3655  1 3705 1            TCF     UPOUT       NO- THEN EXIT UPDATE PROGRAM
0415   REF  15  LAST 1493   27,3656  0 4362 1  UPERROUT  TC      FALTON      TURN ON UP ERROR, CCS CANT GET HERE
0416   REF   5  LAST 1498   27,3657  1 3705 1            TCF     UPOUT       NO- EXIT UPDATE(HERE WHEN COMPNUMB = 3)

RC417                VERB 72 BRANCH

0418   REF  68  LAST 1495   27,3660  3 4770 0  UPEND72   CAF     BIT1        HAVE AN ODD NO. OF COMPONENTS
0419   REF  11  LAST 1498   27,3661  7 0300 0            MASK    COMPNUMB    BEEN SENT FOR A V72 UPDATE...
0420   REF 426  LAST 1498   27,3662  10 000 0            CCS     A
0421                        27,3663  1 3665 0            TCF     +2          YES
0422   REF   2  LAST 1498   27,3664  1 3656 0            TCF     UPERROUT    ERROR- SHOULD BE ODD NO. OF COMPONENTS
0423   REF  43  LAST 1494   27,3665  4 4767 1            CS      BIT2
0424   REF  12  LAST 1498   27,3666  6 0300 1            AD      COMPNUMB
0425   REF 726  LAST 1498   27,3667  54 154 0  LDLOOP72  TS      MPAC        NOW PERFORM THE UPDATE
0426   REF 427  LAST 1498   27,3670  50 000 1            INDEX   A
0427   REF  24  LAST 1498   27,3671  30 305 1            CAE     UPBUFF +1   PICK UP NEXT UPDATE WORD
0428   REF 428  LAST 1498   27,3672  22 000 1            LXCH    A
0429   REF 727  LAST 1498   27,3673  10 154 0            CCS     MPAC        SET POINTER TO ECADR(MUST BE CCS)
0430   REF 728  LAST 1498   27,3674  54 154 0            TS      MPAC
0431   REF 429  LAST 1498   27,3675  50 000 1            INDEX   A
0432   REF  25  LAST 1498   27,3676  30 305 1            CAE     UPBUFF +1   PICK UP NEXT ECADR OF REG TO BE UPDATED
0433   REF  50  LAST 1497   27,3677  54 003 0            TS      EBANK       SET EBANK
0434   REF  18  LAST 1497   27,3700  7 4350 1            MASK    LOW8        ISOLATE RELATIVE ADDRESS
0435   REF 430  LAST 1498   27,3701  50 000 1            INDEX   A
0436                        E3,1400                      EBANK=  1400
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0437                        27,3702  23'400 1          LXCH   1400          UPDATE THE REGISTER BY CONTENTS OF L
0438   REF  16  LAST 1498   E3,1706                    EBANK= TEPHEM
0439   REF 729  LAST 1498   27,3703  10 154 0          CCS    MPAC          ARE WE THROUGH THE V72 UPDATE...
0440   REF   1              27,3704  1 3667 1          TCF    LDLOOP72      NO

R0441                NORMAL FINISH OF P27

0442                        27,3705                    UPOUT  EQUALS
0443   REF   1              27,3705  0 3072 1          TC     INTWAKEU      RELEASE  GRAB  OF ORBITAL INTEGRATION
0444   REF   5  LAST 1493   27,3706  30 301 0    +1    CAE    UPOLDMOD      RESTORE PRIOR P27 MODE
0445   REF   4  LAST  429   27,3707  0 5347 1          TC     NEWMODEA
04453  REF  69  LAST 1498   27,3710  4 4770 1          CS     BIT1
04455  REF  23  LAST 1493   27,3711  6 1214 1          AD     MODREG
04457  REF 431  LAST 1498   27,3712  10 000 0          CCS    A
0446   REF 432  LAST 1499   27,3713  10 000 0          CCS    A
04463  REF  76  LAST 1496   27,3714  3 4767 0          CAF    TWO
0447   REF  11  LAST 1493   27,3715  54 332 1          TS     DNLSTCOD
0448   REF   4  LAST 1493   27,3716  0 4415 0          TC     UPACTOFF      TURN OFF 'UPLINK ACTIVITY' LIGHT

0449   REF 222  LAST 1495   27,3717  0 4636 0          TC     BANKCALL      KILL GROUP 6
0450   REF   1              27,3720   12556 1          CADR   UPKLEAN

0452   REF  35  LAST 1493   27,3721  0 5524 1          TC     ENDEXT        EXTENDED VERB EXIT

R0453                VERB 70 BRANCH

0454                        27,3722  0 0006 1   UPEND70 EXTEND
0455   REF  26  LAST 1498   27,3723  4 0305 0          DCS    UPBUFF        V70 DOES THE FOLLOWING WITH DP DELTA
0456   REF  27  LAST 1499   27,3724  52 315 1          DXCH   UPBUFF +8D    TIME IN UPBUFF
0457   REF   1              27,3725  0 3563 1          TC     TIMEDIDL      DECREMENT AGC CLOCK

0458   REF   3  LAST 1498   27,3726  0 3656 1          TC     UPERRBOT      ERROR WHILE DECREMENTING CLOCK -- EXIT

0459   REF  17  LAST 1499   E3,1706                    EBANK= TEPHEM
0460                        27,3727  0 0006 1          EXTEND
0461   REF  28  LAST 1499   27,3730  4 0305 0          DCS    UPBUFF        COPY DECREMENTERS FOR
0462   REF  29  LAST 1499   27,3731  52 317 0          DXCH   UPBUFF +10D   RESTART PROTECTION
0463                        27,3732  0 0006 1          EXTEND
0464   REF  30  LAST 1499   27,3733  4 0305 0          DCS    UPBUFF
0465   REF  31  LAST 1499   27,3734  52 321 0          DXCH   UPBUFF +12D

0466   REF 111  LAST 1497   27,3735  0 5402 1          TC     PHASCHNG      RESTART PROTECT(GROUP 6)
0467                        27,3736   04026 1          OCT    04026

0468   REF 281  LAST 1497   27,3737  3 4772 1          CAF    ZERO
0469                        27,3740  22 007 0          ZL
0470   REF  32  LAST 1499   27,3741  52 317 0          DXCH   UPBUFF +10D   DECREMENT CSM STATE VECTOR TIME
0471   REF   3  LAST  228   27,3742  21'571 1          DAS    TETCSM
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0472   REF 282  LAST 1499   27,3743  3 4772 1          CAF     ZERO
0473                        27,3744  22 007 0          ZL
0474   REF  33  LAST 1499   27,3745  52 321 0          DXCH    UPBUFF +12D     DECREMENT LEM STATE VECTOR TIME
0475   REF   3  LAST   90   27,3746  21'643 0          DAS     TETLEM

0476   REF 283  LAST 1500   27,3747  3 4772 1          CAF     ZERO
0477                        27,3750  22 007 0          ZL
0478   REF  34  LAST 1500   27,3751  52 305 0          DXCH    UPBUFF
0479   REF  18  LAST 1499   27,3752  21'710 1          DAS     TEPHEM +1       INCREMENT TP TEPHEM
0480   REF  19  LAST 1500   27,3753  27'706 0          ADS     TEPHEM

0481   REF 112  LAST 1499   27,3754  0 5402 1          TC      PHASCHNG        RESTART PROTECT(GROUP 6)
0482                        27,3755   04026 1          OCT     04026

0483   REF  35  LAST 1500      0304                    EBANK=  UPBUFF

0484   REF   6  LAST 1498   27,3756  0 3705 0          TC      UPOUT           GO TO STANDARD UPDATE PROGRAM EXIT


R04841          VERB 73 BRANCH

04842                       27,3757  0 0006 1  UPEND73 EXTEND
04843  REF  36  LAST 1500   27,3760  3 0305 1          DCA     UPBUFF
04844  REF  37  LAST 1500   27,3761  52 315 1          DXCH    UPBUFF +8D
04845  REF   2  LAST 1499   27,3762  0 3563 1          TC      TIMEDIDL
04846  REF  16  LAST 1498   27,3763  0 4362 1          TC      FALTON
04847  REF   7  LAST 1500   27,3764  0 3706 0          TC      UPOUT +1

R0485           ERROR SEQUENCE

0500   REF  14  LAST 1401   30,2000                    SBANK=  LOWSUPER
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L RTB OP CODES USER'S PAGE NO. 1 E0 S?

```
0002   REF   1              24,2000                          SETLOC RTBCODE1
0003                        24,3751                          BANK

0004   REF  14  LAST 1358   E5,1713                          EBANK= XNB
0005   REF   1                                               COUNT* $$/RTB

R0006          LOAD TIME2, TIME1 INTO MPAC:

0007                        24,3751   0 0006 1  LOADTIME EXTEND
0008   REF  43  LAST 1497   24,3752   3 0025 0            DCA     TIME2
0009   REF   2  LAST 1125   24,3753   1 6024 0            TCF     SLOAD2

R0010          CONVERT THE SINGLE PRECISION 2'S COMPLEMENT NUMBER ARRIVING IN MPAC (SCALED IN HALF-REVOLUTIONS) TO A
R0012  DP 1'S COMPLEMENT NUMBER SCALED IN REVOLUTIONS.

0016   REF 730  LAST 1499   24,3754  10 154 0  CDULOGIC CCS     MPAC
0017   REF 284  LAST 1500   24,3755   3 4772 1            CAF     ZERO
0018                        24,3756   1 3761 0            TCF     +3
0019                        24,3757  13 760 1             NOOP
0020   REF  27  LAST 1207   24,3760   4 4753 0            CS      HALF

0021   REF 731  LAST 1501   24,3761  54 155 1             TS      MPAC +1
0022   REF 285  LAST 1501   24,3762   3 4772 1            CAF     ZERO
0023   REF 732  LAST 1501   24,3763  56 154 1             XCH     MPAC
0024                        24,3764   0 0006 1            EXTEND
0025   REF  28  LAST 1501   24,3765   7 4753 0            MP      HALF
0026   REF 733  LAST 1501   24,3766  20 155 1             DAS     MPAC
0027   REF  69  LAST 1385   24,3767   1 6030 0            TCF     DANZIG          MODE IS ALREADY AT DOUBLE-PRECISION

0028   REF   1              22,2000                          SETLOC RTBCODES
0029                        22,3621                          BANK

0030   REF   1                                               COUNT* $$/RTB
R0040          READ THE PIPS INTO MPAC WITHOUT CHANGING THEM:

0041                        22,3621   0 0004 0  READPIPS INHINT
0042   REF  11  LAST 1426   22,3622   3 0037 0            CA      PIPAX
0043   REF 734  LAST 1501   22,3623  54 154 0             TS      MPAC
0044   REF   6  LAST 1426   22,3624   3 0040 0            CA      PIPAY
0045   REF 735  LAST 1501   22,3625  54 157 0             TS      MPAC +3
0046   REF   8  LAST 1426   22,3626   3 0041 1            CA      PIPAZ
0047                        22,3627   0 0003 1            RELINT
0048   REF 736  LAST 1501   22,3630  54 161 0             TS      MPAC +5

0049   REF 286  LAST 1501   22,3631   3 4772 1            CAF     ZERO
0050   REF 737  LAST 1501   22,3632  54 155 1             TS      MPAC +1
0051   REF 738  LAST 1501   22,3633  54 160 1             TS      MPAC +4
0052   REF 739  LAST 1501   22,3634  54 162 0             TS      MPAC +6

0053   REF   3  LAST 1182   22,3635   1 6470 0  VECMODE   TCF     VMODE
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L RTB OP CODES USER'S PAGE NO. 2 E5 S3

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R0054           FORCE TP SIGN AGREEMENT IN MPAC:

 0055  REF   8  LAST 1497   22,3636  0 7226 0  SGNAGREE TC     TPAGREE
 0056  REF  70  LAST 1501   22,3637  1 6030 0           TCF    DANZIG

R0057           CONVERT THE DP 1'S COMPLEMENT ANGLE SCALED IN REVOLUTIONS TO A SINGLE PRECISION 2'S COMPLEMENT ANGLE
R0059  SCALED IN HALF-REVOLUTIONS.

 0060  REF   1                22,3640  0 3661 0  1STO2S   TC     1TO2SUB
 0061  REF 287  LAST 1501   22,3641  3 4772 1           CAF    ZERO
 0062  REF 740  LAST 1501   22,3642  54 155 1           TS     MPAC +1
 0063  REF   5  LAST 1152   22,3643  1 6027 0           TCF    NEWMODE

R0064           DO 1STO2S ON A VECTOR OF ANGLES:

 0065  REF   2  LAST 1502   22,3644  0 3661 0  V1STO2S  TC     1TO2SUB        ANSWER ARRIVES IN A AND MPAC.

 0066  REF 741  LAST 1502   22,3645  52 162 0           DXCH   MPAC +5
 0067  REF 742  LAST 1502   22,3646  52 155 1           DXCH   MPAC
 0068  REF   3  LAST 1502   22,3647  0 3661 0           TC     1TO2SUB
 0069  REF 743  LAST 1502   22,3650  54 156 1           TS     MPAC +2

 0070  REF 744  LAST 1502   22,3651  52 160 1           DXCH   MPAC +3
 0071  REF 745  LAST 1502   22,3652  52 155 1           DXCH   MPAC
 0072  REF   4  LAST 1502   22,3653  0 3661 0           TC     1TO2SUB
 0073  REF 746  LAST 1502   22,3654  54 155 1           TS     MPAC +1

 0074  REF 747  LAST 1502   22,3655  3 0161 1           CA     MPAC +5
 0075  REF 748  LAST 1502   22,3656  54 154 0           TS     MPAC

 0076  REF 168  LAST 1493   22,3657  3 4770 0  TPMODE   CAF    ONE            MODE IS TP.
 0077  REF   6  LAST 1502   22,3660  1 6027 0           TCF    NEWMODE

R0086           SUBROUTINE TO DO DOUBLING AND 1'S TO 2'S CONVERSION:

 0087  REF 749  LAST 1502   22,3661  52 155 1  1TO2SUB  DXCH   MPAC           FINAL MPAC +1 UNSPECIFIED.
 0088                       22,3662  20 001 1           DDOUBL
 0089  REF 433  LAST 1499   22,3663  10 000 0           CCS    A
 0090  REF 169  LAST 1502   22,3664  6 4770 0           AD     ONE
 0091                       22,3665  1 3667 1           TCF    +2
 0092                       22,3666  4 0000 0           COM                   THIS WAS REVERSE OF MSU.

 0093  REF 750  LAST 1502   22,3667  54 154 0           TS     MPAC           AND SKIP ON OVERFLOW.
 0094  REF 331  LAST 1495   22,3670  0 0002 0           TC     Q

 0095  REF 434  LAST 1502   22,3671  50 000 1           INDEX  A              OVERFLOW UNCORRECT AND IN MSU.
 0096  REF   8  LAST 1207   22,3672  3 4751 0           CAF    LIMITS
 0097  REF 751  LAST 1502   22,3673  26 154 0           ADS    MPAC
 0098  REF 332  LAST 1502   22,3674  0 0002 0           TC     Q
```

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R0114 THE FOLLOWING ROUTINE INCREMENTS IN 2S COMPLEMENT THE REGISTER WHOSE ADDRESS IS IN BUF BY THE 1S COMPL
R0116 QUANTITY FOUND IN TEM2. THIS MAY BE USED TO INCREMENT DESIRED IMU AND OPTICS CDU ANGLES OR ANY OTHER 2S COMPL
R0118 (+0 UNEQUAL TO -0) QUANTITY. MAY BE CALLED BY BANKCALL/SWCALL.

```
0119  REF   5  LAST 1365   22,3675  54 142 1  CDUINC  TS     TEM2    1S COMPL.QUANT. ARRIVES IN ACC. STORE IT
0120  REF 126  LAST 1369   22,3676  50 130 0          INDEX  BUF
0121                       22,3677  10 000 0          CCS    0       CHANGE 2S COMPL. ANGLE(IN BUF)INTO 1S
0122  REF 170  LAST 1502   22,3700  6 4770 0          AD     ONE
0123                       22,3701  1 3705 1          TCF    +4
0124  REF 171  LAST 1503   22,3702  6 4770 0          AD     ONE
0125  REF 172  LAST 1503   22,3703  6 4770 0          AD     ONE     OVERFLOW HERE IF 2S COMPL. IS 180 DEG.
0126                       22,3704  4 0000 0          COM

0127  REF   6  LAST 1503   22,3705  6 0142 0          AD     TEM2    SULT MOVES FROM 2ND TO 3D QUAD.(OR BACK)
0129  REF 435  LAST 1502   22,3706  10 000 0          CCS    A       BACK TO 2S COMPL.
0130  REF 173  LAST 1503   22,3707  6 4770 0          AD     ONE
0131                       22,3710  1 3712 1          TCF    +2
0132                       22,3711  4 0000 0          COM
0133  REF   7  LAST 1503   22,3712  54 142 1          TS     TEM2    STORE 14BIT QUANTITY WITH PRESENT SIGN
0134                       22,3713  1 3717 1          TCF    +4
0135  REF 436  LAST 1503   22,3714  50 000 1          INDEX  A        SIGN.
0137  REF   9  LAST 1502   22,3715  3 4751 0          CAF    LIMITS  FIX IT,BY ADDING IN 37777 OR 4000
0138  REF   8  LAST 1503   22,3716  6 0142 0          AD     TEM2

0139  REF 127  LAST 1503   22,3717  50 130 0          INDEX  BUF
0140                       22,3720  54 000 0          TS     0       STORE NEW ANGLE IN 2S COMPLEMENT
0141  REF 333  LAST 1502   22,3721  0 0002 0          TC     Q
```

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P0142 RTB TO TORQUE GYROS, EXCEPT FOR THE CALL TO IMUSTALL. ECADR OF COMMANDS ARRIVES IN X1.

```
0144   REF  38  LAST 1325   22,3722  50 120 1  PULSEIMU INDEX  FIXLOC          ADDRESS OF GYRO COMMANDS SHOULD BE IN X1
0145   REF  88  LAST 1374   22,3723  3 0046 0              CA     X1
0146   REF 223  LAST 1499   22,3724  0 4636 0              TC     BANKCALL
0147   REF   7  LAST  755   22,3725   17244 0              CADR   IMUPULSE
0148   REF  71  LAST 1502   22,3726  1 6030 0              TCF    DANZIG
```

```
P0149   EACH ROUTINE TAKES A 3X3 MATRIX STORED IN DOUBLE PRECISION IN A FIXED AREA OF ERASABLE MEMORY AND REPLACES IT
R0151   WITH THE TRANSPOSE MATRIX. TRANSP1 USES LOCATIONS XNB+0,+1 THROUGH XNB+16D, 17D AND TRANSP2 USES LOCATIONS
R0153   XNB1+0,+1 THROUGH XNB1+16D, 17D. EACH MATRIX IS STORED BY ROWS.

 0154   REF  15  LAST 1501   22,3727   02713 0  XNBEB    ECADR  XNB
 0155   REF   5  LAST  299   22,3730   02554 1  XNB1EB   ECADR  XNB1

 0156   REF  16  LAST 1505   E5,1713              EBANK= XNB

 0164   REF   1              22,3731   3 3727 0  TRANSP1  CAF    XNBEB
 0165   REF  51  LAST 1498   22,3732   54 003 0           TS     EBANK
 0166   REF  17  LAST 1505   22,3733   53'716 1           DXCH   XNB +2
 0167   REF  18  LAST 1505   22,3734   53'722 0           DXCH   XNB +6
 0168   REF  19  LAST 1505   22,3735   53'716 1           DXCH   XNB +2

 0169   REF  20  LAST 1505   22,3736   53'720 1           DXCH   XNB +4
 0170   REF  21  LAST 1505   22,3737   53'730 0           DXCH   XNB +12D
 0171   REF  22  LAST 1505   22,3740   53'720 1           DXCH   XNB +4

 0172   REF  23  LAST 1505   22,3741   53'726 1           DXCH   XNB +10D
 0173   REF  24  LAST 1505   22,3742   53'732 1           DXCH   XNB +14D
 0174   REF  25  LAST 1505   22,3743   53'726 1           DXCH   XNB +10D
 0175   REF  72  LAST 1504   22,3744   1 6030 0           TCF    DANZIG

 0176   REF   6  LAST 1505   E5,1554              EBANK= XNB1

 0177   REF   1              22,3745   3 3730 0  TRANSP2  CAF    XNB1EB
 0178   REF  52  LAST 1505   22,3746   54 003 0           TS     EBANK
 0180   REF   7  LAST 1505   22,3747   53'557 0           DXCH   XNB1 +2
 0181   REF   8  LAST 1505   22,3750   53'563 1           DXCH   XNB1 +6
 0182   REF   9  LAST 1505   22,3751   53'557 0           DXCH   XNB1 +2

 0183   REF  10  LAST 1505   22,3752   53'561 0           DXCH   XNB1 +4
 0184   REF  11  LAST 1505   22,3753   53'571 1           DXCH   XNB1 +12D
 0185   REF  12  LAST 1505   22,3754   53'561 0           DXCH   XNB1 +4

 0186   REF  13  LAST 1505   22,3755   53'567 0           DXCH   XNB1 +10D
 0187   REF  14  LAST 1505   22,3756   53'573 0           DXCH   XNB1 +14D
 0188   REF  15  LAST 1505   22,3757   53'567 0           DXCH   XNB1 +10D
 0191   REF  73  LAST 1505   22,3760   1 6030 0           TCF    DANZIG
```

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```
P0192           THE SUBROUTINE  SIGNMPAC  SETS C(MPAC, MPAC +1) TO SIGN(MPAC)
R0193   FOR THIS, ONLY THE CONTENTS OF MPAC ARE EXAMINED.    ALSO +0 YIELDS POSMAX AND -0 YIELDS NEGMAX.

R0195   ENTRY MAY BE BY EITHER OF THE FOLLOWING:

R0196   1.      LIMIT THE SIZE OF MPAC ON INTERPRETIVE OVERFLOW:
R0197   ENTRY:          BOVB
R0198                   SIGNMPAC

R0199   2.      GENERATE IN MPAC THE SIGNUM FUNCTION OF MPAC:
R0200   ENTRY:          RTB
R0201                   SIGNMPAC

R0202   IN EITHER CASE, RETURN IS TO  THE NEXT INTERPRETIVE INSTRUCTION IN THE CALLING SEQUENCE.

 0204                           22,3761  0 0006 1  SIGNMPAC EXTEND
 0205   REF   3  LAST  420     22,3762  3 4750 1            DCA     DPOSMAX
 0206   REF 752  LAST 1502     22,3763  52 155 1            DXCH    MPAC
 0207   REF 437  LAST 1503     22,3764  10 000 0            CCS     A
 0208   REF 288  LAST 1502     22,3765  3 4772 1  DPMODE    CAF     ZERO            SETS MPAC +2 TO ZERO IN THE PROCESS
 0209   REF   3  LAST 1501     22,3766  1 6026 1            TCF     SLOAD2 +2
 0210                           22,3767  1 3770 0            TCF     +1
 0211                           22,3770  0 0006 1            EXTEND
 0212   REF   4  LAST 1506     22,3771  4 4750 0            DCS     DPOSMAX
 0213   REF   4  LAST 1506     22,3772  1 6024 0            TCF     SLOAD2
```

*** END OF ZEUS .046 ***

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
.05G	26,3241		888 1 857	-MUDT(M)	37,3370		841	=-.1SEC	17,3275		1052 3 1049 1052
.05GBIT	4766	=	59 1 1074	-OCT10	6171		1114 3 638 1114	=-2	7701	=	1048 4 1043 1056
.05GSW	0146	=	59 6 793 877	-ON	40,2330		331 3 330 368	=-4	6061	=	1048 2 1043 1044
.166...	23,3526		1362 2 603 1358	-PHASE1	1155		81 6 196 1409	=14MS	17,3302		1052 7 1038 1052
.3D	11,3750		1352 1 1323	-PHASE2	1157		81 4 196 214	==========	==========		==========
.5SEC	5011		1201 10 139 1442	-PHASE3	1161		81 3 196 536	A	0000	=	40 437 144 1506
.5SECDP	14,3272		761 1 758	-PHASE4	1163		81 3 196 703	A-PCHK	13,3252		1320 4 1317 1330
==========	==========		========== -PHASE5	1165		81 4 197 829	ABCLOAD	41,2611		353 1 337
+DECSGN	40,2203		329 1 328	-PHASE6	1167		81 3 197 1497	ABLOAD	41,2716		354 1 337
+DOWN	00,2607		1168 1 1167	-ROLL1	4355	=	996 1 994	ABORT	7706	=	1489
+LIMIT	42,3246		350 1 350	-ROLL2	16,3765		996 1 993	ABORT2	5735		1488
+MGA	E7,1625	=	126 8 126 645	-SLOPE	16,3757		996 3 988 990	ABS	00,3225		1181 2 1180
+ON	40,2310		330 3 330 368	-T-3	15,3374		1092 1 1087	ABTCONIC	12,3760		1304 3 1289 1302
+ROLL1	4773	=	996 1 993	-TORQUE	16,3722		993 1 993	ABVAL	00,3200		1180
+ROLL2	5014	=	996 1 993	-TPER	E4,1736	=	95 7 95 525	ABVALABS	00,3175		1180 1 1119
+TORQUE	16,3701		993 1 993	-UP	00,2617		1168 1 1167	ACADN83	24,3551		714 1 740
+2ACTDEG	20,2462		720 2 719	-VD1SET	4261		381 10 335 381	ACADN85	24,3555		714 2 712 738
==========	==========		========== -VM/360K	15,3400		1092 2 1084 1092	ACBD2Y	17,3377		1055 1 1055
NBSM	23,3647		1367 1 508	-VMT/180	15,3400	=	1092 1 1084	ACBD2Z	17,3442		1056 1 1055
SMNB	23,3633		1367 5 298 940	-VREL	E7,1525	=	122 3 122 890	ACCEPTUP	07,3701		1445 2 1446
==========	==========		========== -VT/180	E6,1613	=	116 13 116 1085	ACCEPTWD	41,2025		334 3 334
-AYO	E3,1711	=	90 2 634 1250	-VT/180E	E6,1570	=	117 1 1083	ACCFINHT	4770	=	85 3 164 1426
-BIT10	06,3000		168 1 164	-1/KB2	26,3213		888 1 874	ACCOMP	11,2456		1336 1 1344
-BIT14	4751	=	1203 2 720 951	-1/12	13,3757		1353 1 1343	ACCWD	E5,1522	=	103 2 441
-CCSPR	01,3123		1218 1 1219	-1/2+2	00,2443		1164 1 1184	ACORBD	E6,1630	=	113 5 113 1056
-CDUT+1	20,3745		1069 1 1068	-1/8	7674		1203 2 393 1100	ACOS=0	00,3634		1189 4 1189 1191
-COMMAX	07,3663		1439 2 1421 1422	-1CHK	43,3225		1395 5 1396 1401	ACOSABRT	00,3720		1191
-COMMAX-	07,3664		1439 2 1421 1422	-15DEGS	06,3557	=	156 1 155	ACOSOVF	00,3716		1191 1 1189
-DELAIG	E6,1676	=	115 5 115 1071	-2SEC	10,3774		1487 1 1473	ACOSSHR	00,3711		1191 1 1189
-DELAMG	E6,1677	=	115 4 115 1071	-4ACTDEG	20,2461		720 1 719	ACOSST	00,3622		1189 1 1189
-DELAOG	E6,1675	=	115 3 115 1071	-50SC	15,3425		1288 1 1277	ACOSST2	00,3637		1189 2 1189
-DTSCALR	04,3302		592 1 592	-6.05DEG	26,3015		814 1 813	ACOSZERO	00,3724		1191 1 1189
-ELR	05,3246		205 2 202	-70DEGS	06,2516		156 1 155	ACOS3	00,3647		1190 1 1191
-ENDERAS	7676		1203 1 1111	-75DEGS	21,2641		1014 1 1015	ACRBDZ	17,3017		1043 2 1043
-ENDVAC	6220		1115 2 1111 1129	==========	==========		==========	ACRJETS	17,3136		1047 2 1042 1055
-ERTHRAT	34,2300		541 1 539	/BUF+	00,2720		1172 2 1171	ACROLL	17,2747		1042
-FOURDT	16,2524		731 1 726	/BUF-	00,2714		1171 2 1171	ACTCENT	E5,1632	=	97 3 98 479
-GYROMIN	07,3437		1431 2 1431 1434	/MPAC+	00,2766		1173 2 1173	ACTIVE	22,3304		500 4 476 677
-HSCALED	26,3317		889 1 859	/MPAC-	00,2762		1173 2 1173	ACTLIM	20,3261		974 2 967 971
-KSCALE	26,3321		889 1 859	/NORM	00,2731		1172 1 1172	ACTSAT	20,3614		981 2 975
-KVSCALE	37,3677		896 1 890	/NORM2	00,2724		1172 1 1172	ACYCHECK	17,3055		1044
-MAXADRS	4344	=	1394 1 1399	==========	==========		==========	ACYJETS	17,3152		1048 2 1044 1055
-MAXDELV	37,3152		835 1 832	=.24	21,2634		1013 1 1012	AC2Y	17,3415		1055 2 1055
-MAXSRT	07,2626		764 4 764	=+.1SEC	17,3277		1052 5 1049 1056	ADB	E6,1655	=	114 12 114 1030
-MUDT(E)	37,3366		841 1 841	=+14MS	21,3075		1018 1 1014	ADBVEL	E6,1523	=	112 4 1029 1032

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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
ADDINDRF	33,3042		445 1 445	AIG	E6,1662	=	115 3 115 1063	ALT	0752	=	77 9 77 1239
ADDRESS	6052		1110	AIG/PIP	E6,1670	=	115 1 115	ALTCALC	22,2123		404 1 404
ADDRWD	0116		70 79 1108 1369	AINLA	E5,1444		102 53 102 103	ALTI	E7,1736	=	124 3 124 548
ADDTEN	20,2303		461 1 460	AK	E6,1476		107 21 117 1022	ALTIM	E5,1540	=	103 3 438
ADENDEXT	25,3031		871 1 869	AKLOAD	34,2474		546 1 546	ALTIMS	E5,1541	=	103 2 438 440
ADERCOMP	33,3127		447	AK1	E6,1477		107 12 135 1074	ALTVAR	1347		86 1 584
ADIAX	E3,1463		89 1 310	AK2	E6,1500		107 13 135 1078	ALWAYSG	33,2764		445 2 439 445
ADIAY	E3,1464		89 1 310	ALARM	5671		1486 38 150 1426	ALXXXZ	33,2702		443 1 435
ADIAZ	E3,1465		89 1 311	ALARM/TB	05,3270		671 1 661	ALX1S	E5,1454	=	102 4 435 443
ADOT	E6,1533	=	112 11 112 1029	ALARM2	5673		1486 2 788 1394	AM	E6,1764	=	118 4 118 416
ADOTLOOP	21,2316		1004 1 1004	ALCGKK	33,2444		440	AM8GUPDT	22,3560		1036 2 1004 1013
ADOT1	E6,1535	=	112 2 112 136	ALDK	E5,1542	=	103 3 440 441	AMG	E6,1663	=	115 6 115 1071
ADOT2	E6,1537	=	112 1 112	ALFA/PIP	E6,1673	=	115 2 115 895	AMG/PIP	E6,1671	=	115 2 115 828
ADRPCHN2	5414		1407 1 1407	ALFA/180	E6,1665	=	115 10 115 1073	AMGB1	E6,1640	=	113 5 113 1036
ADRS+1	43,3557		1400	ALFACOM	E6,1603	=	116 4 116 1074	AMGB4	E6,1641	=	113 5 114 1036
ADRSCHK	43,3526		1399 2 1399	ALFAPAD	E6,1411		106 2 796 822	AMGB5	E6,1642	=	114 5 114 1036
ADRS1	43,3176		1394 1 273	ALFDK	E4,1422	=	96 2 96 440	AMGB7	E6,1643	=	114 5 114 1037
ADSRAX	E3,1466		89 1 310	ALFLT	33,2406		439 1 438	AMGB8	E6,1644	=	114 5 114 1036
ADSRAY	E3,1467		89 1 310	ALFLT1	33,2412		439 1 235	AMOONBIT	4767	=	48
ADSRAZ	E3,1470		89 1 310	ALFLT3	33,2461		440 1 440	AMOONFLG	0015	=	48 6 521 1329
ADSUM	43,3515		1399 2 1399	ALILP	33,2504		440 1 440	AMOVED	11,3606		1349 1 1348
ADTIME	35,2523		476 1 476	ALINTIME	43,2312		258 1 249	ANDOUT	13,3263		1320 2 1320
ADUPBFM1	42,3745		1495 2 1494 1495	ALK	E5,1456	=	102 9 102 446	ANEXIT	E4,1756	=	95 2 685
ADUPBUFF	42,3744		1495 1 1494	ALKCG	33,2447		440	ANGLTIME	22,3011		416 1 416
ADUPTEMP	42,3743		1495 1 1495	ALKCG2	33,2452		440 1 440	ANGOVCOR	15,2151		1065 5 1073 1089
ADVAN	01,3177		1220 2 1215 1395	ALKLP	33,2513		440 1 441	ANGX	E5,1510	=	102 2 441 442
ADVANCE	37,2560		683 3 220 667	ALLDC/OC	41,3011		356 2 353 355	ANGY	E5,1506	=	102 1 442
ADVTKBIT	4757	=	62	ALLOOP	33,2350		438 1 437	ANGZ	E5,1502	=	102 1 442
ADVTRACK	26,2040		783 1 759	ALLOOP1	33,2356		438 1 235	ANNNNNN	33,3157		447 1 436
ADVTRK	0175	=	62 3 564 759	ALLOOP3	33,2352		438	AOG	E6,1661	=	115 35 115 1077
AD14MSP	17,3203		1049 1 1049	ALLSET	35,2761		483 1 483	AOG/PIP	E6,1667	=	115 3 115 890
AD14MSR	17,3323		1052 1 1052	ALM/END	43,2116		251 21 249 276	AOPOLD	0363		75 4 757 763
AD14MSY	17,3247		1051 1 1051	ALMCADR	1363	=	87 13 87 1489	AOPTIME	E4,1746	=	95 16 95 784
AEARTH	31,3476		639 1 635	ALMCYCLE	4173		372 14 335 373	APOPERI	22,2000	=	30 1 498
AERR	E6,1517	=	112 6 112 1032	ALMXIT	04,3411		661 2 682	APSESBIT	4764	=	63
AERRVEL	E6,1522	=	112 8 112 1031	ALMXITA	04,3407		661 1 678	APSESW	0202	=	63 2 1301 1302
AFAILP	17,2643		1039 1 1039	ALOAD	41,2741		355 1 336	APSIDES	12,3717		1303 1 498
AFTERERN	04,2724		219 8 217 219	ALOADED	11,2320		1320 2 1319 1320	ARATE	22,3001		416 3 416
AGAIN	30,3650		716 2 723	ALP	E7,1703	=	123 7 123 873	ARCCOS	00,3607		1189 1 1119
AGAINMM	04,2133		210 1 210	ALPHA	0010	=	1306 4 1277 1279	ARCSIN	00,3605		1189 1 1119
AGEOFW	E7,1735	=	130 4 284 587	ALPHAM	E4,1700	=	93 14 93 1342	ARCTAN	13,2614		1240 2 1237
AGIN,MON	26,2254		793 1 794	ALPHAV	E4,1551	=	93 46 93 1351	ARCTANXX	13,2642		1240 2 1240
AHEAD5	6402		1122 1 1122	ALRM15	4776	=	748 2 567 750	ARCTRIG	23,3311		1356 12 299 1359
AHFNOROT	21,3272		1024 1 1016	ALSIGNAG	7500		1148 4 1171 1174	ARG+	7234		1142 1 1142
AHOOKDV	E7,1657	=	122 4 123 873	ALSK	33,3432		452 1 441	ARGHI	00,3415		1185 2 1186

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ARGLO	00,3465		1 1186	ATTDISP2	34,2413		1 545	AVGEXIT	1061	=	79 3 539 833
ARGZERO	7254		1 1142	ATTHOLD	21,3334		3 1024 1027	AVOUTCAD	37,2766		830 1 830
ARGZERO2	7251		1 1142	ATTINIT	17,2270		1 945	AX*SR*T	23,3651		1368 1 1367
ARG90	5115		1 1207	ATTKALMN	E6,1617	=	113 10 113 1039	AXC	01,2346		1192 1 1118
AROUT1SF	40,2570		347 1 345	ATTLIM	17,2526		949 2 945	AXISGEN	23,3432		1360 3 451 776
ARTHINSF	40,2743		360 1 359	ATTRATES	15,2314		1073 1 1072	AXISGEN1	23,3440		1360 1 1360
ARTIN1SF	40,2756		360 1 359	ATTSEC	E6,1560	=	113 3 113 1004	AXISGEN2	23,3467		1360 1 1361
ARTOUTSF	40,2563		347 1 345	AUGEKUGL	32,2105		648 2 647 910	AXISGEN3	23,3512		1361 1 1361
ARUPT	0010	=	40 10 139 1232	AUG2	07,3531		1433 1 1433	AXO	E3,1713	=	90 2 634 1250
ASCALE	13,3731		1352 1 1338	AUG3	07,3510		1432 1 1433	AXT	01,2341		1192 1 1118
ASET	34,3560		597 4 596 600	AUTOCHK	4112		206 2 206 554	AZIMANGL	1352		86 5 216 604
ASINEX	00,3704		1190 1 1189	AUTOCHK1	4116		206 1 555	AZIMBIT	4761	=	67 4 215 599
ASKEP	E7,1730	=	123 2 867 868	AUTOCK	34,3545		597 1 596	AZIMFLAG	0254	=	67 6 216 626
ASKIFNRM	10,2774		1463 1 1463	AUTOCONT	21,3304		1024	AZIMUTH	E5,1400		102 4 427 544
ASMBLWP	17,3346		1054 2 1049 1050	AUTOSEQ	0236	=	66 18 206 1488	AZMTHCG1	43,3132		452 2 233 259
ASMBLWR	17,3366		1055 2 1052	AUTOSET	04,2507		216 15 215 219	AZO	26,3652		1251 1 1249
ASMBLWY	17,3512		1057 2 1051	AUTOSETA	04,2432		215 1 219	A0	0327	=	73 8 863 876
ASPDWN	E7,1733	=	123 1 868	AUTOW	23,3030		586 1 580	AOCALC	25,2406		863 1 863
ASPS	E7,1730	=	123 11 123 138	AUTOW1	23,3046		586 1 586	A1	E7,1663	=	123 4 123 873
ASPS(TM)	E6,1525	=	120 1 868	AUTOW1A	23,3037		586 1 586				
ASPUP	E7,1732	=	123 1 867	AUTOW11	23,3055		586 1 586	BACK	25,3351		878 1 878
ASP1	E7,1731	=	123 1 867	AUTOW2	23,3133		587 5 586 588	BACK2	25,3374		878 1 879
ASP3	E7,1734	=	123 2 868	AUTOW3	24,2104		587 1 586	BADEND	07,3625		1436 2 1435
ASTNBIT	4755	=	60 2 713	AUTOW4	24,2114		588 2 587	BADR2	10,2453		1302 2 1301
ASTNFLAG	0154	=	60 1 711	AUTOW5	24,2120		588 2 587	BADVCTOR	30,3707		716 1 716
ASTNV99P	24,3476		713	AUTOY	E5,1600	=	97 3 97 685	BADX	12,2347		1280 3 1278
ATAN=90	13,2647		1240 1 1240	AUTO37	04,2044		209 4 208 216	BAILOUT	7706		1487 6 242 1489
ATDOTCAD	15,2312		1072 1 1072	AUTPOINT	1012		77 7 206 219	BANKCALL	4636		1104 223 198 1504
ATERJOB	34,2342		543 2 541 546	AUTSQBIT	4762	=	66 2 206 747	BANKJUMP	4660		1104 11 242 1474
ATERSET	34,2470		546	AUTTEMP	1356	=	87 4 216 219	BANKMASK	4344	=	1204 3 1116 1129
ATERTASK	34,2315		541 2 234 537	AVECTR	0024	=	1251 7 1246 1248	BANKRUPT	0016	=	40 26 141 1446
ATIGINC	E4,1421		92 1 472	AVEGBIT	4770	=	50 4 156 829	BANKSET	0165		73 14 1106 1476
ATOPCSM	13,2761		1314 4 34 1349	AVEGDT	E7,1457	=	128 6 128 699	BARELY1	26,3343	=	887 4 864 873
ATOPLEM	13,3034		1316 4 34 1349	AVEGEXIT	1061	=	79 12 79 808	BASEOTP	E4,1623	=	93 2 510 511
ATOPOTH	13,3034	=	34 1 515	AVEGFLAG	0035	=	50 2 517 808	BASEOTV	E4,1637	=	93 2 510 511
ATOPTHIS	13,2761	=	34 1 515	AVEGOUT	37,2762		830 1 829	BASETEMP	1265	=	83 2 221
ATRESET	34,2510		547 2 543	AVEMDBIT	4770	=	65	BASETHP	E4,1653	=	93 2 510
ATTACHED	43,2774		274 1 249	AVEMIDSW	0225	=	65 3 301 1327	BASETHV	E4,1661	=	93 2 510 511
ATTACHIT	17,2000		274 1 274	AVERAGEG	37,3056		833 1 832	BASETIME	E4,1733	=	94 3 510 511
ATTCHBIT	4767	=	61 2 720	AVETOMID	35,3677		1326 1 834	BB	0006	=	1408 5 1407 1414
ATTCHFLG	0166	=	61	AVFLAG	0050	=	52 6 218 652	BBANK	0006	=	40 34 139 1486
ATTCK1	43,2417		260 1 260	AVFLAGA	4553		652 6 466 667	BCDU	E6,1661	=	118 18 115 558
ATTDISP	34,2360		543 2 543 547	AVFLAGP	4565		652 4 466 667	BDDV	7537		1149 2 1117 1149
ATTDISPR	33,3713		544	AVFLBIT	4764	=	51	BDFAIL	20,2572		722 2 721 722
ATTDISP1	33,3672		544 1 544	AVGEND	37,3100		833 1 830	BDF2Z	17,3473		1056 2 1056

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
BDOT	26,3640	1251	1 1246	BITS15+7	10,3735	1476	1 1464	BLNKBBNK	4304	382	1 381
BDRACZ	17,3101	1044	2 1044	BITS3&4	5775	= 1439		BLNKR1	4770	= 1477	
BDRJETS	17,3137	1047	2 1044 1056	BITS4+10	10,3737	1476	1 1475	BLNKR2	4767	= 1477	
BDROLL	17,3035	1044	2 1042	BITS4&5	5001	1201	10 151 1476	BLNKR3	4766	= 1477	
BDSU	7031	1135	1 1117	BITS4&6	5004	= 1439	5 194 1418	BLNKSUB1	40,3351	382	2 382
BDT	E7,1704	= 128	7 128 730	BITS4-5	5001	= 1439	1 1424	BLOAD	41,2750	355	1 337
BDZCHECK	17,2773	1042		BITS4-6	31,3527	639	1 638	BMAGX	0042	= 40	
BDZJETS	17,3151	1048	2 1043 1056	BITS4,5	5001	= 1002		BMAGY	0043	= 40	
BECONSTD	25,3225	875	1 865	BITS5+11	10,3736	1476	3 1468 1475	BMAGZ	0044	= 40	
BEE17	15,3402	1288		BITS5-6	5010	= 536		BNKCHK	43,3650	1401	
BEE19	15,3414	= 1288	1 1296	BITS7+4	5013	1201	2 1463	BNKOPTN	43,3247	1395	
BEE22	15,3420	= 1288	1 1278	BITS7&8	06,2775	168		BODYATT	37,2000	= 33	1 890
BELOW1	10,2516	1409	1 1410	BITS7-9	31,3526	639	1 638	BODYRATE	15,2165	1070	1 1064
BELOW2	10,2533	1409	2 1409	BIT1	4770	1200	69 48 1499	BOKKEP2	05,3404	957	1 957
BELOW3	10,2547	1409	1 1409	BIT10	4757	1200	38 47 1446	BOOP	33,2572	441	1 442
BELOW4	10,2552	1409	2 1409	BIT11	4756	1200	33 47 1443	BOOSTEMP	E6,1705	= 119	5 119 548
BESTI	0302	= 73	12 73 787	BIT12	4755	1200	31 47 1477	BORTENT	5676	1486	2 1487 1488
BESTJ	0303	= 73	4 73 752	BIT13	4754	1200	43 47 1477	BOTHGO	31,2154	510	1 510
BESTTRIM	24,3075	705		BIT13+8	10,3745	1477	1 1463	BOTHJOBS	10,3131	1466	1 1466
BETA/PIP	E6,1674	= 115	3 115 895	BIT13-14	4346	= 1204	1 1475	BOTHPAD	23,2461	519	1 518
BETA/180	E6,1666	= 115	8 115 1074	BIT14	4753	1200	70 47 1488	BOTHSGN	40,2274	330	1 330
BETACOM	E6,1604	= 116	2 116 1074	BIT14+7	10,3747	1477	1 1463	BOTHSHIP	23,2405	518	1 518
BETADOT	E6,1704	= 115	5 115 1079	BIT14COM	10,2545	1409	1 1409	BOV(B)	01,2454	1195	1 1118
BETAM	E4,1607	= 93	6 93 1351	BIT15	4752	1200	50 48 1485	BPL	01,2500	1196	1 1196
BETAV	E4,1557	= 93	11 93 1338	BIT15+6	7667	1203	3 167 1477	BPL/BMN	01,2471	1196	1 1118
BETA1	E7,1743	= 131	4 131 925	BIT15+9	7716	1487	2 1463 1486	BRANCH	6672	1131	8 1142 1196
BETA12	E7,1754	= 132	8 124 917	BIT15/14	4076	= 366	3 364 1473	BRATE	E6,1710	= 118	6 416 558
BFAILY	17,2677	1040	1 1040	BIT2	4767	1200	43 48 1498	BRNBLKTM	E4,1774	= 96	2 96 586
BHIZ	01,2447	1195		BIT3	4766	1200	44 48 1477	BRNCHCON	7700	= 333	1 332
BIAS	E6,1564	= 113	5 113 1027	BIT4	4765	1200	43 48 1477	BRNCHCTR	12,2334	1280	1 1281
BIASAK	E6,1715	= 119	5 119 547	BIT5	4764	1200	37 48 1484	BRUPT	0017	= 40	1 1488
BIASCALE	22,3035	417	1 416	BIT6	4763	1200	40 48 1495	BSUBD	26,3646	1251	1 1246
BIASCOM	40,2513	346	2 346	BIT7	4762	1200	40 48 1477	BTRIMR	24,3101	705	3 705
BIASEDZ	15,2435	1076	3 1078 1079	BIT7-8	04,3050	224		BUF	0130	70	127 70 1503
BIASHI	00,2565	1166	1 1185	BIT8	4761	1200	35 47 1477	BUF+	00,2421	1162	3 1162 1165
BIASLO	00,2270	1159	1 1186	BIT9	4760	1200	31 47 1498	BUF-	00,2415	1162	3 1162 1165
BIASTEMP	E6,1674	= 118	5 416 558	BKRJCT	43,2632	269	1 269	BUFAGREE	7225	1142	1 1162
BIAS1	E6,1565	= 113	5 113 1027	BLANKCHK	10,3356	1470		BUFLIM	15,3401	= 1092	4 1083
BIAS2	E6,1566	= 113	5 113 1027	BLANKCON	4755	= 333	1 333	BUFNEG	00,2530	1165	1 1162
BIGTIME	12,3501	1299	1 1298	BLANKDSP	41,3466	379	2 379	BUFNORM	00,2477	1165	1 1165
BINCON	4355	385	4 143 1204	BLANKET	5516	1459	13 458 1476	BUFPOS	00,2515	1165	2 1162 1165
BINROUND	40,2753	360	3 359 360	BLANKSUB	4264	381	2 366 1470	BUFZERO	00,2363	1162	1 1165
BITSOFF	41,2702	354	1 354	BLAST	E6,1456	= 107	21 107 1061	BUF2	0133	70	24 72 1487
BITSOFF1	41,2706	354	1 354	BLAST1	E6,1460	= 107	22 107 1061	BURNBIT	4757	= 66	1 702
BITSOFF2	41,2714	354	3 354 355	BLAST2	E6,1462	= 107	16 107 1061	BURNFLAG	0233	= 66	4 218 737

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SYMBOL	DEF	H	REFERENCES
BURNHOW	04,2517		216 7 217 219
BURNTMP1	E5,1552	=	105 3 105 220
BURNTMP2	E5,1560	=	105 3 105 220
BURNTMP3	E5,1566	=	105 3 105 220
BURNTMP4	E5,1574	=	105 2 220
BUTTONS	05,2604		198 1 198
BVECTOR	E7,1501	=	125 22 125 1253
BVECTORS	23,2756		574 2 580 615
BVECTR	0032	=	1251 5 1247
BVSU	7005		1134 1 1117
BYPASS	27,2566		590 1 590
BYPASS1	27,2574		590 2 590
BZE/GOTO	01,2464		1196 1 1118
B12T14	7656	=	1204 1 1120
B15MONCK	41,3307		365 2 365
B2/A2	13,2606		1239 1 1241
B2XSC	13,2604		1239 1 1239
B3TOB4	01,3024	=	1199 2 1198 1199
B5OFF	5626		1484 8 507 941
B5TOB8	01,2462		1195
C(30)LIM	26,2645		809 2 808 809
C*MM*N1	23,3634		1367
C*MM*N2	23,3636		1367 1 1367
C*MM*N3	23,3644		1367 1 1367
C/DO	E7,1705	=	123 3 123 875
CA+ECE	07,3064		1422 2 156 199
CADRFLSH	0371		75 5 136 1474
CADRMARK	0372		75
CADRMASK	5004	=	1476 1 1467
CADRSTOR	1245		82 13 204 1472
CADRTAB	01,2001	=	230 1 1414
CAGEBIT	4756	=	84
CAGESUB	06,2740		167 1 150
CAGESUB1	06,2746		167 1 160
CAGESUB2	06,2751		167 1 152
CAGETEST	07,3606		1435 5 1419 1424
CAGETSTG	07,3575		1435 1 1429
CAGETSTJ	07,3616		1435 5 1418 1427
CAGETSTQ	07,3613		1435 3 1425 1426
CALCDT6	17,3547		1058 2 1059
CALCGA	23,3344		1358 4 427 822
CALCGA1	23,3404		1358 1 1359
CALCGRAV	37,3270		840 3 723 841
CALCGTA	23,3240		1354 4 451 755
CALCMAN2	0053	=	52 3 416 558
CALCN83	24,3706		740 1 714
CALCN85	24,3576		737 1 714
CALCPHI	22,2674		414 1 414
CALCRVG	37,3336		841 1 833
CALCSMSC	16,2756		770 2 751 782
CALCSXA	23,2034		298 1 759
CALCTFF	27,3261		1380 4 525 814
CALCTPER	27,3256		1380 1 525
CALCUT	16,2115		723
CALC2BIT	4767	=	52
CALFA	E6,1506	=	116 8 116 1090
CALL	6607		1129 1 1196
CALL/ITA	01,2504		1196 1 1118
CALLCODE	5002		1201 1 1121
CALLCON	26,2660		812 1 814
CALLCRS	06,2460		156 1 156
CALLRECT	11,3273		1344 4 1343 1344
CALLRPRT	13,2556		1238 1 1238
CALLRTRP	13,2466		1236 1 1236
CALLR52	30,2242		562 1 562
CALLR6X	36,2263		556 1 555
CALOOP	14,2346		749 1 749
CALOOP1	14,2376		749 2 749
CALSAM1	14,3714		787 1 787
CAL53A	14,2335		749
CAL53RET	14,2405		749
CAM	E6,1716	=	118 5 118 405
CANCOARS	06,3161		171 2 171
CANDEL	23,2611		521 1 519
CANTDO	32,2077		648 2 647
CANTROO	04,2125		210 1 209
CANV37	04,2162		210 2 210 834
CANZOPT	06,3104		170 2 170 171
CAPSI	E6,1645	=	114 4 114 1036
CATLOG	15,3775		1391 11 603 787
CCALL	6575		1129 1 1117
CCSL	7617		1151 1 1204
CD*TR*GS	23,3542		1364 1 1367
CDELF/2	0016	=	1371 3 647 819
CDHMVR	27,2674		688 3 220 677
CDHTAG	27,2000	=	32 1 688
CDHTAGS	15,2000	=	29 1 687
CDHTAG2	31,2000	=	32 1 686
CDHTAG3	37,2000	=	33 2 670 683
CDRVE	06,2012		142
CDUCHKWD	1341		86 2 244
CDUINC	22,3675		1503
CDUIND	E3,1474	=	89 19 150 1427
CDULIMIT	E5,1453	=	102
CDULOGIC	24,3754		1501 9 297 1365
CDULOOP	34,3466		596 1 596
CDUS	0036	=	40 8 135 512
CDUSCMD	0054	=	41 1 41
CDUSPOT	1171		81 16 81 1366
CDUSPOTX	1175	=	81 1 710
CDUSPOTY	1171	=	81 1 710
CDUSPOTZ	1173	=	81 1 710
CDUT	0035	=	40 8 172 757
CDUTCMD	0053	=	40 3 40 178
CDUTODCM	22,2377		409 4 398 558
CDUTRIG	23,3530		1364 9 508 940
CDUTRIGS	23,3534		1364 1 1364
CDUX	0032	=	40 31 135 1421
CDUXCMD	0050	=	40 4 160 1421
CDUXD	E6,1646	=	114 9 114 1006
CDUY	0033	=	40 18 182 1417
CDUYCMD	0051	=	40 2 160 1009
CDUYD	E6,1650	=	114 4 114 599
CDUZ	0034	=	40 26 135 1417
CDUZCMD	0052	=	40 2 160 1009
CDUZD	E6,1652	=	114 4 114 599
CEARTH	0016	=	767 3 753 767
CENTANG	E7,1753	=	130 8 133 674
CFAILP	17,2645		1039 1 1039
CFPA	E7,1746	=	131 4 131 929
CG.CORR	16,3137		952
CGOTO	6652		1130 1 1117
CGTRACK	16,2231		726
CHANBITS	41,2667		354 1 354
CHANDSP	41,2477		344 1 343
CHANG1	5152		1208 4 250 1400
CHANG2	5156		1209 1 1109
CHANJOB	01,2677		1213 4 1208 1219
CHANLOAD	41,3155		358 1 358
CHANTEMP	E6,1633	=	113 4 113 1024
CHAN12	0012	=	42 55 151 1435
CHAN13	0013	=	42 17 194 1443
CHAN14	0014	=	42 19 160 1434
CHAN30	0030	=	42 6 147 543

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CHAN31	0031	=	42 6 550 1485	CH31TEMP	E6,1632	=	113 6 113 1019	CM/FDAIR	15,3333		1090 2 1075 1089
CHAN32	0032	=	42 2 144 1024	CIRCL	23,3161		676 3 674	CM/FLAGS	0102	=	852 24 804 1089
CHAN33	0033	=	42 5 153 590	CIRCULAR	12,3713		1302 1 1301	CM/GYMDT	E6,1725	=	116 6 116 1068
CHAN5	0005	=	42 8 194 1132	CKGYMSW	15,2135		1064 1 1064	CM/GYMIC	15,2141		1064 1 1063
CHAN6	0006	=	42 8 194 1061	CKLFTBTS	43,2427		261 2 260	CM/POSE	37,3404		890 1 799
CHAN76	0076	=	42	CKLSTAUT	4777	=	215 1 215	CM/POSE2	37,3433		890 1 890
CHAN77	0077	=	42 2 194 1332	CKMID2	13,3656		1329 1 1348	CM/POSE3	37,3664		895
CHAR	0117	=	70 5 326 328	CKMODCAD	43,2260		256 2 254 256	CM/RCS	15,2645		1081 1 1075
CHARALRM	40,3275		372 18 326 375	CKNVWRD1	24,3306		710 1 709	CM/SAVE	E6,1623	=	117 3 117 1091
CHARIN	40,2000		326 1 1445	CKOPTV8	43,2342		258 1 249	CM/SWIC1	20,3744		1069 1 1068
CHARIN2	40,2013		326 2 326	CK1K2	32,2223		650 1 649	CM/SWIC2	4355	=	1069 1 1068
CHAZFOGC	43,2352		259 1 250	CK4V32	42,3735		1495 3 1494 1495	CM/TRIO	37,3443		890
CHECKB	5464		1410 1 1407	CLEANDSP	10,2715		1462 7 453 798	CMARMBIT	4755	=	58 3 828 1072
CHECKCTR	12,2716		1286 2 1280 1298	CLEANEND	10,3455		1472 1 1470	CMCSTADL	05,2113	=	183 2 179 190
CHECKMAX	22,2111		404 1 404	CLEANOUT	43,2673		270 1 275	CMCSTA01	05,2043	=	183 1 183
CHECKMM	5354		1402 21 241 780	CLEAR	40,2364		331 1 327	CMCSTA02	05,2052	=	183 2 183
CHECKNJ	43,3264		1395 3 1395 1400	CLEARMRK	5527		1459 9 206 1459	CMCSTA03	05,2057	=	183 1 183
CHECKTAB	04,2132		210 1 210	CLEARSTR	24,3134		706 2 531 707	CMCSTA04	05,2061	=	183 1 183
CHECKT23	17,3543		1058 1 1059	CLEARW54	30,3460		620 1 620	CMCSTA05	05,2063	=	183 1 183
CHEKAVEG	37,2740		829 2 236 828	CLEAR1	40,2417		332 1 332	CMCSTA06	05,2072	=	183 1 183
CHEKAXIS	27,2324		399 1 399	CLOAD	41,2765		355 1 337	CMCSTA07	05,2101	=	183 1 183
CHGRMS	35,3125		486 1 486	CLOCKCON	10,3750		1477 1 1462	CMDAPARM	0135	=	58
CHKCOMED	33,3162		447 3 437 446	CLOCKJOB	24,3276		710 1 709	CMDAPMOD	E6,1700	=	115 12 115 1089
CHKCORS	07,3017		1421 1 1422	CLOCKON	24,3234		709 1 709	CMDCMP	07,2617		764 3 764
CHKCTR	37,3003		831	CLOCPLAY	10,2727		1462 2 710 712	CMDSET	10,2131		177 1 177
CHKDSP	40,2057		327 2 327	CLOG2732	23,2211		303 1 303	CMDSETUP	10,2124		177 4 176
CHKFAIL1	5705		1486	CLOKNOW	33,3522		528	CMDSOUT	16,3266		962 1 963
CHKFAIL2	5712		1486 1 1486	CLOKTASK	24,3225		709 5 236 709	CMDTMP	E6,1666	=	110 18 110 976
CHKLINUS	27,2152		395 2 394 395	CLPASHI	40,2402		332 1 331	CMENTRDL	05,2211	=	187 2 179 190
CHKLIST	05,3463		1097	CLPASS	1220		82 13 204 380	CMENTR01	05,2043	=	187 1 187
CHKNOVAC	01,3600		1413 1 1416	CLRMOON	13,3011		1315 2 1316 1345	CMENTR02	05,2052	=	187 2 187
CHKPOOH	43,2714		271 6 255 390	CLROVFLW	13,2616		1240 1 1240	CMENTR03	05,2057	=	188 1 187
CHKPRIO	10,2670		1461 1 1460	CLR5	40,2422		332 1 332	CMENTR04	05,2061	=	188 1 187
CHKSAB	16,2662		768	CLUPDATE	35,3101		486 1 485	CMENTR05	05,2260		188 1 187
CHKSB	16,2664		768 1 768	CLUPLOCK	07,3761		1446 1 1446	CMENTR07	05,2101	=	188
CHKSCODE	14,3636		781 2 756 781	CM/ATUP	37,3571		894	CMENTR09	05,2107	=	188 1 187
CHKSD	16,2702		769 1 768	CM/BIAS	15,2623		1079 2 1076	CMMOVE	17,2011		274 1 274
CHKSDA	16,2724		769 1 769	CM/DAPIC	20,3703		1068 1 795	CMNTOVFL	12,2361		1280 1 1281
CHKSDATA	16,2657		768 2 768 776	CM/DAPON	20,3624		1066 1 796	CMOON	0022	=	767 2 766 767
CHKSUPR	43,3600		1400 1 1400	CM/DAP2C	20,3705		1068	CMOONBIT	4755	=	62
CHKSWTCH	11,3317		1344 2 1329 1343	CM/DSBIT	4767	=	60 4 804 1089	CMOONFLG	0173	=	62 31 34 1327
CHKTEMX	37,3254		839 1 839	CM/DSTBY	0147	=	60 1 834	CMPG22DL	05,2267	=	189 1 190
CHOOK	26,3251		888 1 865	CM/DUMPR	15,3337		1090	CMPG2201	05,2043	=	189 1 189
CHRPRIO	4346		385 3 365 1496	CM/END	15,3364		1091 1 1090	CMPG2202	05,2052	=	189 2 189
CH1	26,3255		889 3 865 873	CM/FDAI	15,3325		1090 1 1075	CMPG2203	05,2057	=	190 1 189

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CMPG2204	05,2061	=	190 1 189	COB	0040	=	1251 4 1246 1247	COMPUTER	0122	=	57
CMPG2205	05,2335		190 1 189	CODE	0124	=	70 13 330 386	COMPVER	33,2000		426 2 233 258
CMPG2206	05,2072	=	190 1 189	CODSTOR	4423		386 3 327 370	COMP12	22,2203		406 1 405
CMPG2207	05,2101	=	190 1 189	COEFFADR	E6,1704	=	110 11 110 948	COMSETUP	12,2577		1285 2 1277 1296
CMPOS	34,3327		585 4 579 616	COEFPOLY	34,2616		548 1 543	COMTERM	11,3007		134 1 1343
CMPOWEDL	05,2001	=	180 1 190	COF	E6,1742	=	118 48 118 558	COMXFLG	43,3077		278 1 278
CMPOWE01	05,2043		180 5 180 189	COFMAXGO	22,2170		405	COMZERO	07,3053		1422 2 1421 1422
CMPOWE02	05,2052		180 6 180 189	COFSKEW	E6,1710	=	118 8 117 406	COM52	14,3120		759 3 758 783
CMPOWE03	05,2057		181 6 180 190	COGA	E7,1767	=	130 18 130 1301	CONC+S1	43,3173		1394 1 1398
CMPOWE04	05,2061		181 5 180 190	COGAFBIT	4765	=	63	CONC+S2	43,3174		1394 1 1398
CMPOWE05	05,2063		181 3 180 186	COGAFLAG	0203	=	63 3 1289	CONICS	12,2000	=	29 4 1276 1303
CMPOWE06	05,2072		181 3 183 190	COGAMAX	0016	=	1307 4 1296 1299	CONICS1	15,2000	=	29 1 1288
CMPOWE07	05,2101		181 5 180 190	COGAMIN	0010	=	1307 3 1297 1299	CONICS2	17,2000	=	30 1 1289
CMPOWE08	05,2075		181 1 180	COGAOVFL	12,3027		1289 2 1289 1301	CONICS3	11,2000	=	29 1 1305
CMPOWE09	05,2107		181 1 188	COGLOLIM	15,3435		1288 1 1300	CONICS4	05,2000	=	28 1 1291
CMPX1	E5,1455	=	102 2 440	COGUPLIM	15,3433		1288 2 1296	CONICS5	10,2000	=	28 1 1302
CMRENDDL	05,2146	=	185 1 190	COLINEAR	05,3747		1291 1 1291	CONICX1	E7,1550	=	131 5 131 923
CMREND01	05,2043	=	185 1 185	COLREG	0770	=	77 6 1347 1349	CONSTD	25,3231		875 1 862
CMREND02	05,2052	=	185 2 185	COMADRS	43,3465		1398 2 1400	CONSTD1	25,3250		875 1 876
CMREND03	05,2057	=	185 1 185	COMAZM	36,2107		554 1 554	CONTBL2	01,3626		1414 2 1416
CMREND04	05,2061	=	185 1 185	COMBLOAD	41,2760		355 1 355	CONTCHK	27,2500		588 1 589
CMREND05	05,2063	=	186 1 185	COMFLAG	5554		1479 1 1479	CONTDRVE	10,2020		175 1 175
CMREND06	05,2072	=	186 1 185	COMGEOM1	23,2000	=	31 1 297	CONTINU	43,3550		1400 5 1399
CMREND07	05,2101	=	186 1 185	COMGEOM2	10,2000	=	28 1 301	CONTINU2	25,3133		873 1 873
CMTMFILE	15,3346		1090 1 1090	COMMAND	E3,1471	=	89 6 1417 1422	CONTIN33	33,3313		450 1 449
CMTMTIME	0304	=	73 3 73 1091	COMMANDO	1325		84 6 176 178	CONTMANU	20,2143		421 1 419
CMTR1	37,3572		894	COMMFX	43,3457		1398 2 1400	CONTONE	20,2641		734 2 734
CMTR2	37,3643		895	COMMNOUT	12,3012		1289 1 1302	CONTTWO	20,2642		734 2 734
CMYDOT	E5,1602	=	97 4 97 685	COMMONLM	12,3471		1298 1 1299	CONT1	25,3064		872 1 872
CNTR	E6,1446		107 36 200 996	COMNEG	07,3043		1422 1 1421	CONT3	25,3074		872 1 872
CNTRCHK	43,3420		1397	COMP	7624		1151 4 1119 1181	CONUMNOR	41,3060		357 1 356
CNTRCON	5004	=	1394 1 1397	COMPAT	15,2727		1082 2 1081 1082	CONVRNGE	27,2534		589 3 579 589
CNTRCOPY	16,3215		953 2 952 963	COMPDISP	31,2034		507 3 510 512	CON1	5433		1407 1 1407
CNTRLOOP	43,3421		1397 1 1398	COMPGS	33,3020		445 1 445	CON2	10,2561		1409 1 1407
CNTRTMP	E6,1661	=	110 7 110 953	COMPICK	41,2506		344 1 344	CON2ADR	5450		1407 1 1407
CNT3TEMP	E7,1731	=	129 4 130 583	COMPMAT	13,2126		514	COPIES	10,3172		1467 1 1460
COARFINE	14,2362		749	COMPMATX	27,2257		398 1 400	COPIES2	10,3173		1467 1 1464
COARS	07,2734		1420 1 1420	COMPMFSN	27,2336		399 1 399	COPINDEX	0164	=	1476 21 1461 1474
COARSERR	07,3034		1422 2 1421	COMPMU	04,3315		653 1 653	COPMPAC	0157	=	1476 4 1472 1475
COARSTOL	07,3042		1422 1 1422	COMPNUMB	0300		73 12 73 1498	COPYNORM	10,3171		1467 1 1464
COARSTST	07,3570		1435 2 1432	COMPOS	07,2776		1421 1 1420	COPYPACS	10,2660		1461 1 1469
COARSTYP	14,2201		747 1 747	COMPTBIT	4761	=	57	COPYTOGO	10,2656		1461 1 1470
COARSUB	14,3742		787 2 749 774	COMPTEST	41,2423		342 6 342 355	COPY40.9	16,2465		730
COARS1	07,2741		1420 1 1420	COMPTGO	35,3525		645 3 485 735	CORANGOV	37,3671		895 4 894 895
COARS2	07,2764		1420 2 1421 1422	COMPTST1	41,2425		342 1 343	CORCOPY	16,3203		953 1 963

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CDREINC	01,3024		1216 3 1199 1216	CSI/B23	22,3406		673 2 673	CS359+	22,3546		675 1 655
CDRFOUND	01,2631		1212	CSI/B23D	22,3421		674 1 674	CTHETA	1310	=	84 2 423 1 21
CDRPLAN	14,3723		787 2 787	CSI/B3	22,3512		675 1 675	CTLIST	0333		74 6 1097
CDRSCALL	14,3753		788 1 788	CSI/CDH	35,2000	=	33 4 466 671	CULTBIT	4762	=	53
CDRSCHK2	07,3031		1422 2 1421 1422	CSI/CDH1	04,2000	=	27 2 661 668	CULTED	14,2571		752 4 752
CDRSETUP	16,3126		952 2 952 963	CSI/CDH2	12,2000	=	29 1 668	CULTFLAG	0065	=	53 8 300 759
COSCDU	1147	=	81 5 81 1366	CSI/SOL	10,2404		681 1 681	CULTRIX	E5,1735	=	99 1 752
COSCDUX	1153	=	81 6 546 970	CSIALRM	E7,1664	=	133 5 133 682	CVECTR	0010	=	1251 1 1247
COSCDUY	1147	=	81 5 770 1370	CSINEXT	23,3145		675 1 675	CXOFF	E7,1744	=	134 5 134 616
COSCDUZ	1151	=	81 7 545 1370	CSINEXT1	16,2012		677 1 676	CYCLSHFT	43,3427		1398
COSF	0030	=	1307 4 1301 1302	CSINEXT2	07,2440		678 1 678	CYC61BIT	4765	=	48 1 202
COSG/2	E7,1667	=	123 5 123 867	CSINEXT3	10,2316		680 1 680	CYC61FLG	0013	=	48 3 416 597
COSI	26,3630		1251 2 1247	CSINEXT4	31,3535		681 1 681	CYL	0022	=	40 27 214 1398
COSINE	00,3514		1187 2 1119 1365	CSIPROG	06,2000	=	28 2 672 685	CYR	0020	=	40 40 384 1413
COSM	E6,1511	=	116 4 116 1070	CSIPROG2	12,2000	=	29 1 673	C001	26,3267		889 1 862
COSO	E6,1513	=	116 3 116 1071	CSIPROG3	22,2000	=	31 2 673 685	C1/16	34,3770	=	887 1 867
COSOCOSM	E6,1515	=	116 2 1070	CSIPROG4	23,2000	=	31 1 675	C1/2	7653		1203 1 1207
COSPHI/2	0022	=	1353 6 1340 1343	CSIPROG5	16,2000	=	30 1 677	C12	26,3207		888 1 867
COSPHIE	11,3221		1343 1 1340	CSIPROG6	07,2000	=	28 2 678 684	C13BANK	04,2000	=	28 1 592
COSTEN	27,2640		607 1 597	CSIPROG7	24,2000	=	31 1 679	C13SLOOP	04,3256		592 1 592
COSTH	0020	=	74 18 299 1358	CSIPROG8	10,2000	=	28 1 680	C13STALL	4542		592 6 392 1098
COSTRIM	15,2627		1079 1 1072	CSIPROG9	31,2000	=	32 1 681	C13STAL1	04,3251		592 1 592
COS15	26,3323		889 1 852	CSISBIT	4763	=	67	C18	26,3165		887 1 872
COS33	14,2576		753 1 751	CSISFLAG	0256	=	67 5 217 663	C20	26,3217		888 1 874
COUNT	0143	=	71 11 332 386	CSISTEP	10,2377		681 1 681	C21	26,3221		888 1 872
COUNTPL	E5,1552	=	102	CSITAG1	05,2000	=	28 1 671	C372	7672		1203 1 1207
COUNT3MK	E5,1550	=	105 8 105 588	CSMCFADR	17,2521		949 1 944	C31BTCHK	5654		1485 8 394 1024
COVCNV	42,3552		940 1 940	CSMCONIC	13,3170		1318 10 500 940	C31CMCHK	5663		1485 1 1485
COZY4	E7,1627	=	126 5 127 493	CSMMASS	E6,1473		107 13 182 957	C31FLWRD	0374		75 6 135 1485
CPHI	1307	=	83 7 394 1021	CSMNIO	17,2470		948 1 949	C33JMP	06,2766		168 1 154
CPHIX	1013		78 5 257 1022	CSMPOS	1045		79 11 79 762	C33TEST	06,2366		153 6 150 152
CPSI	1311	=	84 1 423	CSMPREC	13,3145		1318 6 35 912	C4RTE	35,3661		939 1 899
CREWMANU	43,2535		264 1 249	CSMSTORE	22,3310		500 1 500	C45LIM	15,2625		1079 2 1077
CRITCON	40,2212		329 2 328 329	CSMVEC	43,2705		271 1 250	C5/2	5022		1201 1 1207
CRS61.1	34,3432		595 1 572	CSS	0016	=	753 1 752	==========			
CRS61.2	34,3610		598 1 598	CSSUN	16,2655		768 1 767	D	E7,1637	=	122 23 122 880
CRS61.2A	34,3662		599 1 600	CSS33	14,2604		753 2 752	DACLIMIT	21,2547		1010 3 1010
CSCDES	06,3143		171 1 169	CSS5	16,2653		767 2 766 767	DACLOOP	21,2504		1010 1 1010
CSCTOMAN	06,3154		171 4 170 171	CSS66	14,2600		753 1 751	DACNDLS	21,2416		1007 1 1005
CSCTOZOP	06,3146		171 2 171	CSS6640	14,2602		753 1 751	DAD	6744		1132 1 1117
CSI/A	06,3672		672 1 662	CSTEER	E7,1702	=	128 6 128 737	DANZIG	6030		1109 73 222 1505
CSI/B	06,3704		672 1 682	CSTH	E5,1733	=	100 11 100 1302	DAPBIT1	0132	=	58 1 1066
CSI/B1	06,3744		673 3 678 681	CSTH-RHO	E5,1737	=	100 4 100 1297	DAPBIT2	0133	=	58 1 1066
CSI/B2	12,2050		673 2 673 680	CSUBT	26,3333	=	938 1 904	DAPCK	34,3554		597 1 597
CSI/B22	12,2070		673 1 673	CSUN	0020	=	767 1 767	DAPDATR1	E6,1465		107 66 135 1066

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DAPDATR2	E6,1466		107 8 182 722	DECNEG23	4616		1025	DELAYEX	5273		1224 1 1224
DAPDISP	43,2544		265 1 249	DECON	40,2217		329 1 328	DELAYJOB	00,3731		1481 17 209 1066
DAPFIG	43,2465		262 1 261	DECOUNT	0117	=	70 25 338 361	DELAYLOC	1000		77 7 204 1481
DAPINIT	20,3227		974 2 949 981	DECRET	0115	=	70 2 357 358	DELAYNUM	6214	=	35 1 1481
DAPINIT5	17,2535		949 1 946	DECRM61	37,2416		572 3 571 572	DELAY200	21,2545		101 1 1010
DAPMASS	05,2000	=	28 1 956	DECROUND	40,2343		331 1 368	DELBARP	20,2766		968
DAPROLL	16,2000	=	30 3 951 987	DECTEM	0122	=	70 3 344	DELBARY	20,3152		971
DAPS1	20,2000	=	30 1 1066	DECTOBIN	40,2121		328 1 327	DELBRTMP	E6,1662	=	11 1 110 975
DAPS2	20,2000	=	30 1 965	DECTWO	35,3152		488	DELCDUX	E6,1575	=	113 6 113 1006
DAPS3	21,2000	=	30 4 734 1025	DEC182	26,3325	=	623 1 618	DELCDUY	E6,1577	=	113 4 113 600
DAPS4	17,2000	=	30 1 1038	DEC15	4777	=	887	DELCDUZ	E6,1601	=	113 4 113 600
DAPS5	17,2000	=	30 1 1060	DEC17	4352	=	432 2 427 444	DELCOMP	22,2522		411 4 398 558
DAPS6	20,2000	=	30 3 718 733	DEC20	4124	=	214 2 215 218	DELDEP	E5,1761	=	100 5 100 1286
DAPS7	17,2000	=	30 1 943	DEC227	14,3727		787 1 787	DELDV	E7,1463	=	133 13 133 681
DAPS8	22,2000	=	30 1 1036	DEC23	4615		1025 2 258 385	DELEL	E7,1451	=	126 5 126 476
DAPT5	20,3617		981	DEC31	4342	=	214 1 217	DELELO	0032	=	467 3 473 476
DAP1	E6,1615	=	109 15 109 978	DEC32	4763	=	214 1 217	DELINDEP	0014	=	1307 2 1285 1286
DAP1BIT	4752	=	58 1 703	DEC33	5003	=	214 1 218	DELLOOP	00,3734		1481 1 1481
DAP2	E6,1617	=	109 16 109 979	DEC34	4260	=	215 1 218	DELLT4	E7,1422	=	121 9 121 723
DAP2BIT	4753	=	58 2 735 1036	DEC35	04,2403		215 2 218	DELM	E5,1560	=	103 5 440 441
DAP3	E6,1621	=	109 12 109 980	DEC36	04,2402		215 1 217	DELMAX1	05,3311		671 2 681
DB	16,3756		996 4 987 990	DEC40	5004	=	214 1 217	DELMLP	33,2463		440 1 440
DBPTC	E6,1773	=	119 5 119 571	DEC409	20,2612		733 1 721	DELOGA	E6,1652	=	110 5 110 990
DCDU	E6,1603	=	113 9 113 1370	DEC41	04,2377		214 2 216 218	DELOGAC	16,3405		988
DCDUINCR	21,2372		1005	DEC45	5006		1201 3 1028 1194	DELOGART	E6,1650	=	110 7 110 990
DCDULOOP	34,3671		599 1 599	DEC46	20,2613		733 1 721	DELOK	12,2704		1286 1 1285
DCMKPERF	4761	=	1477 2 1460 1469	DEC50	5011	=	215 1 215	DELOOP	21,2373		1005 1 1006
DCMTODCDU	22,2647		413 2 399 418	DEC500	7704		1225 1 390	DELOPCMD	10,2175		178 2 177
DCOGA	0014	=	1307 4 1298 1299	DEC52	04,2401		214 2 218	DELPBAR	E6,1601	=	109 8 109 969
DCOMP	7641		1151 2 1151	DEC57	4351	=	432	DELRDONE	32,2073		648
DCOMPTST	41,2436		343 3 342	DEC76	04,2400		214 1 219	DELRSPL	32,2027		647 1 521
DCONSTD	25,3220		875 2 868 869	DEC79	04,2404		215 1 219	DELRSPL1	32,2000	=	32 1 647
DCTSTCYC	41,2445		343 2 357 358	DEC86	04,2405		215 1 215	DELSTOR	34,2561		548 1 545
DDV	7533		1149 1 1117	DEGCOM	40,2546		346 2 346	DELT	E5,1644	=	100 3 100 1279
DDV/BDDV	00,2353		1162 1 1149	DEGCON1	40,2737		360 1 359	DELTACSM	E3,1572		90 2 585 633
DDVCALL	00,3003		1173 1 1173	DEGCON2	40,2741		360 1 360	DELTALEM	E3,1644		90 1 585
DE-GR-50	30,2427		564 1 564	DEGINSF	40,2674		359 1 359	DELTAQ	E7,1523	=	125 5 125 1254
DEBIT	5565		1479 4 278 1479	DEGINSF2	40,2705		359 1 361	DELTAT	E7,1725	=	131 2 131 132
DEC-12	04,3771		1206	DEGOUTSF	40,2531		346 2 345 346	DELTATOK	27,3616		1497 1 1497
DEC-6	04,3770		1206 1 215	DEGREE1	16,2742		769 1 749	DELTATT	21,2167		1001 1 1021
DECBRNCH	1203		82 18 327 373	DEGREE10	27,2644		607 1 596	DELTATT2	7663	=	1001 3 1001 1021
DECCEND	40,2156		328 2 328	DEGTAB	40,2556		346 2 346	DELTATT3	17,2624		1039 1 1038
DECDSP	41,2516		344 1 336	DEG359	16,2743		769 1 749	DELTAX	1113	=	79 20 79 1259
DECDSP3	41,2570		345 2 345	DEL	E7,1425	=	125 12 398 418	DELTEED	E7,1447	=	126 5 126 476
DECEND	40,2161		328 2 328 334	DELATT20	7663	=	1039 1 1038	DELTEMPX	E6,1515	=	112 5 112 1004

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DELTEMPY	E6,1517	=	112	3	112	1003	DIFCHK	07,2325		246	3	244		DL110	E6,1477	=	182			
DELTEMPZ	E6,1521	=	112	2	1003		DIFEQ+0	11,3445		1347	1	1343		DL111	E6,1500	=	182			
DELTIME	12,2462		1283	3	1279	1298	DIFEQ+1	11,3451		1347	1	1343		DL112	E6,1501	=	182			
DELTLOAD	20,2215		460	1	461		DIFEQ+2	11,3462		1347	1	1343		DL113	E6,1573	=	182			
DELTLONG	E7,1545	=	134	4	134	460	DIFEQCNT	E3,1500		89	25	89	1349	DL114	E6,1574	=	182			
DELTYME	27,2643		607	1	597		DIFEQCOM	11,3625		1349	2	1347		DL115	0776	=	182			
DELV	1314		84	13	84	856	DIFEQTAB	11,3234		1343	1	1343		DL116	E6,1573	=	182			
DELVCS1	E7,1461	=	133	15	133	681	DIFEQ0	11,3304		1344	1	1348		DL117	E6,1574	=	182			
DELVCTL	E7,1664	=	127	3	740	741	DIFF	E7,1607	=	122	7	122	875	DL118	0375	=	182			
DELVEET1	E5,1444	=	105	5	105	674	DIFFALT	E5,1632	=	105	5	185	689	DL119	0037	=	182			
DELVEET2	E7,1666	=	133	5	129	690	DIFFOLD	E7,1611	=	122	5	122	875	DL120	0040	=	182			
DELVEET3	E7,1645	=	127	12	127	723	DIMOBIT	4770	=	54				DL121	0041	=	182			
DELVIMU	E7,1674	=	128	7	128	741	DIMOFLAG	0073	=	54	20	227	1349	DL122	E6,1473	=	182			
DELVLVC	E7,1404	=	121	26	216	910	DIRADRES	6055		1110	2	1124		DL123	E6,1466	=	182			
DELVOV	E7,1537	=	126	14	126	663	DISDVLVC	37,2537		670	2	662	669	DL124	E6,1570	=	182			
DELVREF	E7,1431	=	121	8	725	858	DISPLACE	41,3055		356	1	357		DL125	E6,1571	=	182			
DELVSAB	E7,1653	=	127	3	127	695	DISPLAYS	10,2000	=	28	3	1459	1487	DL126	E6,1525	=	182			
DELVSIN	E7,1645	=	127	12	127	905	DISPMGA	35,3517		645	1	645		DL127	1307	=	182			
DELVSLV	E7,1404	=	121	6	36	644	DISPN5X	31,2012		507	1	507		DL128	1334	=	182			
DELVSUM	E6,1726	=	110	6	110	730	DISPN90	06,3756		685	2	657	670	DL201	0303	=	184			
DELVSUMP	E6,1734	=	110	3	111	728	DISPTARG	04,3731		820	2	813		DL202	E4,1744	=	184			
DELVTPF	E5,1636	=	98	4	98	468	DISP14	33,3503		528				DL203	E6,1424	=	184			
DELVTPI	E5,1634	=	98	4	98	468	DISP45	35,3520		645				DL204	0025	=	184			
DELVX	1314	=	84	13	308	839	DISP7071	31,3360		637	1	638		DL205	E5,1761	=	184			
DELVY	1316	=	84	10	310	839	DISTEM	0122	=	70	3	342		DL206	E5,1763	=	184			
DELVZ	1320	=	84	9	310	839	DIVIDE	31,3344		637	7	635	636	DL301	E7,1703	=	186			
DELX	E5,1642	=	100	6	100	1280	DLAYFAIL	4767	=	85	5	159	163	DL3015	0772	=	186			
DELYBAR	E6,1603	=	109	8	109	973	DLAYJOB	00,2000	=	27	1	1481		DL302	E5,1462	=	186			
DEP	0036	=	1307	1	1285		DLEWD	E7,1641	=	122	4	122	871	DL303	E4,1713	=	186			
DEPREV	E5,1763	=	100	2	100	1285	DLEWD0	26,3157		887	1	871		DL304	0025	=	186			
DESOPMOD	1330		84	2	169	171	DLOAD	6021		1108	1	1117		DL305	E7,1402	=	186			
DESOPTS	1313		84	5	176	763	DLOAD*	7666		1203	1	1112		DL306	E7,1760	=	186			
DESOPTT	1312		84	7	176	764	DLOADCOD	7665		1203	1	1124		DL401	E6,1701	=	188			
DEXDEX	0142	=	71	7	1364	1369	DLY2	5244		1223	2	1224	1481	DL402	E6,1702	=	188			
DEXI	0143	=	72	1	1368		DL101	E6,1424	=	181				DL403	E6,1703	=	188			
DEX1	0143	=	72	5	72	1369	DL102	E6,1624	=	181				DL404	0301	=	188			
DEX2	0144	=	72				DL103	0025	=	181				DL405	0302	=	188			
DFAILY	17,2701		1040	1	1040		DL104	E6,1624	=	182				DL406	0303	=	188			
DFRNT	40,3227		371				DL105	1340	=	182				DL407	E6,1714	=	188			
DFT	E6,1547	=	112	7	112	1056	DL1055	E7,1722	=	182				DL408	E7,1677	=	188			
DFTMAX	17,3276		1052	4	1049	1052	DL1056	E7,1724	=	182				DL409	E7,1701	=	188			
DFT1	E6,1550	=	112	4	112	1050	DL106	0035	=	182				DL410	E7,1402	=	188			
DFT2	E6,1551	=	112	4	112	1051	DL107	E6,1533	=	182				DL411	E6,1666	=	188			
DHOOK	E7,1655	=	122	5	122	873	DL108	E6,1533	=	182				DL412	0025	=	188			
DHOOKYQ7	25,3003		870	2	865	870	DL109	0033	=	182				DL413	0776	=	188			

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SYMBOL	DEF	H	REFERENCES
DL414	E6,1570	=	188
DL415	E6,1571	=	188
DL416	E6,1572	=	188
DL417	E6,1573	=	188
DL418	E6,1574	=	188
DL419	E6,1701	=	188
DL420	E6,1702	=	188
DL421	E6,1703	=	188
DL422	E6,1473	=	188
DL423	E6,1466	=	188
DL424	E6,1715	=	188
DL425	1340	=	188
DL426	0375	=	188
DL501	0025	=	190
DMENFBIT	4760	=	57
DMENFLG	0121	=	56 11 581 1259
DMODE	7266		1143 1 1182
DMP	7052		1137 15 328 362
DMPINCP2	30,3171		616
DMPINTEG	30,2544		610
DMPR	7530		1149 1 1117
DMPSUB	7056		1137 22 1139 1369
DMPSUB2	7075		1137 1 1142
DMP1	7526		1149 1 1117
DNADRDCR	05,3462		1097 1 1099
DNDUMP	05,3656		1102 1 1102
DNDUMP1	05,3643		1101 2 271 1102
DNDUMP1	05,3670		1102 1 1102
DNDUMP2	05,3672		1102 1 1102
DNECADR	0335	=	74 15 1096 1099
DNEDUMP	43,2706		271 2 249 271
DNLADPOO	4772	=	227 1 212
DNLKFAIL	4755	=	85 1 391
DNLSTADR	0332	=	74
DNLSTCOD	0332		74 11 74 1499
DNPHASE1	05,3446		1096 2 205 1102
DNPHASE2	05,3454		1097 1 1099
DNRNGERR	E7,1715	=	123 4 123 879
DNTABLE	05,2362		190 1 1097
DNTMBUFF	0337		74 30 179 1102
DNTMEXIT	05,3635		1099 6 1098 1102
DNTMFAST	06,2674		165 1 168
DNTMGOTO	0334		74 8 202 1102
DNTM1	0034	=	42 1 1099
DNTM2	0035	=	42 1 1099
DOALARM	5205	=	1489
DOBRATE	15,2125		1064 1 1064
DOBRATE?	15,2115		1063
DOBRATE1	15,2126		1064 1 1064
DOCSM	36,3743		1259 1 1258
DOCSM1	36,3746		1259 1 1259
DODELAY	36,2314		557 1 557
DODELVZ	37,3220		838 1 839
DODLOAD	6427		1124 1 1121
DODLOAD*	6113		1112 2 1121 1124
DODNADR	05,3455		1097
DODNCHAN	05,3523		1097
DODNPTR	05,3545		1098 1 1097
DODOWNTM	4621		1096 1 139
DOFSTART	05,2414		194 2 201 202
DOGAMDOT	37,3605		894 1 894
DOJET	21,3757		1034 3 1032 1034
DONEADR	37,3267		839 1 838
DONOUN46	42,2000		265 2 265
DONOUN47	42,2016		265 1 266
DONOUN48	42,2042		266 3 266
DONTPULS	07,3601		1435 1 1435
DOP41	04,2637		218 1 218
DOREMIS	20,2176		421 1 421
DOR60	31,2756		632 2 567 630
DOR608	31,2765		632 1 629
DOSPSOFF	24,3024		704
DOSSHFT	00,2322		1160 1 1160
DOSTORE	6331		1120 1 1109
DOSTRULL	24,2755		703 1 232
DOSUBLST	05,3621		1099 1 1098
DOSWITCH	11,3354		1345 1 1343
DOT	7265		1143 1 1117
DOTICK	23,2525		520 1 520
DOTINC	0136		71 7 71 1144
DOTIXBR	01,2421		1193
DOTPER	23,2731		525 1 525
DOTRET	0137		71 8 71 1183
DOTSUB	7125		1139 3 1144
DOTVCON	24,2724		702 1 232
DOTVCRCS	24,3027		704
DOUBLK	40,2470		333 2 332 333
DOVECPT	31,2552		629 1 629
DOVLOAD	6432		1124 1 1121
DOVLOAD*	6435		1124 1 1121
DOV5N71	30,2244		562 1 564
DOV6N78	36,2061		553 1 553
DOW..	11,3664		1351 2 1344 1349
DOW..1	11,3712		1351 2 1351
DOWNCNTL	25,3257		875 1 872
DOWNENT2	10,3762		1478 5 1468 1474
DOWNFLAG	5561		1479 75 206 1488
DOWNMRK	07,2304		246 1 245
DOWNTELM	05,2000	=	28 2 179 1096
DOWNX	43,3065		278 6 257 277
DP(-22)	34,3764		1386 1 1381
DP-.01	35,3153		488 3 485
DPADD	21,2072		997 1 1006
DPADD+	21,2112		997 1 997
DPADD-	21,2114		997 1 997
DPADD2+	21,2117		998 1 997
DPAGREE	7224		1142 9 258 1444
DPB-14	27,2425		400 2 398 400
DPB-9	16,2532		731 1 725
DPBIT14	01,3451		1235 1 1234
DPCONFIG	4076	=	107 16 199 1036
DPFRACIN	40,3007		361 1 359
DPFRACOT	40,2633		348 1 345
DPHALF	26,3333	=	1205 15 405 544
DPINCOM	40,3013		361 1 361
DPINORM	40,3021		361 1 361
DPINSF	40,2776		361 3 359 361
DPINSF2	40,3023		361 1 359
DPINSF4	40,3027		361 1 359
DPIPAY	E5,1532	=	103 3 439 445
DPIPAZ	E5,1536	=	103 1 439
DPMODE	22,3765		1506 2 927 935
DPNDX	E6,1507	=	112 25 112 1029
DPOSMAX	4747		1200 4 368 1506
DPOUT	40,2607		347 3 347
DPPOSMAX	26,3343		1205 12 43 1386
DPTEST	41,2260		338 4 338 358
DPTEST1	6706	=	339 5 339
DPZERO	04,3761	=	1352 3 751 1344
DP1/2	04,3757	=	1239 5 1239 1251
DP1/20	37,3374		841 1 840
DP1/4	15,3411	=	1352 2 1302 1352
DP1/4TH	26,3325		1205 9 34 1254
DP1/6	26,2132		784 1 783
DP1MIN	23,3143		626 1 626

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
DP1OUTSF	40,2574		347 1 345	DSPDECVN	40,3146		369 4 347 382	DTHETASM	E6,1611	=	113 19 113 1370
DP2(-3)	34,3766		1386 2 938 1383	DSPDECWD	40,3072		368 4 345 349	DT2IPR	E7,1647	=	131 5 131 918
DP2(-4)	34,3770		1386 6 791 1377	DSPDELAY	31,2004		507 1 507	DUMMYAD	04,2171		211 1 224
DP2/3	11,3770		1352 3 1333 1352	DSPDPDEC	40,2657		352 1 336	DUMMYJOB	01,3171		1220 2 196 1219
DP2OUTSF	40,2601		347 2 345	DSPFLG	1273	=	83 3 1469 1471	DUMPCNIC	27,3217		1375
DP3OUTSF	40,2603		347 1 345	DSPFMEM	41,3341		367 1 337	DUMPFISH	26,3047		816
DP9/10	15,3423		1288 4 1280 1286	DSPIN	40,3161		370 5 327 372	DUMPLOC	0335	=	74 5 111 1102
DQUARTER	15,3411	=	1352 2 1338	DSPIN1	40,3212		371 2 370 372	DUMPP61	26,2276		793
DRCON	E7,1665	=	131 6 131 919	DSPLAY	06,2047		143 1 143	DUMPRPRA	27,3255		1377
DRFTBIT	4752	=	50 4 315 1423	DSPLIST	1246		82 6 204 1472	DUMPTFF1	27,3340		1381
DRFTSUB2	06,3474		313 1 317	DSPLOCK	1215		82 9 204 1474	DUMPTFF2	27,3435		1382
DRHO	E6,1552	=	112 6 112 1004	DSPLV	41,3374		370	DUMPTRIG	27,3070		820
DRHOLOOP	21,2223		1002 1 1003	DSPMMJB	40,3377		382 1 1402	DUMPVGAM	26,3076		818
DRHO1	E6,1554	=	112 1 113	DSPMMJOB	40,3377	=	1402 2 391 1402	DURATION	16,3351		987
DRHO2	E6,1556	=	113 1 113	DSPMMTEM	0140	=	71 2 382	DV	E7,1705	=	131 9 131 936
DRIFTFLG	0036	=	50 5 747 833	DSPMSK	4774	=	370 1 370	DV/SC	7572		1150 2 1150
DRIFTI	E5,1514	=	103 1 428	DSPOCTIN	40,3255		372 1 370	DVCALC	32,3665		935 3 930 933
DRIFTO	E5,1512	=	103 2 428	DSPOCTWD	41,3351		370 3 336 367	DVECTR	0010	=	1251 1 1247
DRIFTSUB	06,3454		313 3 310 311	DSPOFF	05,3165		204 1 204	DVL	E7,1661	=	123 8 123 873
DRIFTT	E5,1452	=	102	DSPONLY	4772	=	1477 2 1462	DVLOS	E5,1610	=	97 7 97 481
DRIVEDAC	21,2537		1010	DSPOUT	06,2063		143 2 142	DVMAX1	05,3301		671 1 673
DSALMOUT	0011	=	42 29 157 1471	DSPOUTSB	06,2024		143 2 143 145	DVMAX2	05,3303		671 1 673
DSEXIT	0114	=	70 3 370 371	DSPSCAN	06,2032		143 2 143	DVNORM	00,2504		1165 3 1164
DSKYBIT	4752	=	56 2 143 1445	DSPSFNOR	41,2555		345 1 344	DVNORMCT	0137	=	71 6 1162 1173
DSKYFLAG	0113	=	56	DSPSIGN	40,3055		368 3 368 369	DVOK	16,3544		990 1 990
DSLV	40,3241		371 2 371	DSPTAB	1226		82 49 142 1486	DVOVF	00,2404		1162 11 1164 1175
DSMAG	0142	=	71 2 371	DSPTEMX	1254	=	82 4 82 519	DVPREV	E7,1467	=	133 5 133 680
DSMSK	40,3243		371 2 371	DSPTEM1	1250		82 29 82 746	DVSIGN	0136	=	71 10 1162 1179
DSPA	41,2364		342 1 336	DSPTEM2	1253		82 11 82 432	DVTHRESH	1344		86 1 725
DSPAB	41,2357		342 1 336	DSPWDRET	0144	=	71 3 368	DVTHRUSH	4775	=	835
DSPABC	41,2352		342 1 336	DSP0633	35,3437		644	DVTOTAL	E7,1425	=	121 19 121 833
DSPABORT	4245		381 2 381	DSP2DEC	40,3133		369 1 352	DVTOTUP	37,3037		832 1 832
DSPALARM	40,3261		372 5 336 359	DSQ	00,3173		1180 1 1119	DVTRANS	13,2150		514 1 514
DSPB	41,2372		342 1 336	DSQSUB	00,3277		1183 5 1180 1188	DVXSC	7364		1146 2 1145
DSPC	41,2377		342 1 336	DSREL	0141	=	71 4 370 371	DV40/41	04,2535		217 1 216
DSPCNT	1201		82 7 143 204	DSRUPTEM	0073	=	69 5 143	DV47TEMP	E7,1457	=	128 4 128 740
DSPCOM1	41,2403		342 3 342 344	DSRUPTSW	1322		84 11 140 203	DWNRPTBB	4051	=	140 1 139
DSPCOM2	41,2404		342 1 342	DSTORE	25,2162		856 1 859	DXCHT12	17,3566		1059 1 1058
DSPCOM3	41,2412		342 1 342	DSU	6754		1134 1 1117	DXCHT23	17,3572		1059 1 1058
DSPCOUNT	1202		82 52 144 1445	DT/2	E4,1704	=	93 10 94 1349	DXCOMP	12,2222		1278 1 1278
DSPDCEND	41,2561		345 4 345 350	DT/2COMP	13,3425		1323 1 1324	DXITFIX	05,3445		958 1 956
DSPDCGET	41,2522		344 1 344	DT/2MAX	13,3514		1324 2 1323 1324	DXTEST	05,3340		956
DSPDCPUT	41,2532		344 1 345	DT/2MIN	13,3512		1324 1 1324	DYNDISP	24,3271		709 1 709
DSPDCWD1	40,3106		368 3 368 369	DTEAROT	E7,1605	=	122 8 122 857	DZCALL	15,3305		1089 2 1083 1084
DSPDC2NR	40,3126		369 3 350 369	DTF	E4,1754	=	96 2 96 530	DZCALL1	15,3323		1089 1 1082

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SYMBOL	DEF	H	REFERENCES
DZCOM	15,2462		1076 1 1076
DZNOCOM	15,2463		1076 1 1076
DZ1	15,3013		1084 1 1083
DZ2	15,3020		1084 1 1084
D0	E7,1707	=	123 4 123 875
D0EQ	25,2316		861 1 861
D1/1024	15,3417		1288 2 671 1297
D1/128	15,3405		1288 3 1281 1292
D1/16	15,3413		1288 2 1294 1301
D1/256	15,3421		1288 3 1282 1288
D1/32	15,3415		1288 8 653 1342
D1/4	15,3411		1288 7 34 1352
D1/64	15,3407		1288 5 1277 1303
D1/8	15,3403		1288 1 1303
D6OR9BIT	4767	=	54
D6OR9FLG	0072	=	53 5 588 1349
==========			
E(-AT)	20,3623		981 4 968 972
E/BKCALL	13,2036		424
E/CALL	13,2055		425
E/JOBWAK	12,2000		426
E/PROG	12,2000	=	29 1 426
E/PROG1	13,2000	=	29 1 424
E/SWITCH	13,2053		424
EARROT1	23,2213		305 1 854
EARROT2	23,2223		305 3 305 857
EARSPH	11,3347		1345 1 1345
EARTCNTR	13,2363		766
EARTHALT	34,2555		547 1 547
EARTHGON	23,2647		522 2 519 521
EARTHL	26,3617		1250
EARTHMU	16,2514		731 1 730
EARTHMX	26,3567		1249 2 1243 1245
EARTHMXX	0051	=	1251 4 1246 1250
EARTHPAD	23,2457		519 1 518
EARTHR	33,2146		431 2 431 538
EARTHR*	33,2175		431 2 437 446
EBANK	0003	=	40 52 155 1505
EBANKSAV	1273		83 3 83 1467
EBANKTEM	1275		83 5 195 1475
EBANK3	5024	=	1204 5 200 895
EBANK4	4756	=	1204 3 428 905
EBANK5	5043		1202 4 255 786
EBANK6	5045	=	1204 2 155 713
EBANK7	5046		1202 4 217 1467
EBUF2	1114	=	80 11 80 425
ECC	E5,1753	=	100 3 100 1303
ECDISAB	06,3257		173 2 171
ECENAB	06,3263		173 1 171
ECENAB1	06,3272		173 1 173
ECLIPOL	16,2643		767 2 602 767
ECSTEER	E7,1424	=	121 5 185 898
EDOP	0023	=	40 13 366 1398
EDOT	E6,1515	=	112 16 112 1033
EDOTVEL	E6,1520	=	112 7 112 1031
EDRIVEX	E6,1503		108 3 1009 1010
EDRIVEY	E6,1504		108 1 1009
EDRIVEZ	E6,1505		108 1 1009
EE	13,2610		1239 1 1239
EFIMP01	E3,1764		91 1 733
EFIMP16	E3,1765		91 3 91 733
EGFLGBIT	4761	=	59
EGRESS	E4,1710	=	94 15 94 1327
EGSW	0141	=	59 3 59 878
EIGHT	4765	=	1204
EIGHTEEN	5000	=	224 1 223
EIMP1SEC	E3,1763		91 1 733
EISOI	42,3527		940 2 940
EJSCAN	01,3111		1218 2 1215 1218
EJ1	01,3156		1219 6 1218
EJ2	01,3165		1219 1 1219
EKPRIME	E6,1414		106 1 944
EKTLX/I	E6,1416		106 2 944 947
ELCALC	35,2271		473 1 476
ELEPS	35,3150		488 1 473
ELEV	E7,1743	=	130 14 130 677
ELEVEN	4775		1200 1 174 1204
ELEX	35,2546		476 1 473
ELOOPFIN	43,3371		1397 2 1396 1397
ELRCODE	5000	=	1447 1 1446
ELRCODE1	40,2212	=	329 1 326
ELRSKIP	05,2632		199 1 198
EMATRIX	E5,1570	=	97 3 619 621
EMBDSPCK	4226		378 2 378 381
EMDOT	1350		86 2 725 903
EMSALT	E4,1417		92 3 812 940
ENABL1	16,3244		961 3 961 962
ENABL2	16,3255		961 1 963
ENABT6	17,3721		1061 2 1061
ENATMA	43,2445		261 1 249
END-DELV	E7,1425		121 2 121 125
END-E7	E7,1777	=	134
END-IN/M	E7,1631	=	127 2 127 131
END-KALC	E7,1447	=	125 3 121 126
END-P30S	E7,1664	=	127 2 127 129
END-SVCR	E7,1451	=	121 2 121 122
END-W	E5,1642	=	97 3 99 101
ENDALL	40,2154		328 2 328
ENDALM	4201		372
ENDAVEG	37,3141		834 1 834
ENDBLFF	4305	=	382
ENDBUF	0324	=	73 3 73 1091
ENDCOPY	37,3072		833
ENDDAMP	21,3433		1027 1 1027
ENDDCM	22,2522	=	411
ENDDOT	7154		1139 1 1183
ENDDPDEC	40,2673		352
ENDDPUSH	6517		1126 1 1126
ENDEXIT	25,3574		881 2 797 871
ENDEXT	5524	=	1476 35 242 1499
ENDEXTVB	5524	=	251 7 254 257
ENDFIND	5210		1210 4 1212 1216
ENDGTSAL	33,3043		446
ENDIDLE	10,3516		1472
ENDIDRET	10,3557		1473 1 1472
ENDIGN	24,2772		703
ENDIMU	07,3563		1435 3 1419 1424
ENDINST	4170	=	366 6 330 1471
ENDINT	13,2732		1314 1 228
ENDIT	10,3602		1474 1 1470
ENDJETS	17,3556		1058
ENDJOB1	01,3074		1218 1 1210
ENDLAMB	16,2423		729
ENDMANU	10,2311		422 1 415
ENDMANUV	27,2141		395 1 422
ENDMANU1	27,2150		395 2 394 396
ENDMARK	5524		1459 2 570 1476
ENDMASSP	05,3403		957
ENDMAXDV	00,2623		1168 2 1168 1170
ENDMODE	07,3641		1436 1 1436
ENDMONDO	41,3336		366
ENDMRC	17,2204		944
ENDNMTST	40,2136		328 2 327 328
ENDNUM	40,2150		328 1 328
ENDNVSB1	41,3555		380

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
ENDOFJOB	5205		1210 103 210 1496	ENDV99P	24,3510		713	EP4(45)L	16,2516		731 1 729
ENDPASTE	4170		366 1 366	ENDV99P1	24,3504		713	ERAD	13,2612		1239 1 1242
ENDPINBF	4463	=	388	ENDZOPT	06,3171		171 1 170	ERADFBIT	4754	=	49
ENDPINS1	40,3636	=	393	END2DEC	40,3145		369	ERADFLAG	0021	=	49 13 458 1242
ENDPLAC	14,3263		761 4 588 836	ENEMA	05,2712		20 2 270 1488	ERADM	E4,1637	=	93 12 93 1242
ENDPRCHG	01,2756		1214 2 1213 1219	ENGINOFF	24,3023		704 3 231 706	ERASCHK	43,3271		1396 1 1395
ENDP76	13,2234		515 2 513	ENGONBIT	4762	=	57 6 160 952	ERASCON1	43,3166		1394 1 1396
ENDRDLO	40,2656		348	ENGONFLG	0123	=	57	ERASCON2	43,3167		1394 1 1396
ENDREP11	34,2270		540 1 540	ENGREQST	24,3427		712 1 710	ERASCON3	5030	=	1394 1 1396
ENDRET	10,3555		1473 5 1468 1475	ENG2BIT	4756	=	49 1 700	ERASCON4	43,3170		1394 1 1396
ENDRET1	10,3571		1473 2 1474	ENG2FLAG	0023	=	49 4 693 737	ERASCON5	43,3175		1394 1 1397
ENDRET2	10,3573		1473 1 1474	ENTANSWR	07,2042		241 1 241	ERASCON6	5024	=	1394 3 1396 1397
ENDROLL	10,2306		422	ENTCADR	26,2427		798 1 798	ERASER	10,3713		1476 1 1469
ENDRQCAT	41,2313		339	ENTER	41,2000		334 1 372	ERASID	5041	=	35 1 1102
ENDRQWT	41,3465		374	ENTERJMP	4200		372 1 327	ERASLOOP	43,3321		1396 4 1396 1397
ENDRSTRT	05,2534		196 2 201	ENTEXIT	0136	=	71 10 335 373	ERASPIP	E4,1400	=	92 2 428
ENDR57	37,2247		568 2 568	ENTMASK	25,2113		854 1 852	ERASZERO	0007	=	179 1 179
ENDSAM	13,2432		767 1 766	ENTMID1	13,3616		1329 1 1329	ERCNT	0117	=	70 7 390 393
ENDSCALE	40,2727		360 5 359 361	ENTMID2	13,3612		1329 1 1328	ERCOM	40,3623		393 1 392
ENDSLECT	17,3727	=	1061	ENTPASHI	41,2010		334	ERCOMP	E5,1647	=	103 4 447 538
ENDSPBIT	4754	=	58 1 881	ENTPASO	41,2040		335 3 334 380	ERCOMPPL	33,3210		448 1 447
ENDSPF	41,3350		367	ENTRET	0136	=	71 6 71 379	ERCOMP1	E5,1647	=	103 8 431 451
ENDSPMIN	42,3360		351	ENTRYDSP	0134	=	58 4 796 804	ERCON	40,3216		371 1 392
ENDSPOCT	40,3257		372	ENTRYSW	25,2114		854 1 852	ERCOUNT	1365	=	87 3 87 1394
ENDSTATE	11,3556		1348 1 1347	ENTRYVN	1122	=	79 6 796 882	ERECTIME	E5,1646	=	103 1 435
ENDSUMS	43,2764		273 1 1400	ENTSET	41,3536		379 2 379	ERECTIM1	E5,1646	=	103 3 445 447
ENDSYS-4	E4,1641	=	96	EPC1RTE	35,3643		939 1 913	EREPFRAC	E6,1421		106 2 726 945
ENDSYS-5	E5,1657	=	103	EPC1ORTE	35,3657		939 1 933	ERESTORE	1360	=	87 11 87 1397
ENDS40.6	20,2457		720	EPC2RTE	35,3645		939 1 901	ERMINUS	40,3615		392
ENDS40.9	16,2477		730 1 731	EPC3RTE	35,3647		939 1 901	ERPLUS	40,3620		392 1 392
ENDT(X)	27,3544		1385 1 1385	EPC4RTE	35,3651		939 1 915	ERRBTMP	E6,1664	=	110 23 110 977
ENDTASK	5274		1225 4 203 1231	EPC6RTE	35,3653		939 1 917	ERRLIM	4754	=	981 2 974
ENDTEST1	33,2113		428 2 432 443	EPC7RTE	35,3655		939 1 918	ERROR	40,3553		392 1 326
ENDTFF	27,3432		1382 3 1382 1384	EPC8RTE	16,3034		920 1 920	ERRORLIM	20,3246		974 2 967 971
ENDTNON	06,2265		150 1 150	EPC9RTE	35,3575	=	939 2 932 934	ERRORS	43,3211		1394 1 1394
ENDTNON2	06,2305		151 1 151	EPHEM	26,2000	=	31 1 790	ERRORX	E6,1567	=	113 15 113 1029
ENDTPUSH	6521		1126 2 1126 1182	EPREMM1	04,3173	=	227 1 227	ERRORY	E6,1570	=	113 13 113 1027
ENDTSLC	00,2212		1157 1 1157	EPSFOUR	35,3155		488 1 480	ERRORZ	E6,1571	=	113 12 113 1082
ENDTVCIN	17,2343		946	EPSILN1	05,3305		671 2 681 685	ERTHR	33,2157		431 1 431
ENDVLOAD	6460		1125 2 1127	EPSILONG	30,2141		462 2 460 461	ERTHRVSE	32,2000		431 2 435 442
ENDVPUSH	6507		1126	EPSILONL	E7,1771	=	130 2 1296 1298	ERVECTOR	E5,1404		102 2 431
ENDVXV	6747		1132 4 1132 1148	EPSILONT	1025		78 2 1278 1279	ESCAPE	0136	=	71 4 1189 1190
ENDV6N79	36,2075		553 1 553	EP4(10)H	24,3537		714 1 716	ESCAPE2	0137	=	71 2 1189 1190
ENDV97E	24,3362		711	EP4(10)L	16,2520		731 1 729	ESTICADR	33,2073		428 2 428
ENDV97P	24,3426		712	EP4(45)H	24,3535		714 1 716	ESTIMS	33,2227		435 2 428 447

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ETDECAY	E6,1413		106 1 726	FAKEPRET	5213		1210 2 1208 1218	FINALBIT	4763	=	51 1 485
ETPIBIT	4762	=	51	FALTON	4362		385 16 214 1500	FINALDV	00,2624		1169 3 1162 1168
ETPIFLAG	0046	=	51 7 51 476	FAZA	36,3520		1256 1 1258	FINALFLG	0047	=	51 10 467 905
ETRYDAP	15,2000	=	29 3 1063 1070	FAZAB	36,3655		1258 1 1259	FINCMPTM	E4,1776	=	96 2 96 586
EXDAP	15,2466		1077 1 1074	FAZAB1	36,3703		1259 1 1259	FINCOPY	16,3315		962 1 961
EXDAPIN	15,2417		1074 1 1078	FAZAB2	36,3707		1259 1 1259	FINDGIMB	27,2345		399 2 398
EXDAPOFF	43,2526		262	FAZAB3	36,3716		1259 1 1259	FINDTIME	01,3542		1412 2 1412
EXDAP1	15,2530		1078 3 1078 1079	FAZAB4	36,3726		1259 1 1260	FINDVAC	5135		1208 39 194 1496
EXDAP2	15,2555		1078 1 1077	FAZAB5	36,3735		1259 2 1259 1327	FINDVAC2	01,2576		1211 1 1208
EXDAP3	15,2522		1078 2 1078	FAZA1	36,3524		1257	FINEK2	43,2246		256
EXDAP4	15,2513		1078 2 1077	FAZA2	36,3753		1260 3 1257	FINEONLY	14,2400		749 1 749
EXDSPRET	10,3064		1465 3 254 256	FAZB	36,3577		1257 1 1257	FINETIME	4510		432 2 432 1443
EXECBANK	4756		= 1210 8 1208 1210	FAZB1	36,3602		1257	FINVAC2	5134		1208 2 701 711
EXECB1	01,2000	=	27 3 1211 1234	FAZB2	36,3630		1258 1 1258	FIRELOOK	16,3647		992
EXECCOPY	16,3074		951 1 951	FAZB5	36,3635		1258 1 1258	FIREPLUG	16,3653		992 1 992
EXECF2	4000	=	27 2 1208 1220	FAZC	36,3643		1258 2 1258	FIRSTBIT	4762	=	51
EXECPHS	16,3225		961	FBANK	0004	=	40 30 206 1481	FIRSTFLG	0046	=	51 4 694 730
EXECTEM1	0061	=	69 4 1208 1216	FBANKMSK	4344		= 1116 2 1216	FIRSTIME	12,2660		1286 1 1285
EXECTEM2	0062	=	69 4 1211 1216	FBIASSUB	06,3636		317 3 315	FIRSTTME	16,2442		730 1 730
EXIT	6712		1131 1 1109	FBR3	11,2436		1335 1 1349	FISHCALC	26,3033		816 3 812 814
EXITEM	0114	=	70 6 356	FCADRMM1	04,3055	=	225 1 221	FIVE	4773		1200 29 205 1495
EXITGYRO	07,3457		1432 1 1432	FCORFRAC	4754	=	953 1 952	FIXCLPAS	40,2277		330
EXPIN	43,2676		270 1 270	FDAIDSP1	21,2422		1007	FIXCW	05,3347		956 3 951 956
EXPIN1	43,2701		270 1 270	FDAIDSP2	21,3202		1021 1 1007	FIXDB	36,2416		559 7 396 559
EXRSTRT	16,3325		962 1 961	FDAITOTL	21,3217		1021 1 1021	FIXDELAY	5255		1223 11 531 1421
EXTENTST	16,3657		992	FDOT	26,3636		1251 1 1246	FIXLOC	0120		70 38 512 1504
EXTVBACT	1247		82 20 195 1488	FEARTH	30,2145		462 1 460	FIXROOT	00,3450		1185 3 1184
EXTVBS	42,2000	=	34 1 265	FENG	24,3531		714 1 693	FKPRIMDT	17,2532		949 1 947
EXTVERBS	43,2000	=	34 6 249 1492	FETCH2WD	05,3607		1099 2 1097	FLAGEND	35,3025		484
EXTVRBS1	17,2000	=	30 2 274 275	FFTAG1	4000	=	27 9 238 1479	FLAGGON	23,2363		518 1 517
E1345678	43,3302		1396 1 1397	FFTAG10	4000	=	27 2 206 208	FLAGOFF	35,3023		484 1 484
E3J22R2M	E3,1766	=	91 2 91 1343	FFTAG12	4000	=	27 7 141 1096	FLAGON	35,3003		484 2 484
E3RTE	35,3675		939 1 901	FFTAG13	6000	=	27 1 1487	FLAGTABL	04,3032		222 1 222
E32C31RM	E3,1767	=	91 2 91 1342	FFTAG2	4000	=	27 4 551 1414	FLAGWRD0	0074	=	47 22 136 1480
E6SETTER	4611		713 15 200 1068	FFTAG3	4000	=	27 1 1417	FLAGWRD1	0075	=	48 42 156 1446
E7SETTER	4606		713 15 208 883	FFTAG4	4000	=	27 2 1459 1483	FLAGWRD2	0076	=	50 27 202 1423
==========			==========	FFTAG6	6000	=	27 3 1065 1225	FLAGWRD3	0077	=	52 9 196 1440
F	E7,1726	=	128 4 128 724	FFTAG7	4000	=	27 2 1486 1488	FLAGWRD4	0100	=	54 32 204 1478
FACEREG	0154		= 1476 8 1468	FFTAG8	4000	=	27 5 366 384	FLAGWRD5	0101	=	56 16 143 1445
FACTOR	E7,1613	=	122 5 122 874	FIFPSDP	05,3307		671 1 680	FLAGWRD6	0102	=	58 26 199 1036
FACT1	E7,1615	=	122 5 122 873	FIFTYFPS	10,2330		680 1 680	FLAGWRD7	0103	=	60 27 210 1496
FACT2	E7,1617	=	122 4 122 872	FIGTIME	35,2333		474	FLAGWRD8	0104	=	61 22 162 1492
FAILBIT	4346		= 1485 1 1485	FIG2EXIT	30,2476		609	FLAGWRD9	0105	=	63 12 222 1021
FAILDSP	24,3313		710	FILDELV	E5,1474	=	103 1 103	FLASHOFF	4417		386 6 257 1470
FAILREG	0375		75 14 182 1486	FILDELV1	E5,1474	=	103 8 103 445	FLASHON	4360		385 4 335 1472

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FLASHSUB	10,3504		1472 3 1470 1472	GAIN1	21,3121		1020 1 1002	GENRET	E6,1770	=	119 5 119 572
FLGWRD10	0106	=	65 22 196 1325	GAIN2	21,3137		1020 1 1004	GENSCL	00,2346		1161 2 1161
FLGWRD11	0107	=	67 5 196 599	GAMA	E6,1722	=	116 3 116 894	GENSCR	00,2277		1160 4 1159 1181
FLSHRGST	4765	=	1477 7 1463 1475	GAMCOMP	11,2602		1337 3 1336 1337	GENSHFT2	00,2224		1158 1 1158
FLUSHJET	6000		1065 3 1063 1066	GAMDIFSW	0136	=	58	GENSHIFT	00,2214		1158 1 1149
FMOON	30,2147		462 2 459 460	GAMDOT	E6,1723	=	116 7 116 1072	GENTRAN	5607		1483 11 223 1483
FORCEV25	42,3501		363 1 362	GAMDVX	32,3663		934 3 932 934	GEOCOMPS	E5,1643	=	103
FOREHUNT	25,3021		871 2 862 871	GAMDV10	32,3464		932 3 928 929	GEOCOMP1	E5,1643	=	103 4 435 444
FORTYONE	13,3553		1325 1 1317	GAMDV15	32,3511		932 1 932	GEOCONS1	33,3440		452 1 445
FOUR	4766	=	1204 22 308 1430	GAMDV20	32,3515		932 2 932	GEOCONS2	33,3442		452 1 445
FOURSEC	16,2526		731 2 726 727	GAMDV25	32,3520		932 1 934	GEOCONS3	33,3444		452 2 445
FOURTEEN	4321	=	1178 1 1175	GAMDV30	32,3530		932 1 932	GEOCONS4	33,3446		452 1 445
FOURTH	26,3325	=	889 2 856 888	GAMDV32	32,3550		933	GEOCONS5	26,3333	=	448 1 445
FPX2	17,3355		1054 2 1054	GAMDV33	32,3554		933 1 933	GEOIMUTT	33,2002		427 1 444
FRANDRES	05,2000	=	28 1 194	GAMDV35	32,3557		933 1 933	GEOM	05,3717		1291 2 1289 1296
FRCS2	24,3533		714 1 737	GAMDV40	32,3563		933	GEOMSGN	E5,1674	=	100 7 100 1297
FREECHK	21,2205		1002	GAMDV45	32,3570		933	GEORGEJ	33,3436		452 2 441 442
FREECONT	21,3310		1024 1 1024	GAMDV47	32,3616		934 1 933	GEOSAVED	E5,1631	=	103
FREEFBIT	4766	=	48	GAMDV50	32,3622		934 2 933	GEOSAVE1	E5,1631	=	103 5 438 447
FREEFLAG	0014	=	48 7 755 776	GAMDV55	32,3641		934 1 934	GET.LVC	04,3200		495 2 695 723
FREEFUNC	21,3076		1018 1 1017	GAMDV60	32,3647		934 1 934	GET+MGA	27,2444		495 2 485 645
FREETAU	21,3112		1020	GAMDV65	32,3654		934 2 934	GETAKS	21,3227		1021 1 1022
FREPFRAC	17,2533		949 2 727 947	GAMMA	E7,1455	=	125 5 125 1256	GETANGLE	25,2217		857
FREPSET	16,2325		727 1 726	GAMMAEI	E7,1760	=	124 13 123 910	GETARG	32,2046		647 1 648
FRESHDAP	21,2551		1012 1 1001	GAMMAL	E7,1760	=	123 4 865 868	GETCADR	01,3142		1219 1 1235
FRSTPAS	24,2206		680 1 679	GAMMALI	0026	=	123 6 864 867	GETCOMP	41,2510		344 5 342 344
FSUBO	26,3644		1251 1 1246	GAMMASB	E4,1713	=	94 2 292 941	GETDHOOK	25,2533		865 1 865
FT99999	40,3771		642 2 641	GAMPREV	E7,1465	=	133 7 133 681	GETDLEWD	25,2677		868 1 868
FUDGE	E7,1547	=	134 3 134 460	GAMRP	0010	=	1241 3 1237 1241	GETDOWN	34,2331		541 1 538
FULLDSP	40,3546		391 1 390	GCOMP	E3,1471		89 20 89 775	GETECC	12,3726		1303 1 1303
FULLDSP1	40,3547		391 1 390	GCOMPSUB	06,3425		312 6 310 311	GETERAD	13,2570		1239 4 635 1242
FULTKBIT	4767	=	66 1 279	GCOMPSW	E3,1477		89 9 308 435	GETETA	26,3077		859 1 857
FULTKFLG	0243	=	66 3 279 587	GCOMPVER	33,3212		449 1 426	GETINREL	40,2221		329 5 327 332
FURST3	7673	=	608 2 394 597	GCOMP1	06,3544		314 1 314	GETLCX	15,2667		1082 1 1081
FV	E4,1601	=	93 15 93 1351	GCOMP4	33,3354		451 1 451	GETMAXDT	13,3452		1324 1 1323
FVACCADR	01,3506		1411 1 1413	GCOMP5	33,3370		451 3 241 451	GETNEWNM	5455		1407 1 1407
FWDFLTR	20,3300		975 2 967 971	GDESELCT	07,3560		1434 1 1429	GETNOW	23,2443		519 1 519
FX	E7,1652	=	122 8 122 880	GDT/2	1045	=	78 4 79 841	GETOFF	15,3106		1085 1 1085
FXADRS	43,3511		1399 2 1400	GDTSETUP	20,2413		719	GETOFF2	15,3132		1086 1 1085
FXFX	43,3475		1399 1 1400	GDT1/2	1106	=	79 2 79 841	GETON1	15,3047		1084 1 1084
FYX2	17,3521		1057 2 1057	GEADDR	6105		1111 1 1111	GETON2	15,3072		1085 1 1085
F2RTE	0012	=	48 3 925 933	GENDDV	00,2567		1167 2 1166 1170	GETOPCMD	10,2047		176 1 177
F2RTEBIT	4764	=	48	GENMARK	10,3250		1468	GETPART2	01,3502		1411 1 1218
==========	==========		==========	GENMASK	0162	=	1476 4 1461 1473	GETPRIO	5451		1407 2 1407 1410
GAINCHNG	16,3067		951	GENPL	E5,1444	=	102	GETRPSV	11,2554		1337 1 1337

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GETRVN	31,2301		512 2 510 511	GOEXTVB	43,2000		249 1 336	GOTOGE	6644		1130 1 1129
GETRVN5	31,2264		511 1 510	GOFLASH	10,2743		1463 27 402 1463	GOTOPOOH	4103		206 55 201 1444
GETRVN6	31,2275		512 2 511	GOFLASHR	10,3101		1465 5 616 905	GOTOR23	43,2600		268 1 249
GETTCRLQ	41,3063		357 2 356	GOFLASH2	10,2745		1463 13 1460 1465	GOTOUPSY	25,3032		872 1 868
GETTF	31,2357		619 6 610 617	GOGOMARK	10,2634		1460	GOTOV56	4546		640 2 396 585
GETUM	23,3017		576 3 580 762	GOGOPROG	04,2266		213 1 213	GOVNUPDT	40,3156		369 1 340
GETUNITV	25,2137		856 1 856	GOINT	35,2734		483 2 476	GOXDSPF	10,2576	=	1476 17 254 1495
GETVEL	25,2133		856 1 856	GOITER	12,3451		1298 1 1298	GRABANG	21,3410		1027 1 1024
GETX	12,3032		1292 3 1289 1302	GOLOADLV	43,2265		257 6 249 250	GRAD	E7,1651	=	122 3 122 879
GET45	35,3055		485 3 485	GOLOC	0705	=	76 30 1411 1416	GROUPKIL	04,2255		212
GIMBY	21,2710		1015 2 1015	GOMARKF	10,2576		1460 5 258 1476	GRP2PC	11,2327		1332 30 574 1348
GIMDTEST	20,2415		719 1 719	GOMARKFR	10,2607		1460 3 568 941	GRP2SVQ	E7,1536	=	125 4 125 1332
GIMLOCK1	23,3422		1359 1 1358	GOMARK2	10,2601		1460 1 785	GRRBKBIT	4764	=	57 2 261 448
GIMTRIM	20,2444		719 3 719	GOMARK4	10,2604		1460 1 241	GRRBKFLG	0125	=	57 1 271
GL+NOATT	5004	=	393 1 392	GOMAXL/D	25,3470		880 4 874 880	GSELECT	07,3352		1430 3 1429
GLAMPTST	06,2513		156 1 156	GOMOD	04,2264		212 1 214	GSHIFT	7555		1149 1 1117
GLIMITER	25,3474		880 1 880	GOMOVE	27,2435		402 1 402	GTSCPSS	33,2703		443 1 426
GLINVERT	06,2504		156 1 156	GONEBIT	4757	=	58	GTSCPSSA	33,2711		444 1 443
GLOCKCHK	06,2433		155 2 155	GONEBY	0160	=	61 4 857 879	GTSCPSS1	33,2001		426 1 225
GLOCKMCN	06,2426		155 1 153	GONEGLAD	25,3466		880 3 879 880	GTSFIN	42,2122		283 1 358
GLOCKOK	5323	=	168 4 156	GONEPAST	0137	=	58 4 861 881	GTSFINLC	41,3153		358 1 358
GLOKFAIL	0056	=	52 2 428 1359	GONXTBNK	43,3614		1400 3 1400	GTSFOUT	42,2114		282 1 345
GLOKFBIT	4753	=	52 1 428	GOPERFRS	10,3151		1467	GTSFOUTL	41,2557		345 1 344
GMAX	E7,1721	=	123 3 123 814	GOPERFS	10,3071		1465	GTSOPNDZ	E5,1655	=	103
GMAX/2	26,3161		887 2 880	GOPERF1	10,3067		1465 11 215 1442	GTSWTLST	E5,1645	=	103
GMDIFBIT	4756	=	58 2 894 1066	GOPERF1R	10,3147		1466 1 795	GTSWTLT1	E5,1645	=	103 3 435 438
GMERGE	07,3417		1431 1 1434	GOPERF2R	10,3154		1467 1 394	GUESSBIT	4767	=	50
GOALMCYC	41,2347		340 1 359	GOPERF4	10,3074		1465 3 456 744	GUESSW	0034	=	50 4 490 1297
GOANIDLE	10,3365		1470 1 1471	GOPIN	43,2117		251 16 252 278	GWAKE	07,3314		1428 1 1428
GOBAC	13,3563		1325 2 1325	GOPLAY	10,3315	=	1476 1 1465	GWAKE2	07,3254		1427 1 1428
GOBAQUE	11,2726		1339 3 1341 1348	GOPOOCAD	10,3753		1477 1 1474	GYCRS	14,2212		747 1 748
GOBB	4051		140 2 139 140	GOPOOFIX	04,2000		206 1 206	GYMDIBIT	4770	=	60 3 804 1064
GOBKCALB	33,3202		448 1 447	GOPOSLAD	25,3521		880 1 880	GYMDIFSW	0150	=	60
GOBL/2	1053	=	79 3 79 836	GOPROG	05,2563		198 2 139 140	GYROAGRE	07,3266		1427 1 1427
GOBL1/2	1114	=	79 4 79 840	GOPROG2	05,3015		201 1 213	GYROBUSY	07,3307		1428 1 1427
GODSP	10,2702		1462	GOPROG3	05,2730		200 3 200	GYROCMD	0047	=	40 8 160 1433
GODSPALM	41,2350		340 19 335 379	GOPROG4	05,2744		200 3 200 201	GYROEXIT	07,3463		1432 1 1432
GODSPR	10,2710		1462 4 395 809	GOP76	27,2042		220 1 220	GYROFRAC	07,3561		1434 2 1431 1434
GODSPRET	10,2705		1462 3 449 774	GOQ	41,3020		356 1 356	GONBYBIT	4761	=	61
GODSPRS	10,3103		1465 4 1460 1467	GOREDO20	27,2213		396 1 395	==========			
GODSPRS1	10,3105		1466 2 1462 1463	GOSHOSUM	43,2735	=	273 1 250	H	E4,1611	=	93 8 93 1349
GODSPR1	10,2711		1462	GOSLEEPS	10,3210		1467 3 1465 1475	HABIT	4762	=	67
GODSPR2	10,2712		1462 1 1462	GOTO	6615		1129 13 1130 1196	HAFLAG	0255	=	67 3 653 662
GODSP2	10,2703		1462	GOTOADDR	E7,1645	=	122 14 122 883	HAFPA1	E7,1471	=	133 5 674 677
GOESTIMS	33,2070		428 1 428	GOTOERS	6631		1129 1 1129	HALF	4753	=	1204 28 427 1501

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
HALFDP	04,3757	= 1206	1 1338	HIND	0143	= 59	3 868 871	ICDUFAIL	06,2706	= 167	1 168
HALFNFLT	23,2265	306		HINDBIT	4763	= 59		ICDUFLBT	4755	= 84	1 391
HALFPR	4752	= 1081	1 1082	HIPRIO	10,2766	1463	1 1463	ICDUINHT	4766	= 85	3 151 1419
HALFREV	27,2442	495	2 495	HISCALAR	0003	= 42	2 432 1132	ICORK2	43,2151	254	
HALVE	26,3333	= 889	7 865 889	HISECON	42,3304	350	1 350	IDADDTAB	42,2557	291	2 282
HAMDELH	E4,1767	= 96	2 96 654	HITEMIN	0123	= 70	3 362 363	IDAD1TEM	0150	71	4 282 357
HANG20	06,2072	143	1 142	HITEMOUT	1212	= 82	4 349 351	IDAD2TEM	0151	71	2 282
HAPO	E4,1754	= 96	3 96 646	HIUNITX	26,3333	= 34	4 298 940	IDAD3TEM	0152	71	
HAPOX	E4,1742	= 95	6 95 524	HIUNITY	26,3331	= 34	2 298 941	IDLEBIT	4763	= 49	
HARTBURN	27,2000	219	1 219	HIUNITZ	26,3327	= 34	3 298 941	IDLECADR	43,2720	271	1 262
HAVDNRNG	25,3451	879	1 879	HI10	07,3774	1447	1 1446	IDLEFAIL	0030	= 49	3 706 712
HAVEBASE	31,2177	510	1 507	HI5	4344	385	9 143 1400	IDLEMASK	7675	= 1477	1 1472
HAVEGUES	11,2002	490	1 729	HI6ZEROS	26,3335	= 34	31 525 1386	IDLERET1	10,3522	1472	1 1473
HAVENDRM	05,3751	1291	1 1291	HMCSI	23,3233	677	1 676	IDLESLEP	10,3743	1476	1 1468
HBCFADR	17,2522	949		HMSIN	42,3361	362	1 359	IERASTST	6074	1111	1 1111
HBD11/2	E6,1430	106		HMSOUT	42,3137	348	1 345	IFAILINH	05,3240	205	1 199
HBD12	E6,1431	106		HOLDFLAG	1340	86	20 182 1029	IFAILJMP	06,2760	168	1 148
HBD21/2	E6,1435	106		HOLDFUNC	21,3404	1027	1 1024	IFAILOK	07,3155	1425	1 1424
HBD22	E6,1436	106		HOLDW	E5,1664	= 101	7 101 1258	IFLAGC	13,3176	1318	1 1319
HBD31/2	E6,1442	107		HOPALONG	30,2061	459	1 461	IFLAGP	13,3153	1318	1 1318
HBD32	E6,1443	107		HOP1	20,2212	460	1 460	IFLEGAL	10,3025	1464	1 1464
HBN10	E6,1425	106	1 949	HOP2	20,2214	460	1 460	IGC	E5,1761	= 99	6 99 1359
HBN11/2	E6,1426	106		HOP29DSP	30,2015	459	1 457	IGNFLAG	0153	= 60	1 711
HBN12	E6,1427	106		HORISLP	E6,1775	= 120	1 634	IGNFLBIT	4754	= 60	2 702 713
HBN20	E6,1432	106		HORIZ.1	31,3155	635	1 637	IGNITION	24,2664	702	2 233 713
HBN21/2	E6,1433	106		HORIZ.2	31,3321	637	1 637	IGSAMEX	27,2312	399	1 399
HBN22	E6,1434	106		HORIZ.3	31,3330	637	1 637	IMEDIATE	01,3561	1413	4 1412 1415
HBN30	E6,1437	107		HORIZ.4	31,3333	637	1 637	IMODES30	1333	84	69 135 1440
HBN31/2	E6,1440	107		HORIZ.5	31,3335	637	1 637	IMODES33	1334	85	43 144 1425
HBN32	E6,1441	107		HORIZ.6	31,3324	637	1 634	IMPLBURN	24,2773	703	1 702
HDOT	E7,1740	= 124	2 293 547	HORIZALT	1345	86	1 635	IMPLCONT	24,3016	704	1 704
HDSUPBIT	4756	= 66	2 196 216	HORIZON	E7,1752	= 134	6 134 638	IMPULBIT	4760	= 51	2 702 704
HDSUPFLG	0232	= 66		HPER	E4,1756	= 96	2 291 646	IMPULCHK	24,2702	702	
HEADSUP	E6,1726	= 116	6 116 853	HPERMIN	E4,1711	= 94	5 94 525	IMPULSW	0044	= 51	1 733
HERE	26,3565	1248	1 1248	HPERX	E4,1744	= 95	5 95 525	IMUAOK	21,2622	1013	1 1013
HIDPHALF	26,3333	= 34	12 305 1356	HRCON	42,3446	363	2 362	IMUATTCK	43,2364	260	1 249
HIDP1/4	26,3325	= 34	4 820 1386	HRCON1	42,3206	349	1 349	IMUBACK	33,2005	427	
HIENERGY	12,3465	1298	1 1298	HUNTEST	25,2373	863	4 863 875	IMUBAD	07,3625	= 1435	4 151 1435
HIGHGAIN	20,2114	420	1 420	HUNTEST1	25,2442	864	1 863	IMUCADR	1335	= 85	3 204 1435
HIGH1	15,3432	= 663	1 663	HUNTEST3	25,2561	865	1 870	IMUCAGE	06,2566	160	1 168
HIGH2	23,3137	587	1 676	==========	==========	==========	==========	IMUCAL	33,2000	= 33	6 427 452
HIGH3	23,3141	587	1 582	I	E6,1653	= 110	14 110 993	IMUCAL3	32,2000	= 32	1 431
HIGH4	7675	1203	5 141 1477	IAVG	E6,1470	107	2 734	IMUCDARK	43,2143	253	1 253
HIGH9	7677	1203	4 487 1112	IAVG/TLX	E6,1471	107	1 948	IMUCDARS	07,2724	1420	3 254 788
HIMINCON	42,3305	350	1 350	IBNKCALL	4714	1106	39 145 1426	IMUCDARV	43,2164	254	2 254 255

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SYMBOL	DEF	H	REFERENCES
IMUCOMP	06,2000	=	28 1 308
IMUFAIL	06,2706	=	167 1 168
IMUFINE	07,3133		1424 3 256 1439
IMUFINED	07,3153		1424 2 1424 1429
IMUFINEK	43,2227		256 1 249
IMUFINEV	43,2257		256 1 256
IMUFINHT	4765	=	85 5 151 1425
IMUFIN2C	07,3133	=	1439 1 788
IMUFLBIT	4754	=	84 2 391 1425
IMUMON	06,2167		147 1 145
IMUNITBT	4763	=	85 7 151 1435
IMUOP	06,2620		162 1 168
IMUOPBIT	4760	=	84 4 150 1440
IMUOP2	06,2646		163 1 162
IMUPULSE	07,3244		1427 7 256 1504
IMUSE	0007	=	47 5 214 1442
IMUSEBIT	4761	=	47 2 162 212
IMUSEFLG	4761	=	1439 3 151 162
IMUSTALL	07,3644		1437 11 252 788
IMUSTLLG	33,2126		430 5 427 442
IMUVAR	27,2460		588 2 581 584
IMUVARR	32,2025		623 1 615
IMUZERO	07,2627		1418 2 252 427
IMUZEROA	07,2637		1418 1 1418
IMUZERO2	07,2677		1419 1 1418
IMUZERO3	07,2706		1419
IMUZROBT	4764	=	85 2 1418 1419
IM30INIF	05,3247		205 1 195
IM30INIR	7660	=	205 1 199
IM33INIT	5055	=	205 2 195 199
INBOUND	27,3341		1381 1 1380
INCOR8IT	4756	=	56
INCORFLG	0117	=	56 10 579 616
INCORPEX	E4,1641	=	93 5 542 1239
INCORP1	36,3260		1252 3 581 631
INCORP2	36,3472		1256 3 582 632
INCOR1	36,3314		1253 1 1253
INCOR1A	36,3323		1253 1 1253
INCOR1B	36,3352		1253 1 1253
INCOR1C	36,3360		1253 2 1253
INCOR2	36,3421		1254 2 1254 1261
INCOR2AB	36,3451		1255 1 1255
INCOR3	36,3455		1255 1 1255
INCR	01,2403		1193 1 1118
INCRDCDU	22,3100		418 2 419 421
INCRQCK	5651		1485 5 168 1435
INCRSVG	24,3137		706 1 726
INDEP	E7,1767	=	130 4 1285 1286
INDERASE	6155		1112 1 1112
INDEX	6115		1112 1 1110
INDEXI	23,3737		1369 1 1368
INDEXLOC	0130	=	70 12 1112 1194
INDEX2	6133		1112 1 1112
INDINC	07,2273		246 2 245 246
INDJUMP	6243		1117 6 1111 1114
INDWORK	6153		1112 1 1112
INFINAPO	12,3755		1303 2 1303
INFINBIT	4762	=	62
INFINFLG	0200	=	62 4 1289 1298
INFINITY	12,3250		1295 5 1292 1295
INFLIGHT	23,2000	=	31 1 1354
INHOLD	21,3474		1029 1 1029
INITA	27,2620		590 1 591
INITDSP	10,3263		1469 1 1411
INITIALW	27,2612		590 3 580 633
INITLOC2	17,2537		949 1 944
INITRET	04,3024		222 2 222
INITRL1	25,2362		862 1 861
INITROLL	25,2260		861 1 853
INITST	05,3277		671 1 672
INITST1	35,3560		671 1 680
INITSUB	04,2767		221 2 206 211
INITSUBA	04,3002		222 3 212 222
INITSUBB	04,3030		222 1 270
INITV	12,3546		1300 2 1298 1299
INITVEL	11,2000		490 2 480 716
INITVELX	11,2240		494 1 494
INITVEL1	11,2022		490 1 490
INITVEL2	11,2056		491 1 493
INITVEL3	11,2101		491 2 491
INITVEL4	11,2133		492 1 492
INITVEL5	11,2157		492 1 492
INITVEL6	16,2000		493 1 493
INITVEL7	16,2003		493 1 492
INITVEL8	11,2221		494 1 493
INITZOPT	06,3213		172 1 171
INLINK	0045	=	40 2 204 1446
INPUTDSP	04,3546		663 2 653 661
INREL	0137	=	71 24 327 333
INRELTAB	40,2225		329 2 329 331
INRLBIT	4764	=	59
INRLSW	0144	=	59 2 861 862
INROLOUT	25,2351		862 3 861 862
INT-ABRT	11,2751		1339 1 1339
INT/W	35,3753		1327 2 1326
INTADR	13,2241		515 1 514
INTALM	35,2055		467 1 467
INTBANK	13,3144		1317 1 1317
INTBIT15	0115		70 6 70 1112
INTB15+	0114		70 2 70
INTEGRV	13,3236		1320 12 227 1329
INTEGRVS	13,3211		1319 7 457 923
INTEGRV1	13,3240		1320 2 1318
INTEGRV2	13,3243		1320 1 1349
INTERBO	00,2000	=	27 2 1119 1152
INTERB1	01,2000	=	27 1 1192
INTERCEP	16,3761		996 1 989
INTERF3	6000	=	27 2 1108 1120
INTEXIT	13,3331		1321 3 1323 1324
INTFLAG	0227	=	65
INTFLBIT	4753	=	65 4 199 1325
INTGRATE	11,3275		1344 2 1344 1345
INTIME	E7,1502	=	126 6 126 492
INTINIT	13,2000	=	29 4 227 1328
INTINIT1	11,2000	=	29 1 1320
INTINIT2	35,2000	=	33 1 1326
INTINIT3	05,2000	=	28 1 1330
INTINT	35,2740		483 6 479 686
INTINT2C	31,3606		686 2 676 677
INTINT3P	31,3615		686 2 667
INTLOOP	35,2044		467 1 467
INTMCTBS	41,2116		335 2 335
INTOTHIS	13,2176		514
INTPRET	6006		1108 245 211 1496
INTPRET1	26,2000	=	31 1 1205
INTPRET2	04,2000	=	27 1 1206
INTRSM	6017		1108 1 1215
INTSETUP	36,2150		555 1 554
INTSTALL	13,3516		1324 31 211 1496
INTTEMP	E6,1506		108 2 108 112
INTVAL	33,2671		443 2 435 439
INTVALUE	05,3420		958 1 956
INTVAR	E4,1777	=	96 1 581
INTVEC	E5,1476	=	103
INTVEC1	E5,1476	=	103 3 445

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INTVEL	11,2000	= 29	2 490 493	ITEMP3	0063	69	6 69 1479	JETADDR	21,3767	1035	1 1034
INTVEL1	16,2000	= 30	1 493	ITEMP4	0064	69	8 69 1434	JETAG	E6,1711	= 115	10 115 1089
INTWAKE	13,3527	1325	3 642 1321	ITEMP5	0065	69	2 69 1408	JETCALL	15,3276	1089	1 1088
INTWAKEC	27,3120	1331	1 1331	ITEMP6	0066	69	3 167 1408	JETCALL1	15,3237	1088	1 1088
INTWAKEM	27,3115	1331	1 1331	ITERATOR	12,2610	1285	1 1298	JETCALL2	15,3262	1088	3 1088
INTWAKEU	27,3072	1331	1 1499	ITERCTR	0026	= 1307	2 1285 1286	JETCALL3	15,3246	1088	1 1089
INTWAKEX	27,3132	1331	1 1331	ITISMASK	7667	= 1477	1 1472	JETEM	E6,1720	= 116	23 116 1078
INTWAKE0	13,3525	1324	4 274 1332	ITISMOON	37,3324	840	1 840	JETEM2	E6,1624	= 117	3 1076
INTWAKE1	13,3547	1325	3 1325	ITNON1BT	4762	= 85	3 150 159	JETROLL	16,3664	992	2 992
INTWAKLM	27,3130	1331	1 1331	ITNON2BT	4761	= 84	3 150	JETS	21,3452	1029	4 1018 1027
INTWAKUP	27,3141	1332	1 1331	ITR0	6337	1120		JETSLECT	17,2541	1038	1 1035
INTY	E5,1500	= 102	6 440 441	ITR1	6326	1120		JJ	E7,1761	= 123	8 878 879
INTYBIT	4765	= 53		ITR10	6111	1111		JLOOP	21,3456	1029	1 1034
INTYPFLG	0070	= 53	18 456 1329	ITR11	6151	1112		JN	21,3666	1032	5 1031 1032
INTZ	E5,1504	= 102		ITR12	6103	1111		JNDX	E6,1617	= 116	9 116 1087
INVC100	32,2455	912	1 899	ITR13	6162	1112	1 1112	JNDX1	E6,1620	= 116	6 117 1088
INVC107	32,2475	913		ITR14	6206	1114		JOBSLEEP	5163	1210	8 428 1481
INVC109	32,2500	913	1 913	ITR15	6072	1111		JOBSLP1	01,2767	1215	1 1210
INVC115	32,2525	913	1 913	ITR7	6230	1115		JOBSLP2	01,3000	1215	1 1217
INVC120	32,2531	913	1 913	ITSAJOB	01,3576	1413	1 1412	JOBWAKE	5167	1210	14 383 1481
INVC125	32,2540	913	1 913	ITSAJOB2	01,3707	1415	1 1414	JOBWAKE2	01,3014	1216	1 1210
INVRSEQN	12,3172	1294	1 1294	ITSATBL	01,3612	1413	1 1411	JOBWAKE3	01,3026	1216	2 1216
IOGARATE	E6,1654	= 110	3 110 989	ITSAVAR	01,3512	1411	1 1411	JOBWAKE4	01,3020	1216	1 1216
IRETURN	E4,1613	= 93	8 93 1321	ITSAWAIT	01,3531	1412	1 1411	JOBXCHS	10,3226	1468	2 1463 1464
IRETURN1	0773	77	5 1328 1330	ITSEVEN	01,3713	1416	1 1413	JP	21,3675	1032	6 1031 1032
IRIGCOMP	06,3344	310		ITSINDIR	5470	1412	1 1412	JSWCHBIT	4753	= 47	
IRIGX	06,3346	310		ITSLGCL1	5477	1414	2 1414 1415	JSWITCH	0001	= 47	5 1344 1349
IRIGY	06,3362	310		ITSLGCL2	01,3650	1415	1 1414	JTAGTIME	37,3153	835	1 829
IRIGZ	06,3376	310		ITSLIKE8	01,3563	1413	1 1411	JTIME	21,3740	1034	4 1031 1032
IRIGI	06,3422	312	2 308 312	ITSLNGCL	01,3675	1415	1 1411	JUMPTVC4	16,3313	962	2 962
ISCADR+0	4240	381	2 1472	ITSNOVAC	01,3606	1413	1 1413	J18	21,3641	1031	2 1030 1032
ISITNCO	10,3401	1470	1 1470	ITSWBIT	4753	= 60		J2REQSQ	13,3753	1353	1 1341
ISITPOO	04,2116	210	1 209	ITSWICH	0152	= 60	5 467 667	J20	21,3645	1031	1 1030
ISITPRIO	10,3462	1472	2 1472	ITSWTLST	01,3702	1415	1 1414	J21	21,3656	1031	1 1030
ISITP79	31,2137	509	1 508	ITURNON	06,2537	158	1 168	J22	21,3704	1032	5 1030 1031
ISSERVON	04,2151	210	1 210	ITURNON2	06,2562	159	2 158 163	J23	21,3715	1032	7 1030 1031
ISSUP	06,2320	151		IXX	E6,1467	107	4 734 957	J24	21,3727	1032	2 1031
ISSWOFF	06,2721	166		==========				J4REQ/J3	13,3743	1353	2 1341
ISSWON	06,2731	166	1 166	J/M	E6,1623	= 113	3 113 1034	J6.	21,3527	1029	1 1029
ISSZERO	06,2354	152	1 160	J/M1	E6,1624	= 113	2 113 734	J7	21,3553	1030	1 1030
ISWCALL	4720	1106	1 962	J/M2	E6,1625	= 113	2 113 734	J8	21,3562	1030	1 1030
ISWRETRN	4727	1106		JAMTERM	4247	381	1 1472	==========			
ITCTR	E7,1504	= 126	4 490 493	JANESUB	27,2000	= 32	1 219	K.01	37,2165	458	1 458
ITEMP1	0061	69	46 69 1486	JCAXIS	31,3516	639	1 632	KACOS	26,3247	888	1 860
ITEMP2	0062	69	24 69 1480	JETACTN	15,3270	1088	2 1088 1089	KALCMAN3	22,2000	403	2 395 597

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
KALCMON1	22,2000	= 30	5 403 423	KNOWNBIT	4761	= 59		LANDLONG	E4,1750	= 95	5 95 619
KALCMON2	22,2000	= 30	1 409	KNOWNFLG	0141	= 59	4 563 611	LANDMARK	E7,1751	= 134	20 134 783
KALCMON3	10,2000	= 28	1 422	KPIP1	37,3364	841	2 833 841	LARGE	00,3064	1175	1 1175
KALIM	26,3315	889	2 861	KPRIMEDT	E6,1626	= 109	6 109 947	LARGE2	00,3111	1177	2 1175 1176
KALUPDT	21,3170	1021	1 1014	KRESUME1	21,2424	1007	1 1002	LARGE3	00,3073	1177	1 1175
KASCALE	26,3233	888	1 856	KRESUME2	21,3177	1021		LARMENT	5703	1486	
KAT	E7,1717	= 123	4 123 862	KR1	26,3013	814	1 813	LASINEX	00,3626	1189	1 1189
KATEST	25,2354	862	1 862	KR2	26,3017	814	1 813	LASTBIAS	06,3655	317	1 826
KA2	26,3307	889	1 861	KR3	26,3021	815	1 813	LASTGTS	33,3050	446	
KA3	26,3311	889	1 862	KR4	26,3027	815	1 813	LASTMASP	E6,1522	= 108	
KA4	26,3313	889	1 862	KSPNDX	E6,1664	= 118	7 118 419	LASTSEG	07,3447	1432	1 1433
KC3	26,3257	889	1 868	KT	E4,1754	= 95	7 95 472	LASTTIME	01,3453	1235	
KDPNDX	E6,1665	= 118	4 118 419	KTETA	26,3235	888	1 859	LAT	0746	= 77	15 77 1238
KEEPPRIO	10,3010	1464	2 1469 1473	KTETA1	04,3751	820	1 820	LAT(SPL)	E7,1400	121	13 38 911
KEP	25,3312	877	1 872	KTLX/I	E6,1630	= 109	4 109 948	LAT-LONG	13,2453	1236	8 458 911
KEPCONVG	12,2375	1281	3 1279 1280	KTRCS	4753	= 1092	1 1084	LATANG	E7,1675	= 123	8 123 881
KEPC1	0042	= 1306	3 1277 1293	KT1	26,3237	888	1 859	LATBIAS	26,3243	888	1 881
KEPC2	0044	= 1306	3 1277 1293	KVSCALE	26,3231	888	1 856	LATITUDE	E5,1402	102	3 431 538
KEPLERN	12,2077	1277	2 1334	KWE	26,3245	888	1 890	LATLONG	13,2000	= 29	2 1236 1241
KEPLOOP	12,2233	1279	1 1280	K1D	26,3225	888	1 875	LATLONG1	16,2000	= 30	1 1241
KEPPREP	11,2336	1333	3 1322 1339	K1K2LOOP	32,2145	649	1 649	LATSLOPE	26,3150	= 889	1 852
KEPRTN	E4,1667	= 93	3 1281 1334	K1ORK2	07,2500	678	1 678	LATSW	0145	= 59	1 874
KEPZERO	04,3761	= 1288	3 1278 1302	K1RTE	35,3663	939	2 899	LATSWBIT	4765	= 59	1 1081
KEP2	25,3316	877	2 861 877	K2.	24,2123	679	2 679	LAUNCHAZ	E5,1633	= 103	8 183 544
KEYCALL	07,2142	243		K2CALC	32,2143	649	1 649	LBCFADR	17,2523	949	1 947
KEYCOM	07,3675	1445	1 243	K2D	26,3227	888	2 875 876	LBN1	17,2502	949	1 949
KEYRPTBB	4052	= 140	2 139 140	K2ROLL	E7,1643	= 122	7 122 881	LBUF2	00,2467	1164	2 1188 1190
KEYRUPT	07,2000	= 28	1 1445	K2RTE	35,3665	939	1 899	LCHAN	0001	= 42	17 144 1496
KEYRUPT1	07,3666	1445	1 139	K3RTE	35,3667	939	1 900	LCX/360	E6,1614	= 116	18 116 1085
KEYTEMP1	0073	= 69	6 1446 1447	K4RTE	35,3671	939	1 900	LDANZIG	00,3710	1190	1 1189
KEYTEMP2	1137	= 81	2 1446	==========				LDLOOP72	27,3667	1498	1 1499
KILLGRP4	26,2505	804	1 875	L	0001	= 40	217 42 1498	LDNDUMP	05,3654	1102	1 1102
KILLJETS	16,3752	995		L/D	E7,1633	= 122	13 122 883	LDNDUMP1	43,2711	271	1 271
KILLMON	41,3303	365	1 365	L/DCALC	E7,1726	= 123	1 858	LDNDUMP1	05,3655	1102	1 1102
KILLSIVB	33,3611	531	1 530	L/DCMINR	E7,1627	= 122	4 122 883	LDNPHAS1	05,3241	205	1 202
KILL20	04,2321	213	2 213	L/D1	E7,1635	= 122	5 122 883	LDNPHAS2	05,3574	1099	1 1096
KILMONON	4235	380	4 372 391	LAD	E7,1623	= 122	17 122 881	LDPLANET	31,3464	639	1 638
KLAT	E7,1631	= 122	3 122 881	LADPAD	E6,1407	106	1 852	LDPUSMAX	04,3772	= 1305	1 1303
KLEENEX	10,2575	1460	3 241 762	LALOTORV	13,2524	1238	8 538 853	LEFT	00,2342	1161	1 1158
KMATRIX	21,2355	1004	2 1001 1002	LAMBERT	12,3255	1296	1 492	LEFT-	00,2336	1161	1 1158
KMJ	E6,1620	= 113	3 113 1004	LAMBLOOP	12,3364	1297	3 1298 1299	LEFTNCOM	40,3037	361	1 361
KMJ1	E6,1621	= 113	2 113 734	LAMENTER	12,2751	1287	1 1300	LEFT5	4333	384	5 342 1400
KMJ2	E6,1622	= 113	2 113 734	LAMPTEST	06,2771	168	2 156 157	LEGALTST	40,2424	332	2 332
KMPAC	E6,1510	= 112	37 112 1058	LANDALT	E4,1752	= 95	4 95 619	LEMCONIC	13,3202	1318	4 500 758
KMPTEMP	E6,1512	= 112	3 112 997	LANDLAT	0746	= 77	2 294 563	LEMMASS	E6,1472	107	6 135 957

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LEMNO	05,3321		956	LMYDOT	E5,1604	=	97 2 221 500	LOOPCT	E7,1763	=	133 6 133 682
LEMPOS	1053	=	79 5 79 585	LNG(SPL)	E7,1402	=	121 7 121 911	LOOPMX	15,3416	=	671 1 673
LEMPREC	13,3161		1318 3 34 512	LNGCALL2	01,3425		1234 1 1234	LOOPSET	32,2140		649 4 648 649
LEMSTORE	22,3300		500 1 500	LOADCDUD	22,3163		423 1 404	LOOPSIN	22,2406		409 1 409
LEMTEST	05,3315		956	LOADCOEF	17,2412		947 2 944 947	LOOP1	23,3672		1368 1 1368
LEMVEC	43,2703		271 1 250	LOADITIS	10,3703		1475 1 1473	LOOP2	23,3671		1368 1 1369
LEMYES	05,3324		956 1 956	LOADLV	41,3001		355 7 334 363	LOOSE	33,2545		441 1 441
LEM52	14,3066		758 1 758	LOADLV1	41,3001	=	334 1 257	LOSCALAR	0004	=	42 5 432 592
LENGTHOT	E5,1412		102 8 435 447	LOADSTAT	1217		82 7 356 1475	LOSVEC	E5,1413		102 4 102 451
LEQ	E7,1653	=	122 7 122 880	LOADSTDT	33,2337		437 2 438 439	LOTEMIN	0124	=	70
LESCHK	05,3242		205 1 204	LOADTIME	24,3751		1501 31 431 1330	LOTEMOUT	1213	=	82 1 351
LEWD	E7,1724	=	122 11 863 874	LOADYZ	22,3165		423 1 422	LOTHRUST	24,3143		706 1 725
LEWDOVFL	25,2740		869 1 869	LOC	0164		73 42 223 1476	LOUNITX	04,3757	=	34
LEWDPTR	25,2744		869 1 869	LOCCTR	0064	=	69 29 383 1471	LOUNITY	04,3755	=	34
LEWD1	26,3153		887 1 871	LOCHECK	16,2217		725	LOUNITZ	04,3753	=	34
LFTFLGON	43,2713		271 1 249	LOCSAM	13,2345	=	766 2 750 786	LOWIDCOD	05,2000		179 1 1102
LGCLCADR	01,3137		1218 1 1415	LOCSKIRT	22,2745	=	416 7 404 407	LOWLOAD	4354	=	1476 1 1472
LGCLNGTM	01,3431		1234	LOD	E7,1625	=	122 3 122 880	LOWMEMRY	14,2000		640 1 639
LGCL2CDR	5342		1234 1 1234	LODMIXNN	42,2074		282 1 282	LOWSUPER	30,2000	=	32 14 34 1500
LGCOMP	06,3535		314 2 308 314	LODNLV	42,2112		282 1 282	LOWVERB	41,2037		334 1 335
LGWAKE	07,3323		1428 3 1428 1435	LODNNLOC	41,2114		335 8 335 355	LOW10	5041		1202 18 35 1399
LGYRO	1324		84 11 204 1435	LODNNTAB	42,2056		282 1 335	LOW11	4347		385 6 142 1120
LGYROBIN	43,2255		256 1 256	LODPAD	E6,1410		106 1 852	LOW2	6214	=	1204 1 1158
LIFTTEMP	1126	=	80 5 80 540	LODPHALF	04,3757	=	34 3 726 1302	LOW3	4774	=	1204 2 221 1155
LIGHTON	34,3420		589 2 579 590	LODPMAX	04,3772		1206 1 1305	LOW4	4777		1201 6 215 1479
LIGHTSET	05,3023		201 2 198 200	LODPMAX1	04,3774		1206	LOW5	4342		385 14 214 1446
LIM(-22)	34,3762		1386 1 1381	LODP1/4	15,3411	=	34 1 1240	LOW7	6043		1109 14 210 1475
LIMITCOM	42,3243		350 1 350	LODSAMPT	4366		385 3 365 1446	LOW7+2K	5042		1202 1 1115
LIMITL/D	25,3524		881 8 861 880	LOENERGY	12,3504		1299 1 1298	LOW8	4350		385 18 384 1498
LIMITS	4751	=	1200 9 895 1503	LOG	23,2155		303 1 867	LOW9	5021		1201 7 160 1218
LINUS	5516	=	1476 1 395	LOLIM	12,3543		1300 2 1297	LO6ZEROS	04,3761	=	34 4 729 1288
LINUSCHR	10,3623		1474 2 1463 1464	LOMAT	35,2721		483 4 480 657	LRUPT	0011	=	40
LITTLSUB	33,3450		452 2 450 451	LONG	0750	=	77 12 77 1238	LSDISP	14,2115		745
LLASRD	31,2363		619 3 617 763	LONGBASE	1302		83 2 1409 1415	LSPOS	26,2136		790 3 601 1336
LLASRDA	31,2371		619 2 563 745	LONGCADR	1300		83 2 1219 1234	LSTBNKCH	43,3655		1401 1 1400
LMCRATE	16,3760		996 2 989 990	LONGCALL	5332		1234 5 428 1314	LSTIME	26,2146		790 2 790
LMKLMCOM	14,3105		759 1 758	LONGCLCL	01,3670		1415 2 1415	LSTMRK	14,3411		763 1 762
LMK52	14,3075		759 1 758	LONGCYCL	01,3440		1234 2 1234 1235	LST1	E3,1400		88 46 140 1411
LMMOVE	17,2044		275 1 275	LONGEXIT	E3,1434		88 3 1234 1235	LST2	E3,1410		88 36 203 1231
LMOONBIT	4756	=	62	LONGFOR	E7,1543	=	134 4 134 459	LST2CON	5004	=	336 1 336
LMOONFLG	0174	=	62 4 35 1316	LONGGYRO	07,3503		1432 1 1431	LST2FAN	43,2002		249 2 249 389
LMPOS	34,3336		585 2 579 583	LONGPASS	30,2004		458 2 457 461	LTHVACA	5005		1201 5 143 204
LMPTSTBT	4770	=	85 5 166 391	LONGRTRN	01,3457		1235 1 1235	LT5	41,2031		334 2 334
LMTOCM	17,2033		275 1 275	LONGTIME	1304		83 13 1234 1415	LUNABIT	4755	=	52
LMTOCMSV	43,3001		274 1 249	LOONE	27,2673		608 1 600	LUNAFLAG	0060	=	52 23 457 1242

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LUNCHAZ1	E5,1633	= 103	5 103 444	MANUOFF	22,3153	419	1 419	MATRIX	11,3227	1343	2 1340
LUNENT	26,3002	814	1 812	MANUSTAL	22,3131	419		MATRXJOB	34,2115	538	2 231 432
LUNPOS	26,2141	790	3 634 1344	MANUSTAT	20,2064	420	1 418	MAX	0016	= 1307	4 1285 1286
LUNVEL	26,2144	790	1 1345	MANUSTOP	10,2303	422	1 419	MAXANG	22,2367	409	1 404
LV	0044	= 41	2 1175 1177	MANUSTUF	20,2000	= 30	2 420 422	MAXCHECK	12,2677	1286	1 1286
LVBUF	6242	1116	1 1140	MANUVER	27,2000	= 32	2 394 400	MAXCHK	23,2745	525	4 524 646
LVSQUARE	0042	= 41	2 1175 1180	MANUVER1	27,2000	= 32	1 400	MAXCOGA	12,3337	1297	2 1296
LVWTLIST	5251	1223	1 1227	MARKBIT	4765	= 50	3 202 247	MAXDB	24,3521	714	1 708
LWDSTORE	25,2706	869	1 869	MARKCONT	07,2204	244	2 244	MAXDBBIT	4755	= 64	2 222 559
LXA	01,2351	1192	1 1118	MARKCOP	10,2653	1461	1 1461	MAXDBFLG	0212	= 64	2 265 266
LXC	01,2355	1192	1 1118	MARKDATA	1077	= 79	3 79 762	MAXDT	13,3446	1324	2 1323
L14/OUT	40,2575	347	1 347	MARKDIF	07,2165	244	1 244	MAXDV	00,2641	1170	1 1166
L350	25,3536	881		MARKDISP	37,2230	568	1 246	MAXDVSW	0140	= 71	6 1162 1177
L353	25,3551	881	1 881	MARKDONE	07,2275	246	2 246	MAXIN	42,2050	266	1 265
L355	25,3564	881	4 881 883	MARKDOWN	E7,1674	= 129	7 129 778	MAXLIM	16,3763	996	2 988 990
L357	25,3627	883	1 881	MARKFLAG	1274	83	2 1460 1461	MAXNM	23,2754	525	3 525
==========				MARKFLG	0032	= 50	2 245 247	MAXOUT	42,2014	265	1 266
M.6RTE	35,3607	938	1 918	MARKFMSK	7664	= 1477	2 1460	MAXPHI	32,2203	649	3 649
M/SCON1	42,3306	351	1 349	MARKFORM	10,2602	1460		MAXPHIC	32,2207	649	2 649
M/SCON2	42,3307	351	1 350	MARKINDX	0301	= 73	12 73 780	MAXPLS	10,2210	178	2 177
M/SCON3	42,3311	351	4 350	MARKIT	07,2154	244	1 243	MAXPLS1	10,2211	178	2 177
M/SLIMIT	42,3235	350	2 349 350	MARKMONR	10,2612	1460	1 570	MAXRA	27,3252	1377	2 1377
M/SNORM	42,3251	350	7 349 351	MARKNV	0367	75	6 1461 1470	MAXRATE	27,2641	607	2 597
M/SOUT	42,3212	349	1 345	MARKOCT	10,3741	1476	1 1468	MAXRNG	25,3767	887	1 879
MAGCK	07,2574	764	1 764	MARKOVER	10,3643	1475	1 1459	MAXTEST	00,2564	1166	4 1165 1179
MAGVEC2	E5,1721	= 100	6 100 1300	MARKPERF	10,2677	1461	1 1471	MAXTFF	27,3442	1383	1 1382
MAJ+	07,3406	1431	1 1430	MARKPLAY	10,2630	1460	4 1460 1476	MAXTFF1	27,3441	1383	1 1380
MAJ-	07,3541	1434	1 1430	MARKRET	10,3640	1474	1 1473	MAXTFIRE	16,3623	992	1 991
MAKECADR	4665	1105	6 241 1481	MARKRUPT	07,2105	243	2 139 140	MAXTST	16,3627	992	
MAKEGEN	10,3744	1476	1 1466	MARKTIME	1061	= 79	19 79 634	MAXVTEST	15,3025	1084	1 1084
MAKEMARK	10,2615	1460	1 1464	MARKWAKE	10,3252	1468	1 1475	MAXVTIM1	15,3044	1084	1 1084
MAKEPLAY	10,3012	1464	3 1463 1476	MARK1/2	05,2340	190	1 189	MAXVTIM2	15,3062	1085	
MAKEPRIO	10,2756	1463	1 1464	MARK2	07,2221	245	1 245	MAXWTIME	E4,1775	= 96	2 96 586
MAKESERV	37,2747	829	1 830	MARK2DWN	E7,1460	= 121	2 183 778	MAX250	35,3144	488	1 473
MAMAX1	E7,1651	= 131	3 131 926	MARK2PAC	1276	83	2 1469 1470	MBDYTCTL	27,2651	607	1 599
MAMAX2	E7,1653	= 131	3 131 926	MARK3/4	05,2347	190	1 189	MCDUYDOT	E6,1642	= 109	5 109 970
MANEUBIT	4764	= 66		MARK3MSK	10,3754	1477	1 1460	MCDUZDOT	E6,1643	= 109	5 110 970
MANEUFLG	0240	= 66	4 216 586	MARK4MSK	10,3723	1476	1 1460	MCLEANJR	17,2355	946	
MANRCT	21,3063	1018	3 1016 1024	MARK5	05,2356	190	1 189	MCOS22.5	35,3635	939	1 904
MANTABLE	21,3065	1018	2 1017 1018	MARSDP	35,3551	645	1 645	MCOS7.5	35,3631	938	1 904
MANTOCSC	06,3137	171	2 171	MARSLEEP	10,3676	1475	1 1461	MDOTRCS	35,3625	938	1 903
MANTOMAN	06,3127	171	1 171	MASSPROP	05,3313	956	5 209 956	MD1	4353	385	4 382 1495
MANUCALL	20,2153	421	1 421	MASSTMP	E6,1734	= 111	2 725 726	MEASINC	36,2000	= 33	1 1252
MANUDES	06,3115	171	1 169	MATINC	0140	71	8 71 1144	MEASINC1	36,2000	= 33	1 1256
MANUEXIT	35,3166	600	1 597	MATMOVE	16,2730	769	4 748 782	MEASINC3	31,2000	= 32	1 1260

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MERRORX	E6,1541	=	112 5 112 1018	MINPERE	23,2455		519 2 522 815	MMTEMP	1264	=	83 2 221
MERRORY	E6,1543	=	112 1 112	MINPERM	23,2453		519 1 522	MNKEYIN	0015	=	42 2 202 1445
MERRORZ	E6,1545	=	112 1 112	MINTAU	4614		1025 3 1024	MNKGOPOO	4105		206 4 486 748
MERUPDAT	21,3042		1018 1 1017	MINTIME2	05,3456		1097 1 1097	MNKPST41	24,3462		712 1 712
METHOD1	22,2234		406 1 406	MINTST	16,3622		992	MODABORT	07,3661		1438 2 1437 1438
METHOD2	22,2210		406	MINUS1	7702	=	1204 1 1431	MODDONE	12,2172		1278 3 1278
METHOD3	22,2260		406 2 405 406	MINUS2	7701	=	1416 2 1258 1411	MODE	0163		73 26 308 1476
MFI	E7,1425	=	125 12 403 405	MIN5	14,3650		781 1 780	MODECADR	1335		85 12 85 1438
MFISYM	E6,1666	=	118 12 405 407	MIS	E6,1720	=	118 18 118 558	MODEEXIT	07,2675		1419 8 1419 1437
MFS	E7,1425	=	125 5 125 403	MISCJUMP	6303		1118 1 1115	MODEGOOD	07,3652		1438 1 1437
MGC	E5,1763	=	99 5 99 1358	MIXAD	41,2257		338 1 338	MODESLP	07,3656		1438 1 1437
MGIM	27,2000	=	32 1 495	MIXBR	0140	=	71 12 282 361	MODESW	07,2000	=	28 1 1418
MGLVFBIT	4767	=	57	MIXCON	5004	=	282 1 282	MODNGDEL	12,2652		1285 2 1285
MGLVFLAG	0130	=	57	MIXNN1	41,2233		338 1 338	MODPSDEL	12,2710		1286 2 1286
MG2	07,3650		1437 1 1438	MIXNN2	41,2245		338 1 338	MODREG	1214		82 23 195 1499
MIDAVBIT	4767	=	65	MIXNOUN	41,2220		338 1 335	MODROUTB	04,2007	=	373 1 373
MIDAVFLG	0224	=	65 3 1321 1348	MIXTEMP	0125	=	70 3 332 338	MODULO	20,2272		461 1 460
MIDDGIM	04,2000	=	28 1 495	MKABORT	07,2071		242 1 242	MONADR	40,2721		359 1 372
MIDFLAG	0002	=	47 6 1320 1351	MKCDUS	0357		74 1 243	MONBACK	41,2433		343 1 366
MIDFLBIT	4754	=	47	MKCDUT	0361		75 1 243	MONBUSY	41,3337		366 1 365
MIDTOAV1	13,3576		1328 1 699	MKCDUX	0362		75 3 243 245	MONDEL	5016	=	365 1 365
MIDTOAV2	13,3566		1328 2 740 808	MKCDUY	0356		74 3 243 245	MONDO	41,3314		365 1 365
MIDIFBIT	4766	=	65	MKCDUZ	0360		74 3 243 245	MONITOR	41,3224		364 7 336
MIDIFLAG	0223	=	65 4 1328 1330	MKDNCDR	17,2103		778 1 778	MONIT1	41,3226		364
MID2	13,3675		1330 1 1329	MKNDX	0353		74 3 244 246	MONIT2	41,3241		364 2 364
MID5	4343		385 1 356	MKOVBIT	4766	=	56 3 1461 1474	MONREF	41,3233		364 1 365
MID7	4171		366 4 365 1476	MKOVFLAG	0110	=	55	MONREQ	41,3267		365 2 365
MIN	0010	=	1307 4 1285 1286	MKREJECT	07,2344		247 1 243	MONSAVE	1223		82 7 204 366
MIN+	07,3403		1431 1 1430	MKRELEAS	07,2073	=	242 4 429 780	MONSAVE1	1224		82 9 204 388
MIN-	07,3536		1434 1 1430	MKRLEES	07,2073		242 3 241 555	MONSAVE2	1225		82 4 364 378
MINANG	22,2366		409 1 404	MKRQST	4752	=	1477	MOONBIT	4755	=	47
MINBLKTM	E4,1772	=	96 2 96 586	MKRUPTBB	4052		140 2 139 140	MOONCASE	16,2462		730 1 730
MINB12	7674	=	1100 1 1097	MKT2T1	0354		74 5 243 246	MOONCNTR	13,2405		766 1 766
MINB1314	05,3511		1097 1 1097	MKVBDSP	07,2023		241 2 242 248	MOONFLAG	0003	=	47 32 457 1351
MINCHECK	12,2643		1285 1 1285	MKVB5X	07,2052		242 2 241 246	MOONGON	23,2635		522 2 518 522
MINCOGA	12,3354		1297 1 1300	MKVB50	07,2054		242	MOONGONA	23,2631		522 1 521
MINCON	42,3450		363 1 362	MKVB51	07,2021		241 1 242	MOONMX	26,3416		1246 2 1243 1245
MINCON1	42,3204		349 1 351	MKVRET	07,2050		242	MOONOTH	0174	=	35 3 274 275
MINCON2	42,3202		349 2 349	MM	E7,1650	=	122 7 122 879	MOONTHIS	0173	=	34 7 274 1258
MINDB	5007		1201 3 558 708	MMADREF	41,2036		334 1 334	MOREROLL	16,3607		991 1 991
MINDEX	1177		81 4 210 221	MMATRIX	0024	=	1251 8 1243 1343	MORNUM	40,2145		328 1 328
MINIRECT	11,3434		1346 2 515 1326	MMCHANG	41,3376		373 2 334 337	MOVATHIS	13,2774	=	35 1 1326
MINKDISP	04,2434		215 6 217 218	MMDSPLAY	5350		1402 1 201	MOVEACSM	13,2774		1315 4 35 1315
MINLIM	16,3762		996 1 989	MMNUMBER	1200		81 15 208 216	MOVEALEM	13,3047		1316 3 1259 1316
MINLIMAP	16,3537		990	MMOK	04,2035		208 1 208	MOVEPCSM	13,3023		1315 3 1259 1315

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MOVEPLEM	13,3070		1316 3 1258 1316	M8RTEB28	35,3615		938 1 901	NEGOPT	40,2521		346 1 345
MPAC	0154		73 752 200 1506	M9RTEB28	35,3613		938 1 899	NEGOUT	13,2644		1240 1 1240
MPAC+	00,2436		1164 2 1163	==========				NEGP	12,3462		1298 3 1297 1298
MPAC+6	0162	=	347 6 347 385	NAVKEYIN	0016	=	42 5 201 243	NEGRATE	07,2610		764 1 764
MPAC-	00,2432		1163 2 1163	NBDONLY	06,3561		315 1 1225	NEGSGN	40,2271		330 1 326
MPACSHR	00,2033		1152 2 1160 1181	NBDX	E3,1460		88 6 308 1225	NEGTESTS	25,3202		874 1 875
MPACSRND	00,2050		1153 1 1152	NBDY	E3,1461		88 2 310 315	NEGTFF	27,3436		1383 2 1382
MPACTST	42,3464		363 1 362	NBDZ	E3,1462		88 2 311 315	NEGTOVFL	12,2373		1281 1 1280
MPACVBUF	7466		1148 4 1144 1367	NBD2	06,3577		315 1 317	NEGVEL	21,3520		1029 3 1029
MPAC2SAV	0165	=	1476 2 1461 1470	NBD3	06,3606		315 1 315	NEG0	4771		1200 18 143 1421
MPERFMSK	10,3733		1476 1 1460	NBPOSPL	33,2011		427 1 449	NEG1	7702	=	1204 6 314 1435
MPERIOD	26,2134		784 1 783	NBRANCH	11,3212		1343 4 1340 1351	NEG1/2	4751		1200 10 176 1231
MPTEMP	0135		70 62 386 1191	NBRCYCLP	E6,1725	=	110 4 110 728	NEG100	5221		1220 2 638
MR.KLEAN	05,2536		196 2 195 1489	NBRCYCLS	E6,1724	=	110 9 110 731	NEG12	00,3726		1191 3 1159 1181
MRCLEAN	17,2166		943 2 943 962	NBUSMASK	10,3727		1476 1 1464	NEG180	40,2731		360 1 359
MRKBUF1	E7,1722	=	129 58 129 834	NB1NB2	23,2277		306 2 297 629	NEG2	7701		1203 11 217 1416
MRKCHK22	07,2235		245 1 245	NB2NB1	23,2255		305 4 298 299	NEG3	7700		1203 8 333 1498
MRKIDBIT	4752	=	54	NCDU	E6,1666	=	118 3 418 419	NEG30	04,2406		215 1 208
MRKIDFLG	0074	=	54	NDCMPTST	41,2435		343	NEG30000	7671		1203 2 394 597
MRKNVBIT	4760	=	55 1 1460	NDRMSBIT	4757	=	60	NEG37	31,3525		639 1 638
MRKNVFLG	0102	=	55	NDUTINPT	36,2117		554 3 556	NEG4	6061		1110 4 1048 1473
MRKREJCT	07,2367		247 1 247	NDXCHNGE	12,2305		1279 2 1279	NEG47	14,3647		781 1 781
MRKRTMP	E6,1444	=	107 4 698 719	NDXCTR	E5,1421		102 3 427 428	NEG47UT	36,2475		560 1 556
MRUPTBIT	4764	=	55 1 1468	ND1	4352		385 7 330 448	NEG6	04,3770	=	215 1 209
MRUPTFLG	0106	=	55	NEARLY1	26,3343	=	303 1 303	NEG7	5736	=	224
MSIN7.5	35,3633		938 1 904	NEARONE	26,3343	=	1386 7 303 1383	NEG79	04,2031		208 1 208
MSTORE1	01,2364		1192 2 1193 1196	NEAR1/4	26,3163		887 2 857	NEJETBTS	24,3616		737 2 737
MU(P)	0032	=	1353	NEEDLBIT	4760	=	47 1 1021	NETZERO	6070		1111
MUCHTIME	01,3462		1235 2 1234	NEEDLEIN	17,2321		945 1 945	NEWANGL	22,3052		418 3 416 559
MUEARTH	13,3737		1353 9 491 1353	NEEDLER	21,2425		1009 9 541 1090	NEWANGLE	26,3543		1248 4 1246 1249
MULTEXIT	5722		1486	NEEDLER1	21,2436		1009 1 1009	NEWAZMTH	E5,1635	=	103 3 447 452
MUM	13,3735	=	1353	NEEDLER2	21,2467		1009 2 260 1009	NEWAZ1	E5,1635	=	103 2 444
MUSUBC	E7,1557	=	134 3 134 460	NEEDLES	21,2503		1010 1 261	NEWDEL	12,2706		1286 2 1286
MUSUBE	E7,1551	=	134 4 134 460	NEEDLES3	21,2476		1010 1 1009	NEWDELHI	22,3037		418 1 421
MUSUBN	E7,1573	=	134 2 459 460	NEEDLEUP	16,3063		951	NEWDELX	12,2325		1280 3 1279 1280
MUSUBS	E7,1565	=	134 3 134 460	NEEDLE11	21,2450		1009 1 260	NEW1BIT	4754	=	62
MUTABLE	11,2300		1305 5 496 1289	NEEDLFLG	0006	=	47 1 257	NEWIFLG	0172	=	62 3 1319 1324
MWAITBIT	4756	=	54	NEG	6710		1131 4 1131	NEWJOB	0067		69 23 203 1401
MWAITFLG	0100	=	54	NEG.2	40,2525		346 1 360	NEWLIST	05,3467		1097 2 1097
MXM3	22,2304		408 4 398 418	NEGAMA	25,2750		870 1 865	NEWLMBIT	4753	=	62
MXV	7270		1143 1 1117	NEGBPW	05,3444		958 1 956	NEWLMFLG	0171	=	62 3 565 763
MYSTEND	22,3161		420 1 418	NEGCOS	13,2636		1240 1 1240	NEWLOC	0065	=	69 10 224 1216
MYSUBS	21,2000	=	30 1 997	NEGMAX	4752	=	1204 12 421 1226	NEWMODE	6027		1109 6 1125 1502
M144RTE	35,3601		938 1 932	NEGONE	7702		1203 26 169 1394	NEWMODEA	5347		1402 4 215 1499
M15RTE	35,3603		938 1 915	NEGOPCMD	10,2170		177 1 177	NEWMODEX	5344		1402 11 435 1493

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NEWOPS	6037		1109 1 1108	NO.MMS	0047	= 227	1 227	NOLEM	17,2614		1039 1 1038
NEWPAR	14,2545		752 1 752	NO.PASS	0737	76	2 565 763	NOLEMVAL	05,3410		958 1 956
NEWPHASE	4126		238 8 438 829	NO.T5VAR	21,2633	1013	1 1012	NOMONLST	05,2113	= 179	
NEWPRIO	0063	= 69	12 221 1466	NO.WDS	6213	1114	5 1114 1182	NOMTIG	E7,1447	= 121	6 121 730
NEWRNVN	26,2257		793 1 793	NO.056	25,2255	858	1 858	NOMTPI	E4,1754	= 96	5 467 668
NEWROLL	16,3612		991 2 991	NO.12-10	16,3735	993	1 993	NOMXFIRE	16,3635		992 1 992
NEWSTATE	12,2723		1287 1 1289	NO.13-15	16,3705	993		NONAVKEY	05,3043		202 5 198 202
NEWTBIT	4757	= 56		NO.16-14	16,3726	993		NOOPRATE	4077		178 3 171 177
NEWTFLAG	0120	= 56	2 457 461	NO.9-11	16,3714	993	1 993	NOPC	04,2642		218 1 218
NEWTN	10,2347		680 2 680	NOACCALM	4764	= 85	1 1425	NOPIE	35,2622		479 1 479
NEWZCMP1	31,3730		1260 2 1260	NOACY	17,3111	1045	3 1044	NOPOLY	34,2612		548 3 543
NEWZCOMP	31,3705		1260 1 1254	NOADJUST	42,3567	941	2 940 941	NOPOLYM	33,3750		545 1 548
NEXBNKSS	33,3336		450	NOATTOFF	07,3207	1425	4 151 1424	NOP01BIT	4755	= 49	3 195 1446
NEXTBNKS	33,3322		450	NOAZCHGE	33,3152	447	1 446	NOP20	04,2431		215 1 215
NEXTCDU	07,3004		1421 4 1421 1422	NOAZFLG1	34,3505	596	1 596	NOQBRSM	5327		1232 1 140
NEXTCOL	11,3541		1348 2 1349	NOAZIM	36,2105	554	1 553	NOQRSM	5325		1232 4 204 995
NEXTCORE	01,2667		1212 2 1211	NOBDZ	17,3027	1043	3 1042 1043	NORATE	21,3032		1018 1 1 17
NEXTES	35,2500		476 1 475	NOCHANGE	21,2753	1016	1 1016	NORESET	07,3347		1429
NEXTIME	E6,1671	= 118	3 421	NOCHORLD	33,3155	447	1 446	NORFBIT	4756	= 47	
NEXTINCL	05,3474		1097 1 1097	NOCOARSE	05,2676	199	1 199	NORFHOR	0004	= 47	4 637 638
NEXTINSL	05,3622		1099 1 1097	NODAPUP	43,2522	262	1 262	NORFINAL	13,3405		1323
NEXTLINE	23,2573		521 1 521	NODDOT	26,3634	1251	1 1246	NORMADR	42,3310		351 1 350
NEXTOPT	10,2157		177 4 177 178	NODIO	26,3642	1251	1 1246	NORMBNCH	10,3306		1469 1 1475
NEXTVEC1	31,2527		629 1 629	NODISKY	25,3604	882	1 881	NORMEX	1023		78 16 473 670
NEXTVEC2	31,2537		629 1 629	NODOBIT	4770	= 52	3 210 1067	NORMGAM	E4,1614	= 93	5 93 1261
NEXTW2W8	30,2521		610 1 610	NODOFLAG	0054	= 52	7 228 1488	NORMLIZE	37,3154		836 3 234 827
NEXT1	25,3177		874 1 874	NODOP01	0022	= 49	1 537	NORMLOP	33,2421		439 1 439
NICKELDP	35,3556		671 1 674	NODSPOUT	06,2126	145	2 143	NORMRET	10,3651		1475 3 1473
NINE	4322	= 1204	8 447 1044	NODSPY	06,2150	145	1 145	NORMSW	0156	= 60	7 491 1291
NINEB4	26,2232		791 1 791	NOEBANK	43,3314	1396	1 1397	NORMTEM1	1250	= 82	3 769 1466
NINETEEN	4351	= 949	2 945 951	NOFLASH	24,3466	712	1 710	NORMTEST	00,3507		1186
NJET	17,3342		1053 3 1049 1052	NOGAMDOT	37,3620	894	1 894	NORMT4	06,2007		141 2 141
NJETSBIT	4752	= 48	2 721	NOGAMDUT	15,2300	1072	1 1071	NORMWAKE	10,3553		1473 1 1475
NJETSFLG	0017	= 48	3 732 903	NOGIMRUN	06,2466	156	3 155 156	NORMZI	0044	= 1261	12 1260 1261
NJ22	21,3600		1030 2 1030	NOGO	22,2723	415	1 404	NOROLL	16,3661		992 6 989 992
NJ23	21,3631		1031 2 1031	NOGOM2	22,2720	415	1 418	NOROLL1	16,3746		995 1 996
NN	E7,1765	= 133	12 130 676	NOGOM3	22,2717	415	1 557	NOROL1T6	16,3754		996 1 992
NNADTAB	42,2127		283 1 282	NOGOOD	36,2253	556	1 556	NOSAM	14,3664		787
NNADTEM	0146		71 8 282 358	NOGUESS	12,3530	1299	1 1297	NOSAVPIP	37,2723		829 1 828
NNTYPTAB	42,2273		287 1 282	NOHIAUTO	21,2724	1015	1 1015	NOSWBIT	4762	= 59	
NNTYPTEM	0147		71 5 282 357	NOIBNKSW	6032	1109	1 1149	NOSWITCH	0142	= 59	3 872 881
NN1	E7,1765	= 131	1 292	NOIMUDAP	4763	= 85	11 151 1424	NOTBIT12	7674	= 393	2 392 393
NN1A	E7,1727	= 131	12 899 929	NOINT	13,2753	1314	1 1313	NOTCDH	27,2066		221 1 220
NN2	E7,1545	= 131	8 131 932	NOKILL	43,2750	273	1 273	NOTIME	05,3756		1330 2 1329 133
NO.CORES	01,2627		1211 2 1211 1216	NOLDCALC	25,2253	858	2 858	NOTPLAN	14,3700		787 1 787

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NOTR67ND	22,2740	415	1 415	NVBNKTEM	1243	82	1 378	N49DISP	E7,1501	= 125	13 292 632
NOTSET	35,3544	645	1 645	NVBUSMSK	10,3732	1476	3 1471 1477	N89ERRX	30,2323	563	2 563
NOTTPI	27,2044	220	1 220	NVCADR	10,3724	1476	1 1472	N90/N81	12,2005	657	2 654 656
NOTYET	20,3644	1066	1 1066	NVCOM	40,2254	330	1 330	N90RET	E5,1551	= 105	5 105 663
NOT4TH	14,3407	763	1 762	NVDSP	10,3315	1469	3 1461 1476	N90TAG	12,2000	= 29	1 656
NOUN	40,2265	330	1 327	NVDSP1	10,3347	1470	1 1470	==========			
NOUNADD	0145	= 71	25 338 384	NVMONOPT	4203	378	1 1470	OBLATE	11,2754	1340	2 1336 1337
NOUNCADR	1222	82	9 335 384	NVQTEM	1242	82	3 378	OBTAINLL	30,2300	562	1 564
NOUNREG	1205	82	15 204 383	NVSAVE	0370	75	3 195 1475	OCCLCOMP	31,2515	629	1 631
NOUNTEM	0122	= 70	3 338	NVSBBBNK	4223	378	2 378	OCCOS	13,2445	767	2 766 767
NOUNTEST	41,2453	343	2 353 354	NVSBENDL	40,3431	383	1 372	OCCULT	14,2552	752	2 751
NOUT	1221	82	9 143 390	NVSUB	4202	378	3 250 1476	OCDUFBIT	4762	= 85	5 169 1485
NOUTCON	4775	= 1204	1 204	NVSUBB	41,3513	= 334	1 378	OCDUFTST	06,3221	173	2 169 172
NOUVEAU	04,2352	214	1 211	NVSUBCOM	4212	378		OCDUINHT	4767	= 86	2 170 173
NOVAC	5121	1208	23 241 1475	NVSUBEND	4224	378	3 379 383	OCTAL3	6214	1114	1 1204
NOVACADR	5310	1225	1 1413	NVSUBUSY	10,3476	1472		OCTBACK	41,3372	370	1 372
NOVAC2	01,2620	1211	1 1208	NVSUB1	41,3513	379	2 334 378	OCTHIRTY	5001	= 174	4 169
NOVAC3	01,2623	1211	1 1212	NVSUB2	41,3537	379	1 379	OCT00010	4765	= 221	
NOVAC30	5120	1208	5 144 1445	NVTEMP	0123	= 70	8 378 382	OCT00060	21,3061	1018	
NOVRWRT	35,2676	481	1 482	NVWORD	0366	75	6 1467 1475	OCT00300	21,3062	1018	
NOV37MM	04,3173	227	1 210	NVWORD1	0777	77	23 528 1471	OCT01120	04,3051	224	
NOXLNCMD	17,2625	1039	1 1038	NV50DSP	10,3350	1470	3 1461 1471	OCT01400	21,3060	1018	1 1032
NO2Y	17,3370	1055	4 1055	NWAITBIT	4757	= 55		OCT01760	21,3057	1018	1 1016
NO2Z	17,3374	1055	3 1056	NWAITFLG	0101	= 54		OCT02200	20,2460	720	1 718
NPJETS	E6,1523	= 112	7 112 1050	NWNGL17D	22,3073	418		OCT02202	24,3520	714	1 708
NRJETS	E6,1522	= 112	13 112 1056	NXPOSVEL	40,3724	641	1 641	OCT10000	4754	= 201	
NRMAG	0040	= 1371	7 818 1381	NXTBNK	43,3565	1400	2 273 1401	OCT10001	7617	= 1204	
NRMIDBIT	4754	= 54		NXTFL33	06,2424	154	7 164 165	OCT11	4322	= 1200	1 579
NRMIDFLG	0076	= 54		NXTIBT	06,2412	154	3 154	OCT12	4355	= 714	1 1092
NRMNVBIT	4761	= 55		NXTIFAIL	06,2222	148	11 157 163	OCT120	5014	= 1204	1 996
NRMNVFLG	0103	= 55		NXTIFBIT	06,2210	148	3 148	OCT13	4775	= 174	2 170 747
NRTERM	0020	= 1371	7 818 1380	NXTRST	05,2766	201	1 201	OCT14	5775	1489	5 168 1476
NRUPTBIT	4765	= 55		NXTSUPR	43,3612	1400	1 1400	OCT140	5015	= 1204	
NRUPTFLG	0107	= 55		NXXTBNN	33,2717	444		OCT1400	5024	1201	11 211 1411
NSEC	15,2620	1079	1 1077	NYJETS	E6,1524	= 112	6 1041 1051	OCT14000	5053	= 1408	2 1407 1408
NTP/2	23,3165	676	2 676	NZERO	17,2524	949	2 943 946	OCT15	4776	1200	4 166 1178
NTP/2A	23,3177	676	1 677	NZEROJR	17,2525	949	1 946	OCT15000	5054	= 168	1 166
NUCHANG2	01,3002	1215	1 1220	N10	E6,1705	= 110	39 110 980	OCT16	4321	= 1178	2 786 1178
NUDIRECT	01,3207	1220	1 1220	N22ORN17	0220	= 64	2 257	OCT16000	21,3064	1018	4 1016 1027
NUFAZ+10	4140	238		N2217BIT	4763	= 64	1 1021	OCT17	4777	= 589	1 578
NUJET	E6,1612	= 116	7 116 1088	N26/PRI	1016	78	5 283 374	OCT1720	06,2776	168	1 164
NUM	40,2074	327	9 326 327	N26/2CAD	1017	78	1 374	OCT176	00,2126	1155	2 1161
NUMGRPS	4773	= 205	2 200 201	N45ENAJ	35,3113	486	1 486	OCT177	6043	= 1416	1 1413
NUVCSM	E3,1600	90	1 633	N45NORM	35,3075	486		OCT1777O	5036	1202	2 1406 1408
NUVLEM	E3,1652	90		N45PROC	35,3071	485	1 485	OCT21	4352	= 354	1 354

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
OCT22	5000	1201	2 224 1447	OCT77770	5736	1488	2 224 1394	OMEGAYB	E6,1535	= 108	3 967
OCT220	01,3750	1440	1 1440	OC40010	7664	= 168	1 167	OMEGAYC	E6,1527	= 108	2 943 966
OCT23	4351	= 1204	1 1114	OGA	E6,1647	= 110	6 110 989	OMEGAZB	E6,1537	= 108	3 970 971
OCT24	4124	208	8 174 1492	OGAD	E6,1447	107	2 702 951	OMEGAZC	E6,1531	= 108	1 970
OCT25	4353	= 1204		OGAERR	E6,1647	= 110	1 951	OMEGMOON	13,3136	1317	1 1317
OCT2600	5044	1202	1 1470	OGANOW	E6,1645	= 110	10 110 987	ONCEMORE	33,2612	442	
OCT27/24	4615	= 714		OGAPAST	E6,1646	= 110	3 110 987	ONE	4770	= 1204	173 143 1503
OCT272	06,2774	168	1 160	OGARATE	E6,1533	= 110	10 136 991	ONE7C	31,3474	639	2 630
OCT30	5001	= 354	1 354	OGC	E5,1757	= 99	21 99 1359	ONEBIT	15,3431	1288	3 663 1299
OCT30000	4346	= 201		OGCPL	33,2220	432	1 442	ONEB4	34,3770	= 791	1 791
OCT30002	6440	= 1204		OHWELL1	42,3647	1494	5 1494	ONEDPP	33,2667	443	2 430 447
OCT31	4125	208	5 363 833	OHWELL2	42,3672	1494	4 1494 1495	ONEORTWO	5416	1407	1 1408
OCT34	4172	366	3 245 362	OKGIMB	21,2717	1015	3 1015	ONETHTH	35,3562	672	1 674
OCT34300	10,3734	1476	1 1460	OKMAX	35,2454	475	1 475	ONMNITOR	37,2770	831	1 831
OCT37	4342	= 1201	3 202 700	OKN81	22,3550	685	3 685	ONROLL	16,3500	990	1 989
OCT37737	06,2160	145	1 156	OKPHI	22,2715	414	1 414	OPDEGINZ	40,2766	36	
OCT37766	7661	1203	2 551 1000	OKTHETA	22,2675	414	1 414	OPDEGOUT	40,2505	345	1 345
OCT37774	7662	1203	1 202	OKTOCOPY	10,3002	1464	2 1463 1468	OPDISAB	06,3256	173	1 169
OCT37776	7663	1203	7 145 1473	OKTOENT	10,3530	1473	1 1475	OPFAILOF	06,3247	173	1 173
OCT40	4763	= 174	1 171	OKTOGRAB	13,3561	1325	1 1324	OPFAILON	06,3232	173	
OCT40001	6056	1110	2 1204 1226	OKTOPLAY	10,3043	1464	3 1464	OPIMDIFF	43,2165	254	1 253
OCT4C010	7664	= 1423	2 1423 1425	OKU12	22,2250	406	1 406	OPJUMP	6046	1109	1 1109
OCT40200	7670	1203	2 1485	OKU21	22,2224	406	1 406	OPJUMP2	6216	1115	1 1109
OCT40201	01,3117	1218	1 1226	OKU31	22,2274	407	1 407	OPJUMP3	6232	1116	1 1115
OCT404	14,3310	761	1 761	OK2DELAY	00,3745	1481	1 1481	OPMD1BIT	4764	= 85	1 169
OCT41	26,2545	806	1 795	OLDAZMTH	E5,1637	= 103	3 444 447	OPMD2BIT	4765	= 85	
OCT44571	04,3046	224	1 211	OLDAZ1	E5,1637	= 103		OPONLY	06,2342	152	1 150
OCT50	5004	1201	11 214 1476	OLDBT1	1277	= 83	1 833	OPTCADR	1336	= 85	2 241 242
OCT51	17,2032	274	2 274 275	OLDELP	E6,1706	= 115	3 115 1071	OPTCOARK	43,2166	255	1 253
OCT54	5005	= 143		OLDELQ	E6,1707	= 115	3 115 1070	OPTCOARV	43,2164	= 255	1 255
OCT55000	40,3634	393		OLDELR	E6,1710	= 115	3 115 1071	OPTC1	43,2207	255	3 255
OCT600	04,3047	224	1 211	OLDMKTME	E7,1733	= 130	3 130 587	OPTDATA	33,3221	449	1 449
OCT60000	4076	= 1204	2 107 1408	OLDPRIO	5430	1407	1 1410	OPTDATA8	33,3231	449	1 449
OCT605	35,3627	938	3 901 932	OLDUYA	E7,1533	= 122	3 122 890	OPTDEGIN	40,2761	360	1 359
OCT612	35,3630	938	1 913	OMEG/MS	33,2223	432	2 431 432	OPTDRIVE	10,200	175	1 145
OCT613	16,3036	920	1 920	OMEGA	E7,1457	= 125	9 125 1256	OPTDRV	10,2000	= 28	1 175
OCT62	5011	= 1442	2 215 1442	OMEGAB	E6,1533	= 108	9 108 182	OPTFLAG	E7,1545	= 126	5 513 515
OCT6200	05,2562	197	1 196	OMEGAC	E6,1525	= 108	13 108 727	OPTIND	1323	84	23 169 757
OCT7	4774	= 1478	3 1406 1411	OMEGACLC	16,2323	727		OPTINITF	05,3251	2 5	1 195
OCT700	10,3732	= 1477	1 1470	OMEGAES	E4,1546	= 93	1 791	OPTINITR	5001	= 205	1 199
OCT740	06,2777	168	1 161	OMEGAM1	E5,1642	= 101	3 101 1257	OPTIONEV	1256	83	1 518
OCT74777	05,3245	205	1 202	OMEGAM2	E5,1650	= 101	3 101 1257	OPTIONVN	24,2102	506	1 506
OCT75	5012	1201	1 167	OMEGAM3	E5,1656	= 101	3 101 1257	OPTIONX	1255	= 82	5 279 5 6
OCT75252	06,3557	314	1 156	OMEGAXB	E6,1533	= 108		OPTION1	0775	77	6 135 1465
OCT77603	05,3244	205	1 202	OMEGAXC	E6,1525	= 108		OPTION2	0776	77	14 182 903

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SYMBOL	DEF	H	REFERENCES
OPTMODES	1337		85 33 135 1485
OPTMON	06,3001		169 1 145
OPTNTYPE	1351		86 4 555 744
OPTTEST	06,2124		145 2 145
OPTVARK	20,3356		976 1 976
OPT2	10,2046		176
ORBITAL	11,2000	=	29 2 1332 1333
ORBITAL1	11,2000	=	29 1 1352
ORBITAL2	13,2000	=	29 1 1352
ORBWFBIT	4763	=	53
ORBWFLAG	0066	=	53 15 227 1349
ORDERBIT	4763	=	63
ORDERSW	0201	=	62 3 1285 1286
ORIGCHNG	11,3360		1345 2 1320 1345
ORIGEX	E4,1667	=	93 7 93 1345
OTHINT	31,2244		511 1 512
OTHPREC	13,3161	=	34 2 515 518
OT4OCIO	7664		1203 3 168 1477
OUT	13,2227		515
OUTPULSE	07,3461		1432 2 1432
OUTPUT	20,2431		719 3 719
OUTTAG	E6,1611	=	116 4 116 1089
OUTO	0010	=	42 5 142 146
OVERADAY	23,2243		305 1 305
OVERFFIX	33,2122		430 1 431
OVERFLOW	6766		1134 3 1133 1156
OVERFLWY	6763		1134 4 1132 1156
OVERFLWZ	6760		1134 4 1132 1156
OVERNOUT	25,3575		881
OVF+	00,2413		1162 2 1162
OVFIND	0121		70 13 898 1214
OVFLCLR	12,3253		1295 1 1295
OVRLINE	15,3060		1085 1 1085
OVRLINE1	15,3066		1085 2 1083 1085
OVRLINE2	15,3070		1085 1 1085
OVSPOT	21,2524		1010 1 1010
OZONE	10,2016		175 2 175
==========			
P	E5,1741	=	100 15 100 1303
P(T1)	E7,1745	=	131 3 131 912
P/RJCODE	15,2634		1080 4 1074 1088
P/RPRE	0032	=	132 2 915 916
PAC	E5,1775	=	99 10 99 786
PACLIM	20,2745		967
PACTEMP	0330	=	74 4 759 764
PACTIVE	05,2774		201 1 201
PACTOFF	E6,1423		106 16 135 562
PACTTMP	E6,1655	=	110 4 110 953
PADLONG	1135	=	80 1 538
PARAM	17,3727		1289 4 915 1303
PARAM30	35,3505		644
PARTRACK	43,3103		279
PASSCNT	1131	=	80 3 565 763
PASSIVE	22,3314		500 4 476 667
PASSNN	04,3561		663 1 663
PASSOUT	30,2122		461 2 460
PASSTIME	E7,1541	=	134 5 134 461
PASS75	04,3516		662 1 662
PASS82	04,3537		663 1 663
PASTEOPT	4157		366 1 366
PASTEVB	4151		366 3 343 372
PAXERR	E6,1476	=	117 1 1090
PAXERR1	E6,1713	=	115 9 115 1090
PBIAS	24,3545		714 1 697
PBIASX	E3,1452		88 1 88
PBIASY	E3,1454		88
PBIASZ	E3,1456		88
PBLASTOK	17,3211		1050 1 1049
PBODY	E4,1550		93 19 93 1351
PBYPASS	17,3361		1054 1 1049
PCBIT	4770	=	67 1 218
PCDUDOTS	20,2653		966
PCDUYPST	E6,1636	=	109 4 109 974
PCDUZPST	E6,1637	=	109 4 109 974
PCFLAG	0244	=	67 10 216 748
PCLOOP	05,2745		200 1 200
PCMANBIT	4752	=	65 1 555
PCMANFLG	0226	=	65 5 208 509
PCMD	E6,1623	=	109 9 109 969
PCON	E7,1717	=	131 3 131 935
PCOPY	20,3004		969 2 963 968
PCOPYCYC	20,3002		968
PCP76	04,2644		218 1 218
PDA	0026	=	74 2 299
PDAPEND	20,3003		968
PDDL	6472		1126 1 1117
PDELOFF	E6,1605	=	109 7 109 967
PDSPFBIT	4755	=	54 3 395 590
PDSPFLAG	0077	=	54 3 395 572
PDVL	6526		1127 1 1117
PDXCHNGE	12,2341		1280 2 1280
PEGGY	05,3362		957 2 956 957
PERFCHEK	10,3361		1470
PERFDLAY	E5,1656	=	103 3 428 444
PERFERAS	33,2607		442
PERFMASK	10,3717		1476 2 1465 1467
PERFRQST	4764	=	1477 2 1461 1470
PERF2MSK	5001	=	1476 1 1467
PERF2	14,2320		748 2 747 749
PERF4MSK	5775	=	1476 1 1465
PERIAPO	22,3204		498 1 674
PERIAPO1	22,3174		498 3 468 677
PERIODCH	12,2160		1278 1 1278
PERORLIM	20,2727		967
PERRB	E6,1575	=	109 4 109 969
PFAILOK	07,3175		1425 1 151
PFAILOK2	07,3170		1425 1 1425
PFORWARD	20,2730		967
PFRATBIT	4765	=	52 2 700 744
PFRATFLG	0051	=	52 4 698 755
PGNCSALT	1133	=	80 2 80 538
PHASCHNG	5402		1406 112 206 1500
PHASETAB	10,2000	=	28 2 1402 1408
PHASETMP	E6,1611	=	110 2 946 947
PHASE1	1156		81 4 201 1410
PHASE2	1160		81
PHASE3	1162		81
PHASE4	1164		81
PHASE5	1166		81 3 540 838
PHASE6	1170		81
PHEXIT	13,3302		1321 1 1321
PHICALC	32,2166		649 1 649
PHIDOT	E6,1705	=	115 7 115 1090
PHIV	E4,1565	=	93 6 93 1347
PHI2	E7,1750	=	131 6 131 927
PHI333	E6,1506	=	108 11 108 957
PHSBB1	E3,1437		88
PHSBB2	E3,1441		88
PHSBB3	E3,1443		88
PHSBB4	E3,1445		88
PHSBB5	E3,1447		88
PHSBB6	E3,1451		88
PHSCHK2	16,3302		962
PHSCHNG2	10,2473		1408 1 1407
PHSNAME1	E3,1436		88 7 223 1413

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
PHSNAME2	E3,1440		88	PIPASCFY	E3,1455		88	POLY	7171		114 1 3 3 1385
PHSNAME3	E3,1442		88	PIPASCFZ	E3,1457		88	POLYCNT	0140	=	71 4 1140 1141
PHSNAME4	E3,1444		88	PIPASR	37,3171		837 2 827 828	POLYCOEF	12,3074		1292 1 1294
PHSNAME5	E3,1446		88 2 895	PIPAX	0037	=	40 11 135 1501	POLYCOM	7201		114 1 114
PHSNAME6	E3,1450		88	PIPAY	0040	=	40 6 135 1501	POLYLOC	E6,1673	=	118 1 548
PHSPART2	01,3724		1416 1 1218	PIPAZ	0041	=	40 8 182 1501	POLYLOOP	7211		1141 1 1141
PHSPRDT1	1260		83 5 1407 1415	PIPCHECK	37,3012		832 1 832	POLYNUM	E6,1661	=	118 3 118 543
PHSPRDT2	1262		83 3 211 628	PIPCTR	1066	=	79 4 79 831	POLYRET	0141	=	71 3 1140 1141
PHSPRDT3	1264		83 1 83	PIPFAIL	06,2653		164 1 168	POLYSTOP	E6,1703	=	118 2 119 543
PHSPRDT4	1266		83 1 221	PIPFREE	07,3231		1426 1 834	POLYZ	7214		1141 1 1141
PHSPRDT5	1270		83 1 869	PIPFREE2	07,3226		1426 1 1426	POOBIT	4760	=	53
PHSPRDT6	1272		83 2 645	PIPLOOP	37,3026		832 2 832	POODOO	5726		1488 1 372 1464
PHS2CADR	01,3127		1218 1 1411	PIPSDONE	37,2653		828 1 839	POOFIZZ	04,2311		213 1 213
PI/16	34,3760		1386 2 1382 1384	PIPTIME	1043		78 20 78 1327	POOFLAG	0063	=	53 2 1314 1324
PI/4.0	23,3015		575 2 574 631	PIPTIME1	1104	=	79 9 79 1329	POOH	04,2216		211
PICEND	14,2606		753 1 751	PIPUSE	07,3214		1426 2 317 435	POOKLEAN	05,2542		196 1 212
PICKANG1	27,2334		399 1 399	PIPUSE1	07,3220		1426	POSDEL	12,2672		1286 1 1285
PICKAXIS	27,2355		400 2 398	PIP2FLBT	4754	=	85 3 154 1425	POSDELX	12,2313		1280 1 1279
PICKX	27,2407		400 2 400	PITCHANG	0026	=	941	POSEC	42,3323		351 2 351
PIC1	14,2456		751 3 751 752	PITCHDAP	20,2644		966 1 981	POSECADR	26,2430		799 1 795
PIC2	14,2461		751 1 751	PITCHTIM	17,3153		1049 3 1055 1056	POSEXIT	E6,1724	=	116 5 116 895
PIC3	14,2470		751 6 751 752	PITCHT5	20,3616		981 2 970 974	POSGN	40,2304		33 1 326
PIC4	14,2473		751 1 751	PJETS	17,2722		1041 3 1040 1061	POSITON	E5,1423		1 2 4 427 432
PIKUP20	36,2157		555 2 230 555	PLANET	14,3651		786 4 754 776	POSMAX	4750		120 35 157 1231
PINACT	05,3001		201 1 201	PLANTIN	26,2000	=	31 1 1243	POSNV	E5,1530	=	1 3 2 441
PINBALL1	40,2000	=	34 11 326 640	PLANVCOT	E7,1731	=	130 3 130 603	POSN17C	33,2744		444 2 444 447
PINBALL2	41,2000	=	34 7 334 378	PLANVEC	E5,1600	=	97 6 97 776	POSOPCMD	10,2153		177 1 177
PINBALL3	42,2000	=	34 3 282 362	PLAYJUM1	10,3061		1465 3 1469 1476	POSTAND	26,3735		1443 2 1442 1443
PINBRBIT	4763	=	55	PLAYTEM1	0155	=	1476 23 1459 1467	POSTBURN	24,3174		7 8 3 233 708
PINBRFLG	0105	=	55 1 1469	PLAYTEM3	0157	=	1476 3 1467 1474	POSTCOH	E7,1471	=	133 4 133 681
PINBRNCH	10,3275		1469 6 210 1475	PLAYTEM4	0160	=	1476 12 1459 1474	POSTCOM	26,3762		1444 2 1444
PINDEX	E6,1520	=	112 3 112 1040	PMANNDX	E6,1657	=	114 4 114 1024	POSTCSI	E7,1457	=	133 3 133 681
PINIDMSK	10,3751		1477 1 1473	PMINE	35,3554		671 2 681	POSTJUMP	4655		1104 61 151 1496
PINMASK	7673	=	1476 1 1469	PMINM	35,3564		672	POSTPOLY	34,2371		543
PINSUPBT	4223	=	378 4 257 382	PMISC	20,3027		969	POSTTLI	36,2012		532 1 532
PINSUPER	40,2000	=	34 3 257 517	PMMASK	10,3730		1476 1 1465	POSTTPI	E5,1640	=	98 3 98 468
PINTEGRL	20,2701		966 1 966	POFFSET	20,2742		967	POST41	24,3403		711 3 698 712
PINTEST	43,2002	=	389	POINTAXS	31,3002		633 2 629 630	POSVEL	21,3510		1029 3 1029
PIPABIAS	E3,1452	=	88 1 308	POINTER	0156	=	1416 7 1413 1416	POSVEL2	35,3134		486 1 486
PIPACHK	33,2103		428 1 428	POINTEX	1006	=	77 9 77 639	POSVEL3	35,3135		486
PIPAFLBT	4757	=	84 5 164 1426	POINTVSM	E6,1756	=	118 15 118 696	POS1/2	4753	=	1204 9 1068 1226
PIPAGE	1067	=	79 5 79 838	POINT1	26,3155		887 1 874	POUT	20,2746		967
PIPASC	33,3426		452 1 440	POINT8	26,3271		889 1 599	POWDNCOD	6214	=	541 1 537
PIPASCF	E3,1453	=	88 1 308	POLISH	0117		70 38 70 1199	POWFLITE	23,2000	=	31 1 1364
PIPASCFX	E3,1453		88 1 88	POLLEY	5077		1207 2 1207	POWFLIT1	23,2000	=	31 1 1370

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POWFLIT2	23,2000	= 31	1 303	PRELTERM	33,3203	448	2 448	PRIO31	7652	1203	4 317 996
POWRSERS	7164	1140	1 543	PREMM1	04,3124	= 226	4 210 227	PRIO32	7654	1203	2 827 1472
PPRECOMP	20,2754	967		PREMTRXC	E5,1632	= 103	5 446 453	PRIO33	7655	1203	1 1464
PRAMSET	12,3763	1305	3 1289 1303	PREMTRX1	E5,1632	= 103	1 444	PRIO34	7656	1203	3 1004 1204
PRDTTAB	01,2000	= 230	3 1414 1415	PREPTVC	24,2711	702	1 704	PRIO35	7657	1203	1 1225
PRE-HUNT	25,3013	871	1 234	PREREAD	37,2607	826	3 235 808	PRIO37	7660	1203	6 205 1474
PREBJUMP	5351	1402		PREREAD1	37,2630	827	2 537 826	PRIO4	4755	= 1204	2 261 941
PRECHECK	24,2625	700	4 232 700	PRERORS	43,3200	1394	3 1395	PRIO5	5047	1202	8 211 1313
PRECIBIT	4761	= 53		PRESINE	00,3523	1187	2 1187	PRIO6	5050	1202	4 178 1394
PRECIFLG	0064	= 53	6 227 1324	PRESTAND	26,3656	1442	1 1442	PRIO7	5051	1202	8 219 563
PRECOMP	20,3372	976	2 968 971	PRESTORE	6370	1122	1 1122	PROCDBIT	4753	= 85	2 144
PRECSET	22,3236	500	4 467 683	PREVGAM	26,3051	818	2 813 814	PROCEEDE	06,2076	144	
PRECX	32,3100	920	3 916 920	PRE40.6	20,2355	718	2 236 710	PROCESSW	06,3050	169	
PREC100	32,2546	915	1 902	PRFMSTAQ	4776	= 776	1 774	PROCKEY	40,3311	375	1 144
PREC120	32,2554	915	1 919	PRIOBORT	10,3041	1464	2 1463 1472	PROCKEY1	40,3317	375	
PREC125	32,2562	915	1 918	PRIOCHNG	5176	1210	18 242 1474	PROCTNON	06,2237	150	1 150
PREC130	32,2606	916	1 915	PRIOCH2	01,3063	1217	1 1210	PROGLARM	5716	1486	2 1486
PREC132	32,2611	916	1 918	PRIODBIT	4753	= 54	1 1469	PROG20	36,2016	552	1 225
PREC140	32,2614	916	1 916	PRIODFLG	0075	= 54		PROG21	37,2000	456	2 225 458
PREC150	32,2617	916		PRIODSP	10,2753	1463	2 572 585	PROG22	30,2153	561	1 225
PREC155	32,2632	916		PRIODSPR	10,2750	1463	1 1487	PROG22A	30,2206	561	2 561 618
PREC160	32,2644	916	1 916	PRIODSPY	4762	= 1477		PROG22B	30,2240	562	1 562
PREC162	32,2654	916	1 916	PRIOENT	5677	1486	2 1487 1489	PROG22C	30,2247	562	
PREC165	32,2662	916	2 916	PRIOLARM	10,3766	1487	1 761	PROG24	13,2254	565	1 225
PREC167	32,2677	917	1 917	PRIOOCT	10,3740	1476	2 1461 1467	PROG52	14,2002	743	3 225 743
PREC168	32,2701	917	1 917	PRIOPLAY	10,3062	1465	1 1464	PRONVBIT	4762	= 55	
PREC170	32,2710	917		PRIORITY	0167	73	29 203 1466	PRONVFLG	0104	= 55	
PREC172	32,2755	918	1 918	PRIOTIME	1005	77	2 1464 1473	PROUT	33,2202	431	1 538
PREC173	32,2757	918	1 918	PRIO1	4757	= 1204	1 541	PRSHRTMP	4403	386	4 347 349
PREC174	32,2767	918	1 918	PRIO10	4754	= 1204	7 264 717	PRTRCK	43,3105	279	2 279
PREC175	32,2775	918	2 915 917	PRIO12	4664	1104	4 194 704	PRT2CADR	01,3133	1218	1 1413
PREC205	32,3012	918		PRIO13	5052	1202	6 221 808	PSIV	E4,1573	= 93	3 93 1347
PREC205M	32,3031	919	1 918	PRIO14	5053	1202	6 396 1411	PSI333	E6,1507	= 108	6 108 957
PREC206	32,3034	919	1 919	PRIO15	5054	1202	3 168 1475	PTAUNEG	17,3161	1049	1 1049
PREC207	32,3044	919	1 918	PRIO16	5055	1202	10 168 883	PTAUPOS	17,3163	1049	1 1049
PREC210	32,3063	919	1 919	PRIO2	4756	= 1204		PTBAD	05,3012	201	3 200
PREC220	16,3022	919	1 918	PRIO20	4753	= 1204	4 444 1208	PTIGINC	E4,1423	92	1 472
PREC225	32,3076	920	1 920	PRIO21	5057	1202	2 312 826	PTMP1	E6,1541	= 108	4 108 969
PREDANG	E7,1760	= 123	2 123 879	PRIO22	7644	1202	4 246 448	PTMP2	E6,1543	= 108	3 108 969
PREDICT3	25,3342	878	1 878	PRIO24	7645	1202	2 241 761	PTMP3	E6,1545	= 108	3 108 969
PREDOT	7123	1139	2 1143 1146	PRIO25	7647	1203	1 520	PTMP4	E6,1547	= 108	3 109 969
PREDSPAL	40,3260	372	1 345	PRIO26	7650	1203	9 421 590	PTMP5	E6,1551	= 109	3 109 969
PREFINAL	25,3332	878	4 864 878	PRIO27	7651	1203	4 569 709	PTMP6	E6,1553	= 109	3 109 969
PREL	E6,1701	= 115	11 115 1091	PRIO3	5045	1202	3 507 1477	PTOACSM	13,3005	1315	2 274 1320
PRELOD78	36,2050	553	1 553	PRIO30	4346	= 1204	14 155 1485	PTOALEM	13,3060	1316	1 1320

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
PTV93BIT	4765	= 66		P20S	37,2000	= 33	4 456 603	P23.20	31,3427	638	1 638
PTV93FLG	0241	= 66	5 216 588	P20S1	30,2000	= 32	2 561 583	P23.30	31,3435	638	1 638
PT1/16	26,3275	889	2 874	P20S2	23,2000	= 31	3 572 623	P23.31	31,3461	639	1 639
PULSEIMU	22,3722	1504	1 431	P20S3	34,2000	= 33	5 577 589	P23.57	31,2560	630	
PULSEM	14,2712	755		P20S4	34,2000	= 33	1 595	P23.57A	31,2556	630	1 629
PUSH	00,3246	1182	1 1119	P20S5	24,2000	= 31	1 587	P23.60	31,2567	630	1 628
PUSHLOC	0166	73	28 1114 1214	P20S6	30,2000	= 32	2 609 619	P23.85	31,2612	630	
PUSHUP	6164	1114	1 1110	P20S7	36,2000	= 33	1 552	P23N7071	31,3355	637	2 628 630
PUTADD	41,2330	339	3 339	P20S8	35,2000	= 33	3 600 605	P24BIT	4753	= 63	1 244
PUTCOM	41,3071	357	7 353 355	P20S9	32,2000	= 32	1 623	P24FLAG	0210	= 63	4 209 759
PUTCOM2	41,3151	358	4 357 360	P20TRACK	36,2207	555	1 219	P24MKBIT	4766	= 52	1 762
PUTDCSF2	41,3203	359	1 358	P21ALT	E7,1620	= 133	3 133 458	P24MKFLG	0052	= 52	4 245 763
PUTDECSF	41,3170	358	2 357 358	P21BASER	E7,1604	= 133	4 133 457	P24PROG	13,2000	= 29	1 564
PUTDPCOM	41,3124	357	1 358	P21BASEV	E7,1612	= 133	4 133 457	P29	30,2000	458	2 225 462
PUTMARK	07,2314	246	2 244 245	P21BIT	4755	= 51	1 202	P29BASER	E7,1604	= 134	6 459 461
PUTNORM	41,3133	358	1 357	P21CONT	37,2045	456	1 456	P29BASET	E7,1537	= 134	3 459 461
PUTSFNOR	41,3202	358	1 358	P21DSP	37,2120	457		P29BASEV	E7,1612	= 134	2 459 461
PUTXY	41,2727	355		P21FLAG	0041	= 51	2 456 457	P29BIT	4770	= 48	
PUTXYZ	41,2625	353		P21GAM	E7,1624	= 133	2 293 457	P29FLAG	0016	= 48	4 457 460
PWORD	17,2631	1039	2 1039	P21ONENN	37,2162	458		P29TAG1	30,2000	= 32	2 458 461
PWORD1	E6,1452	= 107	4 107 1060	P21ORIG	E7,1603	= 133	3 133 457	P29TAG2	20,2000	= 30	1 460
PWORD2	E6,1453	= 107	4 107 1061	P21PROG1	37,2015	456	1 458	P3XORP7X	35,3137	487	1 485
PYJETS	0005	= 42	3 42 1075	P21PROG2	37,2023	456	2 458 461	P30	35,3433	644	1 225
PYTABLE	17,2703	1041	4 1040 1057	P21PRTM	37,2155	458	1 456	P30SUBS	4000	= 27	2 487 652
P00HCHK	13,3456	1324	2 1323 1324	P21TIME	E7,1537	= 133	6 134 458	P30S1	35,2000	= 33	2 643 735
P05P06	26,2000	= 31	1 1442	P21VEL	E7,1622	= 133	4 133 457	P30S1A	26,2000	= 31	1 646
P06	26,3654	1442	1 225	P21VSAVE	37,2066	457	1 456	P31	04,3303	653	1 225
P11	34,2000	536	1 448	P22DEX	E7,1753	= 134	14 134 762	P31ALMRT	04,3306	653	1 661
P11+7	34,2011	536	1 540	P22MKBIT	4756	= 53		P31ENT	04,3441	661	1 653
P11FOUR	26,2000	= 31	1 550	P22MKFLG	0061	= 53	4 245 565	P31ONWRD	04,3350	653	
P11ONE	34,2000	= 33	2 536 545	P22OVER	30,3320	618	1 616	P31RECYC	04,3352	653	1 654
P11OUT	33,2225	432	1 541	P22S	31,2000	= 32	1 618	P31RT	04,3357	653	1 662
P11SCADR	34,2302	541	1 539	P22SUBRB	30,2304	562	5 562 638	P31TAG	04,2000	= 28	1 653
P11THREE	21,2000	= 30	1 550	P23	31,2444	628	1 225	P32	04,3403	661	1 225
P11TWO	33,2000	= 33	1 544	P23.00	31,2455	628		P32/P72A	04,3424	661	2 661
P11XIT	34,2277	541	1 538	P23.05	31,2466	628	1 628	P32/P72B	04,3437	661	1 663
P15AVEG	24,2631	700	1 700	P23.06	31,2471	628		P32/P72C	04,3463	662	1 682
P15INTEG	20,2343	529		P23.15	31,3362	637		P32/P72D	04,3474	662	1 662
P15JOB	33,3455	527	1 225	P23.151	31,3375	638	1 637	P32/P72E	04,3476	662	1 662
P15LOC	20,2000	= 30	1 528	P23.152	31,3400	638	1 638	P32/P72F	04,3504	662	1 662
P15LOC1	33,2000	= 33	2 527 530	P23.16	31,3410	638	1 638	P33	04,3573	667	1 225
P15LOC2	36,2000	= 33	1 532	P23.17	31,3450	638		P33/P73A	04,3576	667	2 667 668
P20FLGON	4572	652	6 466 667	P23.170	31,3447	638	1 638	P33/P73B	04,3610	667	1 669
P20OPT	36,2104	554	1 553	P23.176	31,3412	638	1 638	P33/P73C	12,2035	668	2 667 668
P20R52JB	36,2211	555		P23.18	31,3433	638	1 638	P33/P73D	12,2041	668	1 668

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SYMBOL	DEF	H	REFERENCES
P33/P73E	04,3662		668 2 668
P33/P73F	04,3673		668 1 668
P34	35,2000		466 1 225
P34/P74A	35,2003		466 2 466 467
P34/P74B	35,2032		466 1 466
P34/P74C	35,2034		467 2 468 469
P34/P74D	35,2100		467 1 467
P34/P74E	35,2103		467
P34/74E	35,2120		468 3 467
P35	35,2206		472 1 225
P35/P75A	35,2215		472 1 472
P35/P75B	35,2222		472 1 472
P35BIT	4761	=	66
P35FLAG	0235	=	66 3 472 586
P36	22,3334		655 1 225
P36A	22,3343		655 1 496
P36RECYC	22,3377		656 1 656
P36TAG	22,2000	=	31 1 654
P37	36,2476		898 6 225 907
P37E	36,2763		902 1 901
P37G	36,3035		903 1 902
P37GFRB1	36,3222		905 2 898 902
P37N	36,3040		903
P37PRCC	36,3255		906 1 905
P37Q	36,3064		903 1 903
P37R	36,3071		903 1 903
P37RANGE	E6,1412		106 1 910
P37T	36,3075		903 1 903
P37U	36,3160		904 1 904
P37V	36,3162		904 1 904
P37W	36,3174		905 1 904
P37WW	36,3216		905 1 905
P37XGOF	36,3246		906 5 898 904
P37XGOFR	36,3232		905 2 902 905
P40BLNKR	24,2562		699 1 700
P40BURN	04,2532		217 1 216
P40CKLS2	24,3517		714 1 698
P40CLK	24,3623		737
P40CNV85	24,3651		738 3 709 737
P40CSM	24,2214		693 1 225
P40GMB	24,2473		698
P40MINDB	24,3447		712
P40RCS	24,3441		712 1 708
P40S	24,2000	=	31 3 693 737
P40S/C	24,2224		693 1 693
P40S/F	24,2226		693 2 737
P40S/SV	24,2523		699 3 233 738
P40SET	24,2542		699 1 699
P40SNEWM	24,2534		699
P40SXTY	24,2444		698 1 724
P40S1	16,2000	=	30 1 723
P40S3	30,2000	=	32 1 716
P40S5	27,2000	=	32 1 720
P40TMP	E7,1672	=	127 16 128 740
P40TSK	24,2577		700
P41/DSP	24,3626		737 1 698
P41CSM	24,3563		737 1 225
P41REDSP	24,3642		738 1 700
P47/DSP	24,3743		741
P47BOD	24,3736		741
P47BODY	24,3730		740 3 232 741
P47CSM	24,3662		740 1 225
P50S	14,2000	=	29 1 743
P50SEXIT	14,2273		748 1 748
P50S1	14,2000	=	29 3 773 786
P50S2	16,2000	=	30 2 767 770
P50S3	17,2000	=	30 2 778 785
P50S4	04,2000	=	27 1 776
P51	14,3414		773 2 225 773
P51A	14,3423		774 1 774
P51AA	14,3425		774 2 774 776
P51B	14,3454		775 1 774
P51C	14,3471		775 1 776
P51C.1	14,3504		775 1 775
P51C.2	14,3507		775 1 775
P51D	14,3520		775 1 775
P51E	14,3526		775 1 775
P51F	14,3542		776 1 775
P51FIVE	4773	=	776
P51G	04,3716		776 1 776
P51ZERO	4772	=	776 1 774
P52A	14,2033		744 2 744
P52AUTO	14,2276		748 1 744
P52AUTOX	14,2305		748 1 748
P52B	14,2035		744 1 744
P52C	14,2407		750 3 744 755
P52D	14,2170		746 2 746 748
P52F	14,2621		753 1 753
P52I	14,2611		753
P52J	14,2167		746 2 744 747
P52K	14,2334		749 1 747
P53	14,3414	=	773 1 225
P54	14,2002	=	743 1 225
P60S	26,2000	=	31 1 792
P60S1	26,2000	=	31 1 800
P60S2	26,2000	=	31 2 804 812
P60S3	26,2000	=	31 1 807
P60S4	10,2000	=	28 1 821
P60S5	27,2000	=	32 1 819
P60S6	04,2000	=	28 1 820
P60S7	06,2000	=	28
P61	26,2234		792 1 225
P61.1	26,2304		793 1 814
P61.3	26,2244		792 2 796 801
P61.4	26,2247		793 1 792
P62	26,2321		795 1 225
P62.1	26,2343		796 1 1067
P62.2	26,2327		795 1 1069
P62.3	26,2402		797 2 795 877
P63	26,2406		798 2 797
P63.1	26,2422		798 2 797 801
P63FLAG	E6,1727	=	116 7 796 1079
P64	26,2432		800 1 861
P65	26,2440		801 1 872
P65.1	26,2456		801 2 234 801
P66	26,2473		803 1 877
P66END	26,2502		804 1 803
P67	26,2477		804 1 878
P67.1	26,2511		804 3 234 883
P67.2	26,2532		806 1 883
P67.2CAD	25,3626		883 1 883
P67.3	26,2542		806
P72	04,3405		661 1 225
P73	04,3575		667 1 225
P74	35,2002		466 1 225
P75	35,2212		472 1 225
P76ER77	13,2071		513 2 225
P76LOC	13,2000	=	29 1 513
P76SUB1	13,2245		515 2 514 515
P79	04,2677		219 1 225
P79A	04,2716		219 1 219
P79LOC	04,2714		219 1 219
P79LOCRT	04,2715		219 1 219
P791	04,2711		219 1 219
P81	04,2537		217 1 225

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P81CONT1	04,2540		217 1 217	Q2	E7,1711	=	123 3 123 867	RATEBNK	07,2000	=	28 1 763
P82	04,2545		217 1 225	Q21	26,3201		888 1 853	RATEDEN	16,3514		990
P82CONT1	04,2546		217 2 217	Q22	26,3203		888 1 853	RATEDRV1	10,2032		175 1 178
P82CONT2	04,2550		217	Q3	26,3171		887 1 867	RATEDRV2	10,2212		178 1 177
P83	04,2646		218 1 225	Q5	26,3173		887 1 868	RATEFILT	21,2215		1002 1 1002
P83CONT1	04,2647		218 2 218	Q6	26,3175		888 1 868	RATEINDX	0774		77 5 416 1017
P84	04,2656		218 1 225	Q611	E7,1704	=	129 4 129 600	RATELIM	16,3550		990 1 988
P84CONT1	04,2657		218 1 218	Q6111	E7,1705	=	129 4 129 607	RATENUM	16,3530		990
P85	04,2664		218 1 225	Q7	E6,1574	=	120 11 293 875	RATEPTC	E6,1772	=	119 4 119 558
P85CONT1	04,2665		218 1 218	Q7F	26,3177		888 3 852 875	RATESUB	07,2530		763 1 759
P86	04,2606		217 1 225	Q7FKDMIN	26,3167		887 1 877	RATETEMP	0771	=	77 13 635 764
P86CONT1	04,2607		217 1 217	Q7MIN	26,3343	=	889 1 873	RATEZRO	24,3104		706
P86CONT2	04,2626		218	==========				RATT	0000	=	1353 35 457 1329
P89CONT1	04,2671		218	R	0002	=	941 3 940	RATT1	0016	=	1353 7 457 762
==========				R(T1)	E7,1645	=	131 9 131 937	RAXERR	E6,1573	=	117 6 1074 1079
Q	0002	=	40 333 42 1503	R(T1)/	E7,1637	=	131 7 131 922	RBDFAIL	E6,1627	=	113 10 113 1057
Q+1	6706		1131 6 143 1485	R(T2)/	E7,1655	=	131 12 131 923	RBFAIL	17,3042		1044 1 1044
Q+10000	4663		1104 1 1106	R*TL**P	23,3654		1368 2 1369	RBLAST	17,3303		1052 2 1052
Q+2	6710	=	1131 8 382 1483	R-OTHER	E3,1717		90 4 181 302	RBLASTOK	17,3331		1052 1 1052
QAXERR	E6,1572	=	117 3 117 1078	R-TO-RP	26,3370		1245 4 614 1340	RBYPASS	17,3505		1056 1 1052
QCHAN	0002	=	42 2 1198	R/APRE	0034	=	132 3 915 916	RCFAIL	17,2756		1042 1 1042
QMAJ	0300	=	73 8 73 782	RACFAIL	E6,1626	=	113 10 113 1055	RCLP	E7,1530	=	125 8 125 616
QMIN	E5,1777	=	99 7 768 788	RACT1	E5,1540	=	105 11 105 687	RCM	0002	=	941 4 940 941
QPLAC	E5,1424		102 2 451 452	RACT2	E5,1452	=	105 9 105 689	RCNORM	E5,1654	=	100 4 100 1282
QPLACE	E5,1425		102 8 258 444	RACT3	E7,1537	=	126 28 126 683	RCON	E7,1635	=	131 13 131 937
QPLACES	E5,1426		102 4 431 538	RAD	E6,1766	=	118 1 119	RCSADDR	21,2037		734 1 735
QPRET	0052	=	41 15 642 1348	RADDEL	1064	=	80 2 579 592	RCSATT	21,2140		1000 4 734 1058
QREL	E6,1702	=	115 9 115 1078	RADMOON	31,3500		639 1 637	RCSDAPON	21,2042		734 6 209 734
QRUPT	0012	=	40 21 141 1446	RADSTART	34,2713		578 1 579	RCSDAPUP	43,2517		262 2 262
QSAVED	E4,1756	=	95 4 95 486	RADTIME	1063	=	80 3 80 592	RCSFLAGS	E6,1501		107 55 182 1066
QTEMP	E7,1657	=	127 5 127 720	RADTOREV	27,2636		607 1 597	RCSINIT	4766	=	1013 1 1013
QTEMP1	E7,1730	=	128 4 716 738	RAFAIL	17,2754		1042 1 1042	RCSINITB	21,2635		1013 1 1013
QTSN45	23,3524		1362 1 1356	RAKE	04,2771		221 1 222	RCSINT	21,2432		1009 1 1010
QUADANGL	4620		1037 2 1036	RANGBIT	4760	=	66	RCSLOC	21,2136		1000 1 1000
QUADRCT	22,3013		417 4 416 720	RANGE	E4,1711	=	94 11 94 507	RCSSWIT	21,2627		1013 1 1013
QUARTER	4754	=	1204 9 297 1191	RANGER	25,2571		867	RCSUP	21,2032		734
QUICKIGN	24,3346		711	RANGERD	34,2707		578	RCS2CADR	17,3564		1058 1 1058
QUICTRIG	23,3602		1366 2 710 1366	RANGERD1	34,2742		579 1 590	RCV	E3,1534	=	89 27 89 1346
QUIKDSP	06,2132		145 1 141	RANGERD2	34,2754		579 1 589	RCVCSM	E3,1606		90 2 585 633
QUIKOFF	06,2163		146 1 145	RANGERD3	34,3406		589 2 579	RCVLEM	E3,1660		90 1 585
QUIKREAD	37,2773		831 2 828 831	RANGERD4	34,2750		579 1 579	RCYCLR61	34,3747		600 1 416
QUIKRUPT	06,2142		145 1 146	RANGFLAG	0234	=	66 3 578 596	RD	E7,1663	=	131 6 131 919
QUITBIT	4764	=	65	RAPO	0020	=	1377 1 1377	RDAPEND	16,3745		994
QUITFLAG	0221	=	64 4 276 1323	RAPREC	E7,1575	=	127 2 473 476	RDCDUS	16,2744		769 1 749
Q19	26,3333	=	888 1 866	RATEAVG	15,2157		1065 3 1070 1071	RDE	13,3767		1353 1 1340

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
RDESIRED	E5,1757	= 100	5 100 1301	REFLECT	15,3004	1083	1 1083	RENDISP7	34,3356	585	1 585
RDFAIL	17,3044	1044	1 1044	REFLSH	4753	= 1477	3 1462 1474	RENDNOO	04,2275	213	1 213
RDLONOR	40,2655	348	1 348	REFSMBIT	4754	= 52	6 196 1440	RENDP79	04,2033	208	
RDM	13,3765	1353		REFSMFLG	0057	= 52	10 485 776	RENDVOO	04,2270	213	1 212
RDOT	E7,1677	= 123	19 123 880	REFSMMAT	E3,1733	90	48 36 940	RENDWBIT	4770	= 57	1 216
RDOTREF	1307	= 84	5 84 874	REFTEST	35,3507	644		RENDWFLG	0131	= 57	11 228 1349
RDOTV	E7,1501	= 133	4 133 676	REGION6	16,3464	989		REND1	34,2636	578	2 586 589
RDRPTBB	4053	140	1 139	REGODSP	10,2721	1462	2 541 713	REND1A	34,2642	578	3 578
READACCS	37,2652	828	4 540 838	REGODSPR	10,2724	1462	1 882	REND10	34,3067	581	2 584
READCDUK	22,2370	409	3 398 557	REGSLEEP	07,3312	1428	1 1428	REND10A	34,3127	581	2 581
READGYMB	15,2063	1063	3 236 1068	REGUP	6202	1114	3 1114	REND10B	34,3163	582	1 582
READGYM1	15,2076	1063	1 1063	REG1TST	16,3420	988		REND12	34,3176	582	2 581 585
READLO	40,2635	348	5 347 349	REG2TST	16,3450	989		REND12A	34,3217	582	3 582 583
READLO1	40,2646	348	1 348	REG3TST	16,3426	988		REND13	34,3232	583	1 585
READPIPS	22,3621	1501		REG4TST	16,3454	989		REND13A	34,3237	583	1 582
RECALTST	40,3412	383	2 356 375	REG5TST	16,3463	989		REND14	34,3251	584	1 580
RECAL1	40,3415	383	1 383	REINIT	21,2541	1010	3 1002 1024	REND14A	34,3275	584	1 584
RECAL3	40,3427	383		REINTBIT	4754	= 65	2 1325	REND15	34,3302	584	1 581
RECRATIO	13,3761	1353	1 1344	REINTFLG	0230	= 65	6 515 1496	REND16	34,3307	584	1 583
RECT.1	31,3026	633		REJCTBIT	4755	= 66		REND17	34,3315	584	1 583
RECT.2	31,3035	633	1 633	REJCTFLG	0231	= 66	4 247 586	REND18	34,3323	584	1 583
RECT.3	31,3040	633	1 633	REJCTR22	07,2360	247	1 247	REND2	34,2650	578	1 578
RECT.4	31,3044	633	1 633	REJECT3	07,2376	247	1 247	REND3	34,2667	578	1 586
RECT.5	31,3046	633	1 633	REJECT4	07,2422	248	1 247	REND3A	34,2666	578	1 578
RECTEST	11,3245	1343	1 1343	REJECT5	07,2413	248	1 248	REND30S	04,2407	215	2 208 209
RECTIFY	11,3420	1346	7 1259 1345	REJEXIT	07,2433	248	2 248	REND4	34,2761	579	1 578
RECTOUT	13,3304	1321	2 1320 1322	RELDSP	4432	388	10 210 383	REND4A	30,2444	583	1 583
REDAP	21,2553	1012	1 1001	RELDSPON	4356	385	3 326 1472	REND5	30,2456	583	1 583
REDOCTR	1306	83	5 135 198	RELDSP1	4455	388	2 365 376	REND5A	30,2462	583	1 583
REDOMANC	27,2116	394	1 394	RELDSP2	4446	388	3 388	REND5B	34,2776	580	1 587
REDOMANN	27,2076	394		RELINTQ	10,3454	1472	2 1467 1471	REND5C	34,3001	580	4 586 588
REDOMASK	10,3722	1476	1 1462	RELINUS	27,2170	395	1 230	REND6	34,3017	580	1 580
REDOPOSE	37,3656	895	1 896	RELINUSX	27,2210	396	1 395	REND7	34,3021	580	1 583
REDOPRIO	10,3006	1464	1 1476	RELOADSV	11,3621	1349	1 1348	REND8	34,3044	580	1 580
REDORCS	21,2123	1000	1 205	RELRET	0144	= 71	3 388	REND9	34,3047	580	1 580
REDOR22	27,2516	588	1 231	RELTAB	4063	141	2 143 386	REND9A	34,3057	581	1 580
REDOSAT	26,2000	550	2 205 262	RELTAB11	4076	141	3 142 1204	REPCHEK	16,3106	952	1 951
REDOTVC	16,3222	961	1 205	RELVBIT	4760	= 59		REPETE	35,2464	475	1 475
REDO40.9	16,2502	730	1 230	RELVELSW	0140	= 58	3 856 859	REPFRAC	E6,1633	= 109	7 109 952
REDO5.31	37,2613	826		REM	26,2201	791	1 790	REPFRACS	16,2242	726	1 727
REDO5.5	37,2657	828	1 235	REMA	26,2204	791	1 791	REPIP1	37,3207	838	1 839
REENTRY	25,2000	= 31	2 852 861	RENDEZ	37,2000	= 33	1 569	REPIP3	37,3215	838	1 839
REENTRY1	26,2000	= 31	2 859 887	RENDISP	34,3345	585	2 582	REPLACE	17,3650	1060	2 1060
REFAZE10	25,2120	855	1 801	RENDISP2	34,3366	585	1 585	REPLACEP	17,3673	1061	
REFLASH	10,2716	1462	2 708 712	RENDISP3	34,3375	586	5 580 585	REPLACER	17,3667	1061	3 1060 1061

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REPLACEY	17,3702		1061	RETRN1	26,2642		809 1 808	ROLLOGIC	16,3363		987 2 987
REPLACE1	17,3655		1060 2 1060	RETRN2	26,2632		809 2 809	ROLLON	16,3471		989 1 988
REPLACE2	17,3662		1061 2 1060	RETRN3	26,2627		809 1 808	ROLLPREP	16,3046		951
REPOSADR	37,3702		896 1 895	RETROBIT	4753	=	56	ROLLSET	16,3553		991 3 990
REP11	34,2250		540 1 232	RETROFLG	0114	=	56 3 910 913	ROLLTIME	17,3263		1052 4 1043 1045
REP11A	34,2024		536 2 232 540	REVCNT	6211		1114 3 547 1204	ROLLTM	E6,1714	=	115 6 115 1089
REP11A-1	34,2023		536 1 541	REVERS	35,2513		476 1 476	ROLLWORD	E6,1572	=	109 9 109 994
REP11A-2	34,2022		536 1 540	REV37	04,2330		213 1 213	RONE	E4,1717	=	94 17 94 1380
REP11S	34,2273		541 1 536	RHCMINP	21,3320		1024 1 1019	ROO	04,2166		211 1 138
REP11SA	34,2275		541 2 536 540	RHO	E6,1635	=	113 4 113 1013	ROOAD	04,3053		224 1 210
REQ	5642		1485 4 238 1485	RHOSB	E4,1711	=	94 4 94 941	ROOTMU	0020	=	1305 3 1281 1300
REQADD	41,2066		335 1 335	RHO1	E6,1636	=	113 4 113 1013	ROOTOPOO	04,2071		209 1 209
REQCOM	41,2305		339 2 339	RHO2	E6,1637	=	113 4 113 1013	ROPECHK	43,3452		1398 1 1395
REQDATX	41,2300		339 3 353 355	RIGHT	00,2236		1159 1 1161	ROTA	26,2105		783 2 783
REQDATY	41,2302		339 3 353 355	RIGHT-	00,2332		1161 1 1158	ROTATE	07,2520		684 2 683
REQDATZ	41,2304		339 3 335 355	RIGHTGTS	33,2324		437 1 437	ROT180	27,2365		400 1 400
REQEXLOC	41,2206		337	RIGHTR	00,2031		1152 1 1160	ROUND	00,2116		1154 1 1119
REQEX1	41,3440		374 1 374	RIGHT5	4324		384 2 356 357	ROUNDSUB	7105		1138 4 1149 1160
REQMM	41,3417		373 1 373	RINDEX	E6,1517	=	112 4 112 1044	ROWDOT	30,3613		622 3 619 621
REQRET	1216		82 16 204 381	RINIT	E7,1567	=	126 12 126 717	ROWDOT1	30,3624		622 1 623
REQUESTC	41,3444		374 1 374	RLIMTEST	20,2670		966 4 966 970	ROWDOT2	30,3643		623 2 623
REREADAC	37,3222		838 3 234 235	RLS	E4,1425		92 10 36 1316	ROWDOT3	30,3645		623 1 622
RES	26,2163		791 1 790	RLTST	34,2601		548 1 544	RP-TO-R	26,3345		1243 8 459 1317
RESA	26,2200		791	RM	E7,1703	=	129 7 129 590	RPAD	22,3172		498 4 499 1386
RESCALES	34,2620		548 3 546	RMAG1	0014	=	1371 4 1374 1383	RPADTEM	E4,1713	=	94 6 94 525
RESCHNG	33,3134		447 1 236	RMANNDX	E6,1656	=	114 5 114 1024	RPADI	22,3172	=	1386
RESETVHF	43,2770		273 1 250	RMAX	E4,1402		92 1 582	RPASS1	E7,1755	=	133 4 133 683
RESETX2	12,3163		1294 1 1292	RME	04,3176		227 1 1323	RPASS2	E5,1624	=	105 7 105 688
RESIGN	35,2510		476 1 476	RMM	04,3174		227	RPASS3	E7,1553	=	126 15 126 683
RESO	E4,1532	=	93 3 93 791	RN	1027		78 17 180 1326	RPER	0016	=	1377 3 524 1377
RESQ	37,3376		841 1 840	RND/TST	42,3453		363 3 362	RPPREC	E7,1617	=	127 2 473 476
REST	10,3467		1472 1 1470	RNDCON	42,3211		349 2 351	RPQFLAG	0170	=	62 5 1319 1344
RESTAIER	33,3057		446 1 236	RNDREFDR	07,3121		1423 3 160 1442	RPQFLBIT	4752	=	62
RESTARPT	E5,1577	=	103 2 437	RNDVZBIT	4762	=	48 8 162 834	RPQOK	11,3332		1344 1 1344
RESTART	01,2000	=	27 4 230 1415	RNDVZFLG	0010	=	48 11 270 1488	RPQV	E4,1661	=	93 7 93 1345
RESTARTS	01,3467		1411 1 201	RNRAD	0046	=	40 1 590	RPRE	0030	=	132 7 915 919
RESTEST1	33,3100		446 1 235	RN1	1070	=	79 7 79 1329	RPRE,	E7,1667	=	131 5 131 919
RESTEST3	33,3111		446 1 235	ROLL/PIP	E6,1672	=	115 3 115 894	RPREXIT	0050	=	1251 3 1243 1245
RESTREG	0365		75 4 195 1469	ROLL/180	E6,1664	=	115 11 115 1081	RPRPXXXX	26,3406		1245 1 1243
RESTSLEP	10,3473		1472 1 1472	ROLLC	E6,1715	=	115 16 116 1082	RPSTART	E6,1702	=	118 2 118 543
RESTSRF	43,3062		277 1 249	ROLLDAP	16,3342		987 1 951	RPSV	E4,1670	=	93 5 93 1337
RESUME	5323		1232 48 145 1447	ROLLDUMP	15,3275		1089 1 1089	RPTORA	26,3362		1243 1 1243
RETARG	33,3415		451 1 452	ROLLFIRE	E6,1571	=	109 7 109 995	RPTORB	26,3354		1243 1 1244
RETDSPY	4763	=	1477 3 1462 1475	ROLLHOLD	E6,1717	=	116 4 116 1089	RPVAR	E4,1407		92 1 612
RETNON	06,2263		150 1 151	ROLLJETS	0006	=	42 6 42 1089	RRATE	E4,1713	=	94 8 94 508

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RRATE2	E4,1715	=	94 2 295 505	RTE3	31,2000	=	32 1 922	RT53	14,2000	=	29 2 639 780
RRECT	E3,1502	=	89 14 89 1346	RTE317	36,2550		899 2 899	RUN	E5,1427		102 4 449
RRECTCSM	E3,1554		90 11 90 1317	RTE320	36,2572		899	RUPTAGN	1137		80 4 81 1232
RRECTHIS	E3,1554	=	90 6 274 1314	RTE340	36,2604		899 1 899	RUPTREG1	0070		69 45 141 1481
RRECTLEM	E3,1626		90 3 90 1316	RTE350	36,2614		900 1 900	RUPTREG2	0071		69 13 148 1434
RRECTOTH	E3,1626	=	90 2 274 275	RTE360	36,2617		900 4 899 902	RUPTREG3	0072		69 10 426 1467
RRECT1	0022	=	89	RTE367	36,2624		900 1 900	RUPTREG4	0073		69 7 69 1445
RREL	E6,1703	=	115 10 115 1091	RTE369	36,2643		900 1 900	RUTMXTAB	42,3043		295 1 282
RSBBQ	E3,1432		88 3 181 198	RTE372	36,2665		900 1 900	RUTMXTEM	0153		71 2 282 356
RSP-RREC	E4,1746	=	95 3 95 648	RTE373	36,2667		900 1 900	RVAR	E6,1402		106 1 584
RSPHERE	13,3763		1353 2 1345	RTE374	36,2706		901 1 901	RVARMIN	E6,1404		106 2 581
RSTGTS1	33,2232		435 1 235	RTE375	36,2713		901 1 901	RVCON	13,3350		1321 1 1320
RSTRTST	20,2405		719	RTE380	36,2723		901 1 901	RVCS/RDS	27,2645		607 1 598
RSUBE	16,2635		767 1 766	RTE385	36,2744		901 1 901	RVEC	E5,1656	=	100 12 461 1305
RSUBM	16,2633		767 1 767	RTE390	36,2746		901 1 901	RVQ	00,3273		1182 1 1119
RT	E7,1473	=	122 6 122 857	RTE505	36,2765		902	RVSW	0157	=	61 10 461 1289
RTABLE	17,3117		1046 4 1042 1056	RTE510	36,3000		902 2 902	RVSWBIT	4760	=	61
RTARG	E7,1414	=	121 11 121 905	RTE515	36,3002		902 1 902	RWORD	17,2736		1042
RTARG1	E7,1603	=	126 12 126 494	RTE625	36,3004		902	RWORD1	E6,1450		107 12 107 1060
RTB	01,2445		1195 1 1195	RTGO	E7,1713	=	123 6 123 814	RWORD2	E6,1451	=	107 7 107 1061
RTB/BHIZ	01,2444		1195 1 1118	RTGON64	E7,1713	=	124 1 293	RXLNS	17,2764		1042 2 1042
RTBCODES	22,2000	=	30 1 1501	RTGON67	E7,1713	=	124 2 293 857	RZC	E7,1625	=	125 8 125 637
RTBCODE1	24,2000	=	31 1 1501	RTHETA	E4,1715	=	94 10 94 508	RZXLNS	17,3046		1044 2 1044
RTD18	32,2364		910 1 910	RTIG	E7,1631	=	127 12 127 724	R02	01,2000	=	27 1 1440
RTD22	32,2421		910 1 910	RTINIT	E7,1451	=	122 10 122 890	R02BOTH	01,3731		1440 8 552 807
RTE	32,2000	=	32 3 906 923	RTMU	E7,1747	=	130 5 130 689	R02ZERO	01,3745		1440 2 774 1440
RTEALRM	32,2272		907 4 900 913	RTMURTE	35,3673		939 1 926	R1	0040	=	1306 19 674 1303
RTEAST	E7,1457	=	122 3 122 305	RTNAPSE	E5,1712	=	100 3 1303	R1A	E5,1743	=	100 15 100 1303
RTECON1	35,2000	=	33 2 938 939	RTNLAMB	E5,1712	=	100 9 100 1300	R1D1	4321		384 14 242 1178
RTEDISP	32,2323		909 1 902	RTNORM	E7,1465	=	122 3 122 305	R1VEC	E5,1656	=	100 7 98 1296
RTEDVD	E7,1631	=	131 10 131 933	RTNPRM	E5,1755	=	100 3 100 1290	R2	E5,1721	=	100 3 1287
RTED1	1342		86 1 900	RTNSAVER	0145	=	72 3 1368 1369	R2D1	4322		384 7 331 1204
RTEGAM2D	E7,1633	=	131 5 131 900	RTNTR	E5,1712	=	100 1 1301	R2VEC	E5,1664	=	100 10 100 1296
RTENCKEX	E7,1547	=	131 11 131 923	RTNTT	E5,1712	=	100 3 1289	R2ZBIT	4753	=	50 4 202 247
RTENCK1	31,3624		922 1 904	RTORPA	26,3412		1245 1 1245	R2ZEND	37,2320		570 3 569 570
RTENCK2	31,3634		922 1 918	RTORPB	26,3401		1245 1 1245	R2ZMARK	0037	=	50 8 211 581
RTENCK3	31,3652		922 1 915	RTRIAL	26,3023		815 1 812	R22	34,2625		577 2 231 554
RTENCK3A	31,3655		922	RTRN	E4,1757	=	95 3 95 483	R22ALARM	43,2616		268 2 268
RTENCK3B	31,3660		922 1 922	RTRNCADR	01,3526		1411 5 1411 1416	R22CABIT	4762	=	64 2 247 269
RTENCK3D	31,3666		923 1 922	RTRNLOC	E6,1613	=	110 2 946 947	R22CAFLG	0217	=	64 2 578 586
RTERM	0022	=	1371 5 813 1382	RTRNMU	04,3241		496 1 496	R22S1	27,2000	=	32 3 588 607
RTEVN	36,3007		902 2 902 903	RTSR1/MU	E7,1751	=	130 4 130 674	R23.END	31,2755		632
RTE1	36,2000	=	33 1 897	RTX1	E7,1745	=	130 14 130 1329	R23.05	31,3004		633
RTE2	16,2000	=	30 1 919	RTX2	E7,1746	=	130 17 130 1329	R23.1	31,3012		633 1 633
RTE299	36,2517		898	RT23	31,2000	=	32 1 628	R23.10	31,3445		638 5 638

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R23.2	31,3020		633 1 633	R52G	14,3316		762 2 761	R61C1	37,2366		572
R23.3	31,3101		634 1 634	R52H	14,3222		760 1 757	R61DMPTG	37,2360		572
R23.4	31,3114		634 1 634	R52HA	14,3223		760 1 760	R61END	37,2415		572 1 572
R23.5	31,3337		637 1 634	R52J	14,3241		761 3 759 761	R61TEST	27,2215		396 1 394
R23.51	31,2704		631 1 631	R52JA	14,3146		759 1 761	R62DISP	27,2427		402 2 264 402
R23.52	31,2725		632 1 632	R52K	14,3336		762 1 763	R63	35,3171		600 2 595 627
R23.53	31,2733		632 1 632	R52L	14,3276		761 1 759	R63COMP	35,3171	=	627 1 626
R23.55	31,2614		630 1 629	R52M	14,3245		761 1 757	R63COM1	35,3226		601 1 603
R23.6	31,2735		632	R52Q	14,3215		760 1 760	R63TIME	E4,1706	=	94 14 94 626
R23.7	31,2750		632 1 632	R52SYNC	14,3236		761 1 760	R66CSM	36,2454		559 2 557 560
R23.8	31,2751		632	R52VRB	14,3007		757 1 564	R67	36,2320		557 2 415 557
R23CSM	37,2263		569 1 268	R53	14,3571		780 3 628 775	R67BIT	4767	=	63 5 212 421
R23CSM1	37,2277		570 1 570	R53A	14,3575		780 1 780	R67FLAG	0205	=	63 4 270 559
R3D1	4323		384 5 331 382	R53A1	14,3612		780 1 780	R67RSTRT	36,2374		558 2 230 421
R30LOC	23,2000	=	31 1 517	R53B	14,3617		781	R67START	36,2327		557 1 557
R31	31,2000	=	32 1 507	R53C	14,3623		781 1 781	R67TIME	1355		87 4 87 557
R31CALL	31,2000		507 1 267	R53CHK	14,3161		760 2 759 764	==========			
R31FLAG	0222	=	65 3 267 508	R53C1	14,3614		780 1 786	S(XI)	0032	=	1306 6 1281 1287
R31FLBIT	4765	=	65 1 507	R53D	14,3631		781 1 781	S+ZERO	4772	=	1393 9 273 1399
R34	31,2000	=	32 1 512	R53EXIT	E7,1457	=	121 4 121 785	S+1	4770	=	1393 9 273 1401
R34ANG	31,2057		508 1 512	R53FLAG	0011	=	48 3 757 780	S+2	4767	=	1393
R34LOS	31,2317		512 1 508	R53FLBIT	4763	=	48 1 761	S+3	6214	=	1393
R36	24,2000		504 1 276	R53JOB	14,3260		761 1 761	S+4	4766	=	1393
R36A	24,2004		505 1 506	R53OUT	14,3632		781	S+5	4773	=	1393
R36CM	24,2000	=	31 1 504	R53Z	14,3625		781	S+6	6211	=	1393
R40CHECK	24,3146		706	R54	16,2657	=	768 1 755	S+7	4774	=	1393 1 1395
R40ENABL	24,3422		712	R55	14,2710		755	S-ZERO	4771	=	1394 1 1398
R40START	24,3151		706	R55.1	14,2713		755	S-1	7702	=	1394 2 1399 1401
R51	14,2622		754 3 233 753	R55.2	14,2721		755 1 755	S-2	7701	=	1394
R51.3	14,2623		754 1 756	R55CDR	14,3002		756 2 747 755	S-3	7700	=	1394
R51.4	14,2744		755 1 754	R55RET	14,2734		755 1 755	S-4	6061	=	1394
R51A	14,2753		756 1 754	R56	17,2105		785 2 754 775	S-7	5736	=	1394 1 1395
R51B	14,2660		754 1 756	R56A	17,2111		785 1 786	SAC	E5,1773	=	99 10 99 786
R51DSP	14,2763		756 1 756	R56A1	17,2116		785 1 785	SALFA	E6,1507	=	116 6 116 1079
R51DSPA	14,2761		756 2 567 754	R56B	17,2157		786 1 786	SAMEJETS	16,3673		993
R51K	14,2757		756 2 748 755	R57	37,2167		567 2 628	SAMERMS	35,3132		486 1 486
R51KA	14,2736		755 1 756	R57A	37,2171		567 1 568	SAMPTIME	0013	=	40 5 243 385
R51ST	14,2651		754 2 754	R57B	37,2241		568 1 568	SATOUT	34,2466		546 3 546 547
R52	14,3005		757 5 555 756	R57C	37,2213		568 2 567	SATRATE	E6,1710	=	119 4 119 551
R52BNKSV	E5,1577	=	97 2 757 760	R57D	37,2255		568 1 568	SATRLRT	E6,1700	=	118 5 118 548
R52C	14,3034		757 1 760	R60ADRS	31,3524		639 1 632	SATSCALE	E6,1720	=	119 1 548
R52D	14,3037		757 4 761 763	R60CALL	31,2773		632 1 639	SATSTICK	21,2000		550 1 551
R52E	14,3170		760 2 759 760	R60CSM	27,2074		394 5 402 698	SATSTKON	43,2502		262
R52F	14,3175		760 2 761	R61CNTR	E6,1774	=	119 20 120 728	SATSW	E6,1714	=	119 9 119 547
R52FA	14,3202		760 4 760 762	R61CSM	37,2333		571 3 555 760	SAVBNK	E6,1771	=	119 3 119 572

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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL	DEF	H	REFERENCES
SAVECBIT	4757	= 64	
SAVECFLG	0214	= 64	3 628 631
SAVEDEN	27,3326	1381	1 1381
SAVELOCR	10,3164	1467	1 1466
SAVELOCS	10,3157	1467	2 1463 1466
SAVENDX	15,3354	1091	1 1090
SAVEPOS	E7,1706	= 129	13 129 602
SAVESTAR	15,2000	602	1 602
SAVEVEL	E7,1714	= 129	6 129 603
SAVEVSUN	37,2460	602	1 601
SAVQR52	E5,1576	= 97	4 97 760
SAX	E5,1757	= 99	3 751 752
SBAND	42,2000	= 34	1 940
SBANDANT	42,3504	940	2 261 941
SBIT1	4770	= 1393	
SBIT10	4757	= 1393	
SBIT11	4756	= 1393	2 1399 1400
SBIT12	4755	= 1393	1 1399
SBIT13	4754	= 1393	
SBIT14	4753	= 1393	
SBIT15	4752	= 1393	1 1400
SBIT2	4767	= 1393	
SBIT3	4766	= 1393	
SBIT4	4765	= 1393	1 1397
SBIT5	4764	= 1393	
SBIT6	4763	= 1393	
SBIT7	4762	= 1393	1 1400
SBIT8	4761	= 1393	
SBIT9	4760	= 1393	1 1397
SBNK03	5050	= 1394	1 1399
SCALEPOP	25,2115	855	1 853
SCALPREP	26,3715	1443	2 1442 1443
SCALSAVE	1010	77	3 1442 1443
SCAXIS	E6,1750	= 118	21 118 724
SCHZEROS	33,2662	443	5 431 446
SCNDSCL	31,3566	682	7 673 682
SCOUNT	1366	= 87	4 87 1398
SCOUTEND	40,2566	347	5 346 348
SCPOS	14,3643	781	1 781
SCTVAR	32,2023	623	2 612 615
SDISPLAY	43,2746	273	1 1401
SECAD	22,2016	403	
SECMAX	E7,1453	= 126	6 126 475
SECON1	42,3176	349	1 351
SECON2	42,3200	349	1 348
SEC2.5	24,3526	714	2 710 711
SEC24.96	24,3522	714	1 700
SEC29.96	24,3527	714	3 693 738
SELECTMU	04,3217	496	6 466 667
SELFADRS	43,3177	1394	2 273
SELFBANK	01,3113	1218	1 1220
SELFCHEC	43,2000	= 34	1 1393
SELFCHK	43,3270	1395	5 205 1394
SELFERAS	1357	87	1 87
SELFRET	1361	= 87	7 87 1395
SENDID	05,3706	1102	2 1097 1101
SENDOCMD	10,2200	178	2 177 178
SENDPULS	07,3057	1422	1 1421
SEPMIN	42,3344	351	2 349 350
SEPMNRET	0144	= 71	2 351
SEPSCRET	0144	= 71	2 351
SEPSEC	42,3313	351	1 350
SEPSECNR	42,3326	351	3 348 351
SEPSEC1	42,3321	351	1 351
SERVCADR	24,3553	714	2 711 712
SERVCAD1	26,2643	809	2 806 808
SERVCAD2	26,2643	= 806	1 805
SERVEXIT	37,3143	834	4 714 882
SERVICER	37,3010	832	2 235 829
SERVICES	37,2000	= 33	2 826 832
SERVNOUT	25,3607	882	2 806 853
SERVXT	24,3614	737	4 706 740
SERVXT1	24,3603	737	5 531 727
SETBANK	13,3140	1317	4 1315 1316
SETBIT	10,2204	178	1 175
SETCLOCK	24,3242	709	
SETCNT	06,3123	171	1 170
SETCOARS	07,3070	1423	3 156 1420
SETCOAST	35,3706	1326	1 1327
SETDESMD	06,3124	171	7 170 171
SETEBANK	4315	384	2 338 348
SETGAMMA	16,3766	1241	2 1236 1238
SETGLOCK	06,2471	156	4 155 156
SETGMEX	16,3774	1241	1 1241
SETGWLST	33,2306	437	1 437
SETIFLGS	13,2744	1314	3 228 1327
SETINTG	27,2462	588	6 565 633
SETISSW	06,2706	166	7 151 1426
SETJ=2A	30,3573	622	1 622
SETJTAG	15,2636	1081	2 230 829
SETLOC	01,2654	1212	3 1212 1216
SETMARK	10,2772	1463	
SETMAXDB	24,3217	708	3 222 704
SETMAXER	04,3022	222	1 222
SETMGA	27,2454	495	1 495
SETMIND	26,3136	859	1 856
SETMINDB	24,3203	708	4 222 712
SETMOON	13,3016	1315	3 1315 1345
SETMRK	07,2015	241	2 241
SETMUER	04,3230	496	1 496
SETNADD	4313	384	2 335 358
SETNBPOS	33,3216	449	1 427
SETNCADR	4305	384	7 335 384
SETNEEDL	43,2303	257	2 257
SETNORM	10,3000	1464	1 1461
SETOFF	06,3235	173	1 173
SETOVF	6752	1133	1 1136
SETOVF2	7121	1138	1 1134
SETPD	7547	1149	1 1117
SETPRIO	10,2754	1463	
SETRAD	22,3222	499	1 498
SETRADX	22,3235	499	1 499
SETRE	13,2654	1242	4 611 1238
SETREX	0051	= 1242	2 1242
SETROUND	00,2272	1159	3 1159
SETRXX	13,2667	1242	3 1242
SETSAMP	06,3047	169	1 169
SETSURF	43,3064	277	1 249
SETTB6	24,3261	709	2 709
SETTIME4	06,2075	143	1 145
SETT5	21,2170	1001	2 1000
SETUP.9	30,3721	717	1 728
SETUPDSP	10,2463	1402	1 1402
SETUPDYN	24,3264	709	1 709
SETUPER1	33,2621	442	1 442
SETUPGC	33,2736	444	
SETUPTIG	24,3667	740	
SETVAC	41,3460	374	1 374
SETVANDI	30,2513	610	1 610
SETVHFLG	43,2773	273	1 250
SETVPAST	33,3605	530	3 530
SETWBODY	21,3002	1017	1 1018
SETWIN=0	30,3550	622	1 621
SETWD	05,3513	1097	3 1097 1099
SETWW5D	30,2506	610	1 610

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
SETXTACT	43,2105	250		SIGNCK2	21,3574	1030	1 1030	SLAP1	05,2367	194	1 337
SETZOEND	06,3062	170		SIGNCK3	21,3625	1031	1 1031	SLEEPIE	33,2276	437	5 435 447
SET1/PDT	14,3566	776	3 748 775	SIGNCK4	21,3662	1031	1 1031	SLOAD	6450	1125	1 1117
SEUDOPOO	04,2242	212	1 214	SIGNCK5	21,3710	1032	1 1032	SLOAD2	6024	1108	4 1125 1506
SEVEN	4774	1200	22 214 1478	SIGNFIX	40,2715	359	2 359	SLOPE	E6,1654	= 114	4 114 1030
SFAIL	1357	= 87	4 87 1395	SIGNMPAC	22,3761	1506	16 405 1383	SLOPEBIT	4766	= 50	
SFCOM	42,2120	283	1 283	SIGNTEST	40,2344	331	2 330	SLOPEHI	00,2314	1160	1 1185
SFCONOM	41,3042	356	2 344 358	SIM2CADR	05,2374	194		SLOPELO	00,3006	1174	1 1186
SFINTAB	42,2437	289	1 283	SINBLANK	40,2465	333	1 332	SLOPESW	0033	= 50	3 1285 1298
SFINTABR	41,3206	359	1 359	SINCDU	1141	= 81	6 81 1369	SLOPEVAL	05,3432	958	1 956
SFOUTAB	42,2507	290	1 283	SINCDUX	1145	= 81	6 546 970	SLOPE2	21,3451	1029	2 1031 1032
SFOUTABR	41,2573	345	1 345	SINCDUY	1141	= 81	5 770 1370	SLOWBIT	4754	= 56	
SFRET	41,3053	356	1 357	SINCDUZ	1143	= 81	4 545 1370	SLOWFLG	0115	= 56	3 899 929
SFRET1	41,3041	356		SINE	00,3525	1187	2 1119 1365	SMALL	00,3132	1178	1 1175
SFRUTMIX	41,3033	356	4 338 358	SINESLOC	23,3736	1369	1 1368	SMALLMP	21,2060	997	3 1003 1034
SFRUTNOR	41,3025	356	4 343 358	SINGIMLC	27,2412	400	1 398	SMALL2	00,3061	1175	1 1178
SFTEMP1	0123	= 70	20 282 361	SINI	26,3632	1251	2 1247	SMCDURES	23,3743	1370	1 598
SFTEMP2	0124	= 70	2 361	SINM	E6,1510	= 116	2 116 1071	SMODE	1362	= 87	7 87 1395
SGNAGREE	22,3636	1502	3 763 1323	SINNODI	0010	= 1251	1 1247	SMODECHK	43,3233	1395	3 1395 1398
SGNCHECK	12,2634	1285	2 1285 1286	SINO	E6,1512	= 116	3 116 1070	SMPAC+	00,3403	1184	3 1184
SGNCOM	40,2317	330	1 331	SINOCOSM	E6,1514	= 116	3 116 1071	SNAPAGN	05,3567	1098	
SGNDVOVF	00,2401	1162	1 1162	SINTH	0022	= 74	21 299 1359	SNAPEND	05,3606	1099	
SGNOFF	0123	= 70	3 330 331	SINTRIM	15,2626	1079	2 1071 1074	SNAPLOOP	05,3556	1098	1 1099
SGNON	0122	= 70	3 330 331	SINVEC1	27,2414	400	1 398	SNTH	E5,1731	= 100	16 100 1302
SGNRDOT	E5,1756	= 100	4 100 1301	SINVEC2	27,2416	400	1 399	SN1	00,3550	1188	1 1187
SGNRT	E6,1651	= 110	3 110 988	SIN33	14,2574	753	1 751	SN359+	22,3544	675	1 674
SGNTAB	40,2340	331	2 330 331	SIVBCOMP	33,3540	530	1 528	SOB	0042	= 1251	4 1246 1247
SGNTO1	40,2733	360	1 359	SIVBOFF	33,3637	531	2 234 531	SOLD	0741	76	5 171 209
SGNTST1	40,2360	331	3 331	SIX	6211	= 1204	35 156 1420	SOLNSBIT	4766	= 57	
SHAFTSF	E3,1771	= 91		SIXTY	5010	= 1394	1 1400	SOLNSW	0127	= 57	5 1299 1302
SHIFTNDX	27,2603	590	5 579 609	SIZETAB	01,2000	230	2 1413 1416	SOMEERRR	33,2652	443	
SHIFTR1	22,3330	503	8 468 689	SIZETST	42,3470	363	2 362	SOMERR2	33,2655	443	2 430 447
SHOLTS	7704	= 390	1 390	SKEEP1	1371	= 87	20 87 1401	SOPT	43,3637	1401	1 1401
SHORTMP	7256	1142	9 297 1444	SKEEP2	1372	= 87	10 87 1399	SOPTION	43,3622	1400	2 1399
SHORTMP2	7262	1142		SKEEP3	1373	= 87	14 87 1400	SOPTIONS	43,3244	1395	2 1395
SHORTT	00,2017	1152	2 1116	SKEEP4	1374	= 87	14 87 1400	SOPTION1	43,3254	1395	1 1395
SHORTV	00,2121	1155	1 1116	SKEEP5	1375	= 87	10 87 1400	SOPTION2	43,3255	1395	
SHOW	33,2205	432	2 428	SKEEP6	1376	= 87	6 87 1401	SOPTION3	43,3256	1395	
SHOWSUM	43,2735	273	1 273	SKEEP7	1377	= 87	22 198 1400	SOPTION4	43,3257	1395	
SHOW1	33,2207	432	1 432	SKIPADD	10,3204	1467	1 1467	SOPTION5	43,3260	1395	
SIDETRAK	25,2716	869		SKIPSIM	05,2376	194	1 194	SOPTION6	43,3261	1395	
SIDLOOP	43,3221	1394	1 1395	SKIPTPER	23,2735	525	1 525	SOPTION7	43,3262	1395	
SIGHTSIX	6211	= 781	1 787	SKIPVBIT	4757	= 51	3 202 589	SOPTON10	43,3263	1395	
SIGN	7611	1151	1 1117	SKIPVHF	0043	= 51	1 579	SOUPLY	33,2675	443	
SIGNCK1	21,3503	1029	1 1029	SKIP75	04,3710	669	1 668	SOURCBIT	4761	= 64	

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
SOURCFLG	0216	= 64	7 578 586	STADR	6323	1120	1 1119	STIKBIT	4753	= 49	2 597 1017
SOUTHDR	E5,1431	102	2 102 428	STALLOOP	14,3744	788	1 788	STIKBITS	21,2031	551	2 550
SPARE	0007	= 179	16 180 189	STAR	E5,1765	= 99	16 99 784	STIKFLAG	0020	= 48	4 211 1015
SPCOS	5060	1207	7 997 1366	STARAD	E5,1735	= 99	24 99 1361	STKTEST	34,3566	597	2 596 597
SPCOS1	5060	= 997	1 1036	STARALGN	1141	81	2 81	STOINST	05,3334	956	1 956
SPCOS2	5060	= 997	1 1036	STARCODE	1140	81	11 293 787	STOPRAT	4000	= 27	2 178 422
SPECSTS	33,2401	438	1 235	STARIND	0304	= 73	14 211 787	STOPRATE	4463	422	5 200 559
SPECTEST	01,2644	1212	1 1216	STARM	0040	= 74	4 297	STOPVEH	36,2434	559	
SPITGYRO	33,3143	447		STARSAV1	E5,1610	= 98	7 98 776	STOPYZ	4474	422	1 422
SPLRET	23,2616	521	1 648	STARSAV2	E5,1616	= 98	9 98 776	STORBNDS	12,2206	1278	1 1280
SPLRET1	23,2466	519	1 521	STARSAV3	E7,1704	= 129	6 294 787	STORCMD	10,2063	176	1 177
SPNDX	E6,1506	= 112	34 112 1034	STARTAB	15,2000	= 29	2 602 1387	STORDELT	35,2522	476	2 475 476
SPNDXCHK	21,3050	1018	2 1018	STARTAUT	04,2452	215	2 215 219	STORDV	27,2072	221	1 221
SPOLYARG	E6,1704	= 119	10 119 551	STARTENT	25,2000	852	1 798	STORE	6371	1122	6 1121
SPRTETIG	E7,1412	= 132	2 909 912	STARTEN1	25,2063	853	2 793 853	STORE,1	6363	1122	1 1121
SPRTEX	E7,1752	= 131	12 132 920	STARTMNV	27,2137	395		STORE,2	6366	1122	1 1121
SPSCODE	4760	= 1417		STARTSB2	05,3054	202	2 200 201	STOREDTA	33,2326	437	2 437 439
SPSIN	5061	1207	8 997 1366	STARTSIM	05,2372	194		STOREL/D	25,3523	880	1 872
SPSIN1	5061	= 997	1 1036	STARTSTO	6403	1123		STOREMAX	12,2145	1277	3 1277
SPSIN2	5061	= 997	1 1036	STARTSUB	05,3046	202	3 194 202	STOREMIN	12,2217	1278	1 1278
SPSIX	31,3515	639	1 638	STARTSW	05,2371	194		STORE1	6572	1127	1 1157
SPSOFF	24,3045	704	4 209 711	STARTTGO	35,3566	735	1 693	STORHAPO	23,2707	524	
SPSOFF97	24,3330	710		STATE	0074	69	26 47 1198	STORHPER	23,2721	525	
SPSON	24,2674	702		STATEBIT	4764	= 53		STORIJ	14,3732	787	2 781 787
SPT	5064	1207	1 1207	STATEFLG	0067	= 53	8 588 1488	STORJUMP	6341	1121	1 1120
SPVAC	5146	1208	2 221 1466	STATEINT	13,2702	1313	3 231 1314	STORLP71	27,3643	1498	2 1498
SPVACIN	5142	1208	1 1208	STATEND	13,2031	228	1 228	STORT	34,3437	595	1 600
SPVQUIT	37,3427	890		STATEST	31,2031	= 35		STRAT	14,2534	752	1 752
SQ	0743	76	2 1207	STATEUP	13,2000	227	1 1314	STRATGY	14,2526	752	
SQRT	00,3206	1181	1 1119	STATEXTP	31,2146	510	1 507	STRSAT	34,2505	547	1 543
SQRTABRT	00,3401	1184	2 1184	STATINT1	13,2711	1313	3 231 1313	STRTAUT1	04,2470	216	1 216
SQRTNEG	00,3372	1184	1 1184	STATQUO	04,2340	214	2 213 214	STRTDEC1	23,2441	519	1 519
SQRTNM2	00,3472	1186	1 1186	STATQUO1	04,2333	213	1 213	STRTGYRO	07,3324	1429	2 1427 1432
SQRTNORM	00,3477	1186	1 1186	STBYDUMP	15,2303	1072		STRTGYR2	07,3330	1429	4 1430 1434
SQRTSHFT	00,3220	1181	1 1181	STEERBIT	4756	= 51	1 703	STRULBIT	4754	= 58	3 702 703
SQRTSUB	00,3342	1184	3 1175 1189	STEERING	16,2307	727		STRULLSW	0134	= 58	1 58
SR	0021	= 40	32 333 1413	STEEROFF	25,3611	883	1 878	STSHOSUM	43,3454	1398	2 273
SRATE	0736	76	4 177 209	STEERSAT	34,2447	546	1 547	ST52ST	14,3116	759	1 758
SRDDV	00,2024	1152	1 1175	STEERSW	0042	= 51	6 530 726	SUBETA	26,3122	859	1 859
SRTEMP	E5,1657	= 98	5 632 763	STEERULL	24,2761	703		SUBETA2	26,3130	859	1 859
SRTEST	00,3453	1186	1 1185	STEP2CK	34,3452	596		SUBEXIT	E4,1760	= 95	25 96 690
SR30.1	23,2660	524	2 519 521	STEP2CKB	34,3540	597	1 597	SUBLIST	0336	74	12 1096 1099
SR52/1	13,2000	= 29	1 766	STEP3CK	34,3600	598	1 597	SUBTR	00,3677	1190	1 1191
SSP	6567	1127	1 1117	STICKCHK	21,3152	1020	3 550 1024	SUFFCHEK	12,3511	1299	4 1298 1299
STABLISH	43,2451	261	1 249	STICKOUT	21,2030	551		SUHALFA	22,2672	414	1 414

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
SUHALFAP	22,2712		414 1 414	SXTSM	17,2052		778 2 754 775	S22NXXB	30,2705		612 1 612
SUPDACAL	4671		1105 2 367 1399	SXTSM1	17,2057		778 1 576	S22N7071	30,2332		563 2 562
SUPDXCHZ	5214		1220 6 378 1220	SXTSM2	17,2073		778 1 452	S220FF=I	30,3042		614 1 610
SUPERENK	0007	=	42 25 198 1486	SXTVAR	27,2456		588 1 581	S22RHO	0040	=	623 6 612 618
SUPERRSM	5320		1232	SYNCT4	06,2152		145 1 145	S22RL	E5,1554	=	97 2 611
SUPER011	5010		1201 2 536 1394	SYSTSPR1	E5,1422		102	S22RTNEX	E7,1703	=	129 2 129
SUPER100	4762	=	1201	SYSTSPR2	E5,1430		102	S22SAVET	30,2775		613 3 613 616
SUPER101	5014		1201 1 1204	S1	0050	=	41 52 409 1360	S22TOFF	E7,1667	=	129 14 129 763
SUPER110	5015		1201 1 1204	S10BITS	5041	=	1394 2 1396	S22TPRIM	E7,1671	=	129 3 129 614
SUPRCON	43,3171		1394 1 1400	S11.1	34,2537		547 3 530 740	S22UMRL	E7,1501	=	125 7 611 619
SURELY.9	30,3736		717 1 717	S13BITS	43,3172		1394 1 1400	S22UOFF	1053	=	79 2 614 617
SURFFBIT	4761	=	62	S2	0051	=	41 41 431 1360	S22UUT	1113	=	79 9 612 613
SURFFLAG	0177	=	62 7 227 1327	S2BVTRS	30,3124		615	S22WSUBL	E4,1406		92 1 616
SVCT3	5276		1225 2 1225	S2GETUM	30,2542		610	S22W72X	30,2733		613 1 613
SVCT3X	7703		1225 3 1225	S2INCP1	30,3130		615	S22W76X	30,2741		613 3 612 613
SVDWN1	10,2240		301 3 274 1315	S2INTS1	30,3025		614	S22W78X	30,2763		613 3 613
SVDWN2	10,2264		301 3 274 1316	S2RPTR	30,3065		614	S221X3	0030	=	623 2 618
SVMRKDAT	E7,1537	=	125 29 125 763	S2RTRP	30,3057		614	S223X1	0022	=	623 3 611 619
SW/	01,2513	=	1199 1 1118	S22.1	30,2466		609 1 562	S2231NXT	31,2347		618 1 619
SW/NDX	0305	=	73 7 1068 1091	S22.981X	30,3315		617 1 617	S2231X13	31,2340		618 2 611 612
SWBIT	0131	=	70 5 1197 1199	S22ABDE	30,2417		564 2 564	S30/31.1	26,2021		646 1 644
SWBRANCH	6664		1130 1 1199	S22BOX12	30,3102		615 1 616	S32.1F1	0245	=	67 4 672 682
SWCALL	4642		1104 3 424 1459	S22BOX22	30,3204		616 1 611	S32.1F2	0246	=	67 4 672 682
SWCHCLR	35,2065		467 1 467	S22BOX32	30,3066		614 2 616	S32.1F3A	0247	=	67 8 672 682
SWCHSET	35,2043		467 1 467	S22BOX42	30,3164		616 1 615	S32.1F3B	0250	=	67 8 672 682
SWICHOVR	17,2344		946 3 262 962	S22BOX44	30,3256		617 2 616	S32/33.X	15,2050		687 4 220 670
SWINIT	05,3252		205 10 195 196	S22BX44A	30,3261		617 1 617	S32BIT1	4752	=	67
SWITCHES	01,2513		1197 1 1199	S22BX44B	30,3266		617 1 617	S32BIT2	4753	=	67
SWRETURN	4651		1104 7 224 1440	S22D	0036	=	623 3 611 612	S32BIT3A	4754	=	67
SWSAMPLE	1354		87 10 169 757	S22D=9	30,3050		614 1 610	S3229T3B	4755	=	67
SWSKIP	01,2574		1199 2 1199	S22DSPP	30,2367		564 4 563 564	S33/34.1	35,2251		473 2 467 667
SWSTORE	01,2550		1198 2 1198	S22DSPPA	30,2335		563 1 564	S34/35.1	36,2000		478 3 220 473
SWTOVBIT	4752	=	63 2 944 946	S22D6Z	30,3035		614 1 614	S34/35.2	35,2561		479 3 220 472
SWTOVER	0207	=	63 1 726	S22EORM	E7,1673	=	129 9 129 616	S34/35.3	35,2651		481 1 484
SWWORD	0130	=	70 2 1197 1198	S22F2410	30,3331		618 3 611 762	S34/35.4	35,2714		482 1 484
SXA	01,2361		1192 1 1118	S22F244	30,3223		616	S34/35.5	35,2774		484 2 469 472
SXTALARM	23,2142		300 2 300	S22F244X	30,3222		616 1 614	S3435.23	35,2577		479 1 479
SXTANG	23,2053		299 1 451	S22GTP	30,3324		618 1 617	S3435.25	35,2601		479
SXTANG1	23,2076		299 1 298	S22I=N	30,3000		613 1 614	S3435LOC	36,2000	=	33 1 478
SXTLOGIC	23,2027		297 1 297	S22LOC	E7,1750	=	134 6 134 619	S4BCOMP	33,3534		528 1 528
SXTMARK	07,2000		241 2 452 780	S22LSITE	30,2260		562 1 564	S40.1	24,2241		694
SXTMARKE	07,2000	=	28 1 241	S22NXTIN	30,2531		610 3 614	S40.1B	16,2065		723 1 694
SXTMRKA	07,2010		241 1 241	S22NXTU	30,2625		611 1 611	S40.13	16,2534		732 3 231 711
SXTNB	23,2000		297 2 512 778	S22NXTWI	30,2636		611 1 612	S40.130	16,2555		732 2 732
SXTOPTN	E5,1413	=	102	S22NXXA	30,2661		612 1 612	S40.132	16,2607		733 1 733

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
S40.133	16,2617		733 2 733	TARGETV	12,3602		1300 1 1300	TCSUBTR	00,3727		1191 1 1189
S40.135	16,2627		733 1 732	TARG1/2	E5,1431	=	102 2 451	TCTSKOVR	5313	=	385
S40.14	20,2614		734 2 266 1012	TARG1BIT	4757	=	49 2 212 760	TCWAIT	41,3273		365 1 374
S40.15	17,2452		948 3 944 951	TARG1FLG	0024	=	49 6 396 761	TDEC	0744		77 9 77 1349
S40.2,3	24,2331		696 1 724	TARG2BIT	4760	=	49	TDEC1	0040	=	1353 48 228 1349
S40.2,3B	16,2157		724 1 696	TARG2FLG	0025	=	49 6 561 775	TDEC2	E5,1634	=	98 2 500
S40.6	20,2366		718 1 698	TAR1	33,3263		449 1 450	TDELTAV	E3,1520	=	89 14 89 1348
S40.8	16,2176		725 1 714	TASKOVER	5314		1232 67 151 1482	TDESIRED	E5,1672	=	100 5 100 1299
S40.8ADS	24,3557		714 1 698	TAT	0014	=	1353 10 457 1329	TEMK	0742		76 10 1207
S40.81	24,3102		706 1 727	TAU	E6,1561	=	113 10 113 1052	TEMPALFA	E6,1771	=	119 2 119 895
S40.9	16,2400		729 1 717	TAU.	E4,1702	=	93 13 93 1339	TEMPBB	0064	=	1408 1 1407
S41.1	27,3032		720 2 738 740	TAUCHCK	17,3104		1044 1 1044	TEMPBBCN	0073	=	1408 6 1407 1409
S41.2	20,2463		720 2 265 1012	TAUCHECK	17,3022		1043 1 1043	TEMPBETA	E6,1772	=	119 3 119 895
S50	13,2345		766 1 766	TAUNORM	21,3756		1034 2 1034	TEMPDAP	E6,1444		107 8 107 953
S52.2	11,2247		782 2 746 749	TAU1	E6,1562	=	113 7 113 1050	TEMPFLSH	0373		75 5 211 1469
S52.2.1	11,2267		782	TAU2	E6,1563	=	113 7 113 1051	TEMPG	0061	=	1408 11 238 1410
S52.2A	11,2260		782 1 782	TAZEL1	E5,1432		102 4 449 450	TEMPG2	0071	=	1408 3 1406 1409
S52.3	14,2145		746 1 745	TBASE1	1257		83 6 238 1412	TEMPMM	1113	=	80 2 215
S52/2	11,2000	=	29 1 782	TBASE2	1261		83 2 1325	TEMPNM	0063	=	1408 3 1407 1410
S61.1	26,2546		807 2 792 795	TBASE3	1263		83	TEMPOK	06,2531		157 1 157
S61.1A	26,2605		808 1 808	TBASE4	1265		83 1 83	TEMPOR1	1135		80 9 574 614
S61.1A-1	26,2604		808 2 234 808	TBASE5	1267		83 1 540	TEMPOR2	0160	=	1476 10 1461 1471
S61.1B	26,2623		809 1 808	TBASE6	1271		83 2 709 828	TEMPP	0062	=	1408 6 1407 1409
S61.1C	26,2567		808 2 234 808	TBEFCOMP	E4,1773	=	96 2 96 586	TEMPPHS	0154	=	1416 9 1411 1416
S61.2	26,2652		812 1 793	TBITS	E6,1606	=	116 2 116 1088	TEMPPR	0070	=	1408 2 1407 1410
S61DT	E6,1774	=	119 3 234 808	TC	E3,1550	=	89 10 89 1346	TEMPP2	0072	=	1408 5 1406 1409
S62.3	10,2412		822 1 797	TCALARM2	43,3216		1394	TEMPROLL	E6,1770	=	119 3 119 895
S8BITS	4350	=	1394 1 1401	TCCSM	E3,1622		90	TEMPR60	1004		77 5 394 719
==========				TCDANZIG	27,3544	=	1385 12 305 1380	TEMPSET	16,3123		952 1 963
T	0036	=	1306 15 461 1299	TCDH	E5,1460	=	105 13 105 686	TEMPSW	0065	=	1408 7 1406 1409
T(X)	27,3526		1385 2 1382 1383	TCDU	37,3701		896 1 894	TEMPSWCH	0157	=	1416 3 1411 1416
T-OTHER	E3,1642	=	90 3 136 181	TCFINDVC	4345		385 1 374	TEMPSW2	0066	=	1408 4 1406 1409
T-TO-ADD	E7,1465	=	128 6 1328 1330	TCGETCAD	00,3754		1481 1 1482	TEMPTIME	E5,1440		102 2 431
TABLNTH	4355	=	143 1 143	TCGOPOOH	26,3772		1444 1 1477	TEMPVAR	1116	=	80 3 1253 1254
TABPCOM	17,2653		1039 4 1039	TCLEM	E3,1674		90	TEMP2G	0155	=	1416 9 1411 1416
TABRCOM	17,2766		1042 2 1042	TCNOVAC	41,3277		365 1 374	TEMP333	E6,1510	=	108 3 108 957
TABRZCMD	17,3050		1044 2 1044	TCORR	17,2530		949 1 945	TEMREG	E6,1573	=	109 25 109 993
TABYCOM	17,2724		1041 4 1040	TCPIN	17,2030		274	TEMX	1063	=	79 5 79 839
TACHEXIT	17,2016		274 1 275	TCPLON	40,3070		368 2 368	TEMY	1064	=	79 3 79 839
TAD	7040		1136 1 1117	TCQ	6711		1131 9 173 1485	TEMZ	1065	=	79 5 79 839
TAGSUB	01,2436		1194 4 1192 1193	TCQBNK00	00,3452		1185 1 1185	TEM1	0141		71 6 71 1470
TAKEON	34,2531		547 1 547	TCQSTAL	04,3276		592 2 592	TEM18	E7,1646	=	122 8 122 878
TAR/EREF	33,3254		449 2 450 451	TCSI	E5,1462	=	105 15 105 686	TEM2	0142		71 8 71 1503
TARGDRVE	33,3375		451 2 450 451	TCSI2	E4,1750	=	95 5 217 677	TEM3	0143		71 9 71 1365
TARGETNG	25,2125		856 1 855	TCSLEEP	00,3765		1482 1 1481	TEM4	0144		71 7 71 348

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TEM5	0145		71 2 71 72	TFFELL	27,3444		1383 1 1381	THREE/8	11,3746		1352 1 1338
TEN	4355	=	1204 9 204 1143	TFFEL1	27,3446		1383 1 1381	THTDXYZ	34,3710		599 1 599
TENBNK14	27,3046		720 1 720	TFFNP	0034	=	1371 7 818 1383	THTD123	34,3716		599
TENSEC	33,3666		532 1 530	TFFQ1	0016	=	1371 5 1380 1383	TICKTEST	23,2514		520 2 517 520
TENT	32,2176		649 1 649	TFFRP/RA	27,3220		1377 1 524	TICKTFF	23,2504		519 2 519
TENTH	27,2647		607 1 598	TFFRTALF	0030	=	1371 3 1375 1382	TICKTPER	23,2475		519
TENTHSEK	21,2366		1004 1 1004	TFFSW	0167	=	61 3 1380	TICKTTE	37,3040		832
TEPHEM	E3,1706		90 19 91 1500	TFFSWBIT	4770	=	61	TIG	E7,1412	=	121 78 36 904
TEPHEM1	1130	=	80 8 80 537	TFFTEM	0044	=	1371 15 819 1384	TIG-0	24,2651		702 3 233 701
TERMEXTV	5524	=	250 3 254 256	TFFTICK	23,2537		520	TIG-5	24,2634		701 2 232 700
TERMFLSH	10,3621		1474 1 1474	TFFVSQ	0024	=	1371 2 818 1374	TIGAVEG	24,2602		700 2 234 700
TERMIBIT	4752	=	60 1 760	TFFX	0042	=	1371 8 819 1383	TIGBLNK	24,2565		700 3 233 699
TERMIFLG	0151	=	60 2 757 781	TFFXTEST	27,3352		1381 1 1381	TIGNOW	24,3451		712 2 712 737
TERMNVEC	12,3663		1301 1 1302	TFFZEROS	26,3335	=	1386 2 1380 1381	TIGON	24,3676		740 2 234 740
TERMP03	07,2040		241 1 241	TFF1/ALF	0026	=	1371 7 1375 1384	TIG76	04,2733		219 2 220 221
TERMSXT	07,2031		241 2 241 762	TFF1/4	26,3325	=	1386 4 1374 1380	TIME/RTO	E7,1523	=	122 3 122 857
TERM1TMP	0133	=	72 3 1368 1369	TFIGINIT	24,2235		693 1 735	TIMECHEK	10,3536		1473 1 1473
TERM52	14,3312		761 1 761	TGO	E7,1427	=	121 15 121 733	TIMECHK	22,3135		419 1 419
TERRLAMB	E5,1761	=	100 2 1298 1299	TGOCALC	16,2244		726	TIMEDELT	05,3770		1330 5 1328 1330
TEST	01,2562		1199 1 1199	TGR26	32,2200		649 1 649	TIMEDIDL	27,3563		1497 2 1499 1500
TESTBIT	40,3373		382 3 382	TGR26CON	32,2263		650 1 649	TIMEDIDR	27,3575		1497 1 236
TESTLEAD	33,2000	=	33 1 426	THETA	0024	=	74 11 768 1356	TIMEINC	13,3670		1330 2 1330
TESTLOOP	13,3364		1323 6 1320 1350	THETA(1)	E4,1740	=	95 3 95 648	TIMEMO	E4,1433		92 2 92 790
TESTMARK	07,2062		242 3 241 785	THETACON	27,3050		720 1 695	TIMEOPT	23,2424		518 3 505 518
TESTNN	41,2050		335 1 366	THETAD	1307		83 25 83 1421	TIMEOVFL	12,2355		1280 1 1279
TESTOFUF	40,3051		362 3 359 361	THETADX	E6,1572	=	113 14 113 1027	TIMERAD	12,3607		1301 2 908 917
TESTVB	41,2043		335	THETADY	E6,1573	=	113 10 113 1026	TIMESTEP	11,3237		1343 4 1324
TESTXACT	43,2076		250 18 253 1492	THETADZ	E6,1574	=	113 10 113 1027	TIMETEST	01,3535		1412 1 1415
TESTY	35,2317		473 1 473	THETAH	E7,1701	=	123 8 123 879	TIMETHET	12,3002		1289 7 461 904
TET	E3,1516	=	89 33 89 1345	THETAN	E5,1466	=	102 2 103 538	TIMETST	15,3154		1087
TETCSM	E3,1570		90 3 90 1499	THETAN1	E5,1466	=	103 13 103 446	TIMETST1	15,3177		1087 1 1087
TETLEM	E3,1642		90 3 90 1500	THETAX	E5,1460	=	102 1 102	TIMETST2	15,3213		1087 1 1087
TETOTHER	E3,1642	=	90	THETAX1	E5,1460	=	103 5 103 446	TIMETST3	15,3232		1088 1 1087
TETTHIS	E3,1570	=	90 1 514	THETA165	35,3637		939 1 904	TIMETST4	15,3234		1088 1 1087
TET1	0036	=	89	THETA210	35,3641		939 1 904	TIMETST5	15,3235		1088 2 1087 1088
TEVENT	1021		78 8 78 704	THETCOMP	20,2216		460 1 461	TIMEX	35,2556		476 2 474 476
TFF	E4,1734	=	95 13 95 525	THETDONE	25,2226		857 1 860	TIME1	0025	=	40 27 140 1473
TFF/RTMU	0036	=	1371 6 522 1382	THIRD	35,3146		488 1 475	TIME2	0024	=	40 43 135 1501
TFF/TRIG	27,3052		819 4 647 814	THIRTEEN	4776	=	1178 4 836 1175	TIME2SAV	1006		77 4 77 1444
TFFALFA	0032	=	1371 6 1375 1382	THISAXIS	26,3333	=	35 1 508	TIME3	0026	=	40 4 202 1231
TFFBANK	23,2372		518 1 517	THISPREC	13,3145	=	35 4 515 716	TIME4	0027	=	40 4 143 202
TFFCALLS	23,2674		524 1 524	THISSHIP	23,2420		518 1 518	TIME5	0030	=	40 25 139 1072
TFFCONIC	27,3151		1374 1 812	THISVINT	13,2034		228 1 1329	TIME6	0031	=	40 6 992 1061
TFFCONMU	27,3152		1374 1 524	THRDCHK	10,2323		680 2 679	TIMRBIT	4756	=	60 3 531 709
TFFDELQ	0012	=	1371 2 1383 1384	THREE	6214	=	1204 54 35 1493	TIMRFLAG	0155	=	60 5 486 737

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TIMSCAL	15,3137		1086 1 1085	TOFFOVFL	15,3130		1085 1 1085	TRNSPSPD	22,2343		408 2 403 408
TIMSUBM	0016	=	1251 3 1248	TOFFTEST	15,3201		1087 1 1087	TRNVNREF	34,2204		539
TIMSUBO	E3,1706	=	91 1 1248	TOGETHER	20,2501		720 1 720	TRTAGXPI	15,2723		1082
TINIRECT	11,3435		1346 1 1331	TOLD	0740		76 6 171 209	TRTEMP	E5,1656	=	98 6 98 764
TINYTHET	26,3141		859 1 857	TOLDAZMT	E5,1641	=	103	TRUE360X	12,3235		1294 1 1293
TITER	E7,1664	=	129 6 133 475	TOLDAZ1	E5,1641	=	103	TRUNBIAS	1024		78 2 568 631
TIX	01,2412		1193 1 1118	TONISSBT	4753	=	84 4 148 158	TRUNCMD	10,2140		177 1 176
TLESS26	32,2261		650 1 649	TON1	E6,1621	=	117 12 117 1088	TRUNION	E7,1754	=	134 2 630 631
TLIDT	33,3532		528 1 527	TON2	E6,1607	=	116 10 116 1088	TRUNSF	E3,1770	=	91 2 91 763
TLIFTOFF	1021	=	78 5 536 540	TON2TEST	15,3215		1087 1 1087	TRUNVAR	31,3510		639 1 631
TLIM	06,2517		157 1 148	TORQINCH	33,2635		442	TRUN19	31,3504		639 1 631
TLIMBIT	4752	=	84 2 157 391	TORQNDX	E5,1450	=	102 5 427 442	TSIGHT	E5,1606	=	97 12 97 786
TLITMP	E7,1463	=	128 2 527 528	TORQUE	33,2074		428 1 443	TSIGHT1	16,2651		767 1 750
TLOAD	6437		1125 3 409 1204	TPAGREE	7226		1142 8 347 1502	TSK	21,2110		997 4 997 998
TM	E6,1716	=	118 6 416 600	TPASS4	E7,1655	=	127 11 127 905	TSKOVCDR	5313		1225 2 385 1235
TMANUCHK	22,3125		419	TPDVL	6557		1127 1 1127	TSLC	7552		1149 1 1117
TMARK	E5,1442		102 5 431 446	TPERTICK	23,2544		520 1 520	TSLCLOOP	00,2201		1157 1 1157
TMAXFIRE	16,3764		996 2 992	TPIMNBIT	4766	=	66	TSLCTEST	00,2207		1157 1 1157
TMDON	20,2104		420 1 420	TPIMNFLG	0242	=	66 5 220 587	TSLC2	00,2172		1157 1 1149
TMEXITL	05,3640		1099	TPLEFTN	40,3034		361 2 347 361	TSSL	00,2101		1154 3 1152 1161
TMFAIL2	07,3765		1447 2 1447	TPMODE	22,3657		1502 12 581 1294	TSSR	00,2025		1152
TMFI	E6,1666	=	118 9 403 405	TPREV	E5,1763	=	100 3 1298 1299	TST,TRIM	24,2560		699 1 698
TMINDEX	0335		74 6 74 1098	TPSL1	4372		385 7 351 362	TSTAB	40,3605		392 1 393
TMINFIRE	5001	=	996 1 991	TPUSH	00,3271		1182 1 1182	TSTART82	E4,1715	=	94 6 518 648
TMIS	E6,1666	=	118 11 118 403	TR*GL**P	23,3545		1365 1 1365	TSTCON1	40,3550		391 1 390
TMODE	6446		1125	TRACKBIT	4764	=	50 12 200 1423	TSTCON2	40,3551		391 1 390
TMP1	E6,1670	=	110 7 110 977	TRACKCHK	43,2655		270 1 270	TSTCON3	40,3552		391 1 390
TMP2	E6,1672	=	110 11 110 977	TRACKFLG	0031	=	50 14 215 1488	TSTFORDP	41,2461		343 1 342
TMP3	E6,1674	=	110 7 110 978	TRACKTRM	43,2641		270 2 249 640	TSTLTS1	40,3451		390 1 390
TMP4	E6,1676	=	110 11 110 978	TRANSM1	E4,1400	=	96 2 96 441	TSTLTS3	40,3470		390
TMP5	E6,1700	=	110 7 110 979	TRANSPOS	22,2334		408 1 403	TSTLTS4	40,3335		376 1 391
TMP6	E6,1702	=	110 11 110 980	TRANSP1	22,3731		1505 2 299	TSTORE	6423		1123 1 1123
TMRAD100	32,2304		908 2 900 910	TRANSP2	22,3745		1505 1 299	TSTPOINT	23,3731		1369
TMRESUME	05,3642		1099	TRATE	0735		76 5 178 764	TSTRLSRM	13,2671		1242 1 1242
TNIT	E7,1473	=	126 4 126 730	TRFAILOF	5632		1485 2 273 579	TSTRT	E7,1664	=	129 2 129 472
TNITPREV	E7,1475	=	126 3 126 730	TRFAILON	5644		1485 1 589	TSTRXUT	30,3702		716 2 697 724
TNONTEST	06,2224		149 1 147	TRG*NBSM	23,3642		1367 2 597 778	TST2I=0	30,3512		621 1 622
TNUV	E3,1526	=	89 12 89 1348	TRIG1	23,3324		1356 1 1356	TTE	E7,1726	=	123 7 123 833
TOBALL	27,2105		394 1 394	TRIG2	23,3335		1356 1 1356	TTEMP	E6,1672	=	118 4 419
TOBALLC	27,2124		394	TRIM/CMD	16,3321		962 1 961	TTE1	E7,1732	=	124 3 124 820
TOBALL1	27,2104		394 3 394 395	TRIMONLY	24,2500		698 1 699	TTE2	E7,1734	=	124 3 124 832
TOCON2	5445		1407 1 1408	TRIMSCAL	24,3541		714 2 696	TTG/0	24,3617		737 2 232 738
TOF-FF	27,2000	=	32 1 1374	TRIPA	1113	=	80 4 1253 1254	TTGPHS	24,2623		700 2 738 740
TOF-FF1	34,2000	=	33 1 1386	TRKMKCNT	0772		77 5 186 904	TTMP1	E6,1611	=	109 42 109 980
TOFF	E6,1605	=	116 7 116 1088	TRMATTCK	43,2414		260 1 260	TTMP2	E6,1613	=	109 14 109 979

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
TTOGO	E7,1660	=	127 10 127 709	T3RPTBB	5254	=	140 1 139	UCL	1127	=	79 3 80 580
TTPI	E7,1662	=	127 20 127 686	T3RUPT	01,3362		1231 1 139	UCLSTAR	E7,1641	=	125 7 125 631
TTPIO	E5,1464	=	105 3 663 668	T3RUPT2	01,3367		1231 1 1232	UH/	E7,1561	=	132 5 904 936
TUFITS	36,2473		560 2 558	T3TOT4	E5,1640	=	98 2 284 909	ULAGEOFF	24,2764		703 1 703
TUSED	E6,1712	=	115 7 115 1088	T4JUMP	06,2116		145 2 144	ULOS	E5,1624	=	97 7 97 481
TVCADDR	16,3331	=	963 3 961	T4RPTBB	4054		140 1 139	UM	1071	=	79 14 79 762
TVCBCK	10,2226		178 1 175	T4RUP	06,2000	=	28 2 141 142	UMPAC+	00,3167		1179 2 1179
TVCCADR	16,3331		963 2 962 963	T4RUPT	06,2000		141 2 139 140	UMPAC-	00,3161		1179 2 1179
TVCDAPHS	16,3233		961 1 961	T5IDLER	05,3230		205 2 195 199	UN	E5,1675	=	100 7 101 13 2
TVCDAPON	17,2163		943 1 715	T5IDLER1	20,3746		1069 2 1066	UNAJUMP	00,2000		1119 1 1116
TVCDUMMY	E6,1574	=	109 1 109	T5IDLER2	15,3372		1091 1 1091	UNA36	E4,1733	=	94 2 505
TVCEXADR	16,3335		963 1 962	T5IDLOC	05,3226		204 5 205 1091	UNI	E7,1501	=	122 6 122 857
TVCEXEC	16,3037		951 3 200 951	T5IDL24	24,3547		714 1 702	UNIT	00,3022		1175 1 1119
TVCEXFIN	16,3217		953 3 951 952	T5LOC	0112		70 25 140 1091	UNITDV	00,3150		1179 3 1177
TVCEXPHS	E6,1644	=	110 11 110 962	T5PHASE	E6,1464	=	107 10 735 1058	UNITNORM	05,3743		1291 1 1291
TVCINIT1	17,2205		944 1 949	T5PHASE2	21,2674		1014 1 1001	UNITR	E3,1755		91 13 91 892
TVCINIT2	17,2227		944	T5RPTBB	4055		140	UNITV	E7,1507	=	122 2 122 856
TVCINIT3	17,2260		945	T5RUPT	4056		140 2 139 140	UNITW	E3,1711		90 10 90 890
TVCINIT4	17,2326		946 1 962	T5TEMP	E6,1502		107 36 1003 1044	UNITX	26,3333		1205 6 34 1205
TVCON2C	24,3561		715 1 703	T5TIME	E6,1634	=	113 6 113 1038	UNITY	26,3331		1205 2 34 604
TVCPHASE	E6,1635	=	109 16 109 973	T5TVCDT	E6,1625	=	109 7 109 974	UNITZ	26,3327		1205 4 34 938
TVCPITCH	0054	=	41 4 719 967	T5WAIT60	21,2636		1014 1 1013	UNP36	E4,1725	=	94 4 94 505
TVCRCS	E6,1525		108 3 108 112	T6ADDR	21,2637		1014 1 1014	UNRM	E5,1616	=	97 11 97 644
TVCYAW	0053	=	40 3 719 971	T6ADR	0111		69	UNSUSPEN	40,3343		376 1 376
TVCZAP	24,3161		708 4 209 712	T6CHNSET	20,2321		529 1 231	UNVEC	E7,1545	=	133 5 688 689
TVEC	0032	=	1353 4 1341	T6ENABL	16,3742		994 5 993	UNZ2	06,2312		151 1 152
TWEEKIT	0050	=	1308 4 1286 1299	T6LOC	0110		69 4 139 1066	UPACTOFF	4415		386 4 211 1499
TWELVE	5775	=	1039 6 223 1044	T6L1	17,3636		1060 1 1060	UPBUFF	0304	=	73 37 73 1500
TWICEEPS	30,2143		462 1 460	T6L2	17,3643		1060 1 1061	UPCNTRL3	25,3151		874 1 873
TWIDBIT1	5222		1223 2 365 713	T6PROG	21,3763		1034 1 1019	UPCONTRL	25,3034		872 1 801
TWIDDLE	5223		1223 29 152 1432	T6PROGM	21,3105		1019 1 1024	UPCOUNT	0303	=	73 6 73 1494
TWO	4767	=	1204 76 224 1499	T6RESET	20,2331		529 2 231 529	UPDATADR	13,2243		515 1 515
TWODT	16,2530		731 1 723	T6RUPTOR	17,3631		1060 1 1060	UPDATBIT	4762	=	49 3 212 590
TWOPI	35,3142		488 4 475 686	T6SCALE	7652	=	996 1 991	UPDATEOK	43,3707		1493 2 1492 1493
TWOPULSE	07,3467		1432 1 1432	T6SET	20,2311		528 3 232 527	UPDATERT	25,2173		857 2 859
TX789	E7,1447	=	125 3 125 1259	T6SETUP	17,3531		1058 1 1057	UPDATEVG	16,2331		728 2 725 737
TYPE2	36,2271		557 2 556 557	T6START	17,3606		1060 1 1014	UPDATE2	27,2000	=	32 2 1331 1496
TYPE2IN	36,2255		556 1 556	==========				UPDATE3	42,2000	=	34 1 1493
T1	E7,1715	=	131 6 131 922	U=SCAXIS	27,2321		399 1 399	UPDATFLG	0027	=	49 13 270 760
T1BITS	E6,1622	=	117 2 117 1087	UBAR0	E7,1603	=	125 7 125 637	UPDATIME	43,2325		258 1 258
T1TOT2	E5,1546	=	105 6 105 681	UBAR1	E7,1611	=	125 2 125 634	UPDATNN	41,2316		339 3 365 380
T12	E7,1723	=	131 4 131 910	UBAR2	E7,1617	=	125 4 125 634	UPDATRET	0117	=	70 3 339 340
T2	E7,1551	=	131 7 131 923	UBX/2	E7,1563	=	122 12 122 892	UPDATVB	41,2337		339 10 332 380
T2BITS	E6,1610	=	116 2 116 1088	UBY/2	E7,1571	=	122 14 122 892	UPDATI	41,2344		340 2 339 369
T2TOT3	E7,1655	=	133 5 293 668	UBZ/2	E7,1577	=	122 3 122 892	UPDNLIST	05,2211	=	179

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SYMBOL	DEF	H	REFERENCES
UPDTCALL	20,2161		421 1 421
UPDTMEND	43,2340		258
UPDTPHAS	4773	=	1495 1 1497
UPD8MASS	16,2225		726
UPEND70	27,3722		1499 1 1496
UPEND71	27,3626		1497 1 1496
UPEND72	27,3660		1498 1 1496
UPEND73	27,3757		1500 1 1496
UPENT2	10,3755		1478 5 1461 1472
UPERROR	43,3717		1493 1 1493
UPERROUT	27,3656		1498 3 1498 1499
UPFLAG	5547		1479 76 210 1496
UPFNDVAC	42,3770		1496 1 1496
UPJOB	27,3545		1496 1 1496
UPKLEAN	05,2556		197 1 1499
UPLIM	12,3334		1296 1 1296
UPLKFAIL	4756	=	85 1 391
UPLOADNV	42,3746		1495 2 1494
UPLOCBIT	4765	=	61 3 1446 1447
UPLOCKFL	0164	=	61
UPMNSVCD	27,3147		1332 1 1331
UPNEG	7515		1148 1 1148
UPOK	07,3750		1446
UPOLDMOD	0301	=	73 5 73 1499
UPOUT	27,3705	=	1499 7 1332 1500
UPOUT4	42,3733		1495 3 1494 1495
UPPART2	42,3626	=	1493 1 1493
UPPART3	27,3556	=	1496
UPPOS	7505		1148 1 1148
UPRPTBB	4052	=	140 1 139
UPRPT1	07,3731		1446
UPRUPT	07,3710		1446 1 139
UPSTATE	30,2435		583 2 554 579
UPSTORE	42,3750	=	1495 1 1495
UPSUM	1116	=	80 2 1446
UPSVFLAG	E3,1501	=	89 7 36 1332
UPTEMP	0330		73 9 1495 1498
UPTEST	C7,3771		1447 2 1446
UPTMFAST	06,2701		165 1 168
UPVERB	0302	=	73 7 73 1496
UPVERBSV	0331		73 2 1492 1493
UPVERIFY	42,3710		1495 3 1494 1495
UPVRFYNV	42,3747		1495 1 1495
UPWAKE	27,3550		1496
UPX	43,3071		278 5 257 277
UP1	E5,1610	=	105 13 105 689
UP21	4353	=	1495 1 1494
UP70	4772	=	1493 1 1492
UP71	4770	=	1493 1 1492
UP72	4767	=	1493 1 1492
UP73	6214	=	1493 1 1492
UR	0010	=	941 1 941
URH	E7,1541	=	122 2 816 820
URONE	E4,1733	=	95 4 793 816
URP	0016	=	941 1 941
URPV	0016	=	1353 8 1340 1353
URRECT	E5,1646	=	100 4 100 1281
UR1	E5,1723	=	100 11 100 1302
UR1/	E7,1553	=	131 8 131 936
US	E5,1616	=	98 3 630 635
USEADD	41,2106		335 1 335
USEFLBTS	5667		1485 1 1485
USEMAXDT	13,3441		1323 1 1324
USEPIOS	13,3101		1316 1 1316
USERPRIO	0163	=	1476 3 1464 1474
USPRCADR	4733		1106 3 1365
USSTAR	E7,1647	=	125 2 631
USTAR	1101	=	79 5 79 615
UT	E7,1712	=	128 13 128 724
UTABERR	15,2042		603 4 603
UTAMG	0006	=	604 5 606 607
UTAREA1	37,2425		601 1 601
UTAVEND	37,3146		834 1 834
UTBIT	4760	=	62 12 162 1492
UTCGA1	35,3405		606 1 607
UTEARTH	35,3254		603 1 603
UTFLAG	0176	=	62 12 215 1488
UTGMLOCK	35,3425		607 1 606
UTIGA	0032	=	604 1 607
UTKINPUT	36,2220		555 1 554
UTMGA	0034	=	604 1 606
UTMNCNTR	37,2445		602 1 601
UTOFF	04,2421		215 1 215
UTOGA	0030	=	604 4 604 607
UTOPT45	37,2462		604 1 601
UTOPT45A	35,3273		605 1 605
UTPIT	E7,1737	=	130 7 130 626
UTPRFAX	36,2437		559 3 557 604
UTSA	0022	=	604 2 604 605
UTSAP	0000	=	604 2 604
UTSB	0030	=	604 4 604 605
UTSBP	0006	=	604 2 604
UTSP46	15,2047		603 1 602
UTSP6	15,2046		603 1 602
UTSTARNO	1355	=	87 2 556 602
UTSTAR1	35,3162		600 1 598
UTST4650	35,3242		603 1 602
UTSUN	35,3251		603 1 603
UTUX	0022	=	604 4 605
UTUXP	0000	=	604 4 604 605
UTUY	0030	=	604 5 605
UTUYP	0006	=	604 5 604 606
UTUZ	0036	=	604 4 605 606
UTUZP	0014	=	604 4 605 606
UTVIAN88	35,3257		603 1 602
UTX	E6,1750	=	118 9 605 606
UTY	E6,1756	=	118 8 605 606
UTYAW	E7,1741	=	130 7 130 626
UTZ	0000	=	604 2 606
UTZINIT	0044	=	604 4 605 606
UT166	23,3526	=	603 1 606
UV1/	E7,1561	=	131 3 132 913
UXA/2	E7,1541	=	122 9 122 892
UYA/2	E7,1547	=	122 4 122 892
UZ	0024	=	1353 4 1340 1342
UZA/2	E7,1555	=	122 5 122 892
U1POS	22,2242		406 1 406
U2	E5,1713	=	100 5 100 1301
U2POS	22,2216		406 1 406
U3POS	22,2266		407 1 406
==========			
V	E7,1673	=	123 18 123 878
V(T1)/	E7,1671	=	131 6 131 936
V(T2)/	E7,1707	=	131 10 131 923
V(21K)	32,2257		650 1 648
V(24K)	32,2247		650
V(26K)	32,2265		650 1 649
V(28K)	32,2243		650
V(3K)	32,2245		650 1 648
V(32K)	32,2253		650 1 649
V(4K)	32,2255		650 1 648
V(400)	32,2241		650 1 649
V-OTHER	E3,1725		90 4 181 302
V/SC	7560		1150 1 1117
V/SCDV	00,2747		1173 3 1172

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V/SC1	7566		1150 1 1150	VBSP2LD	4354		385 4 353 1476	VEM	26,2212		791 1 790
V/SC2	00,2653		1171 1 1150	VBSP3LD	4615	=	385 2 353 714	VEMA	26,2217		791 1 791
VACOSP	10,3123		1466 1 1466	VBTERM	40,3307		375 2 337 381	VEMSCON	26,3031		815 1 813
VACFOUND	01,2613		1211 5 1211	VBTSTLTS	40,3432		390 1 337	VERB	40,2251		329 1 326
VACSTOR	07,2241		245 1 245	VBUF	0122		70 57 7 1369	VERBFAN	41,2133		336 7 335 338
VACT1	E7,1503	=	133 4 133 683	VBZERO	43,2121		252 1 249	VERBMASK	4171	=	1476 1 1461
VACT2	E5,1532	=	105 4 105 690	VB06N18	5031	=	627 1 626	VERBREG	1204		82 23 244 383
VACT3	E7,1545	=	126 18 126 690	VB06N78	31,2443		627 1 626	VERBSAVE	1244		82 3 335 372
VACT4	E7,1473	=	133 6 133 676	VB06N98	33,2217		432 1 432	VERBTAB	41,2150		336 1 336
VAC1	0401		75	VB51	07,2061		242 1 241	VERB37	04,2000	=	27 6 206 227
VAC1ADRC	05,3243		205 1 203	VB53	17,2161		786 1 785	VERB69	43,2037		249 1 249
VAC1USE	0400		75 3 203 1211	VB56CADR	4551		640 1 640	VERB94	43,3006		275 1 250
VAC2	0455		76	VB6N5	16,2727		769 1 769	VERB96	43,3030		276 1 250
VAC2USE	0454		76 2 204 1211	VB64	43,2437		261 1 249	VERIFBIT	4766	=	61 1 1495
VAC3	0531		76	VC/0	E4,1755	=	96 3 283 530	VERIFLAG	0165	=	61
VAC3USE	0530		76 2 204 1211	VCNTR	E6,1634	=	109 4 109 951	VESO	E4,1540	=	93 3 93 791
VAC4	0605		76	VCRCS	35,3623		938 1 903	VFINAL	26,3301		889 1 862
VAC4USE	0604		76 2 204 1211	VCSPS	35,3621		938 1 903	VFINAL1	26,3303		889 1 861
VAC5	0661		76 9 76 224	VCV	E3,1542	=	89 21 89 1346	VFLAG	0062	=	53 4 751 753
VAC5LOC	20,2000	=	30 1 223	VCVCSM	E3,1614		90 1 634	VFLAGBIT	4757	=	53
VAC5STOR	20,2000		223 3 198 1488	VCVLEM	E3,1666		90	VG	E7,1457	=	126 7 126 728
VAC5USE	0660		76 2 204 1211	VDEF	00,3231		1182 1 1113	VGAMCALC	26,3054		818 2 647 813
VAD	6720		1132 1 1117	VDT/180	E6,1567	=	117 8 1084 1089	VGBODY	E7,1664	=	127 6 127 738
VALMIS	33,2106		428 1 442	VDI	4351		385 8 204 1204	VGCOMP	16,2360		728 2 717 728
VAPREC	E7,1567	=	127 2 473 476	VEARTH	E5,1735	=	99 6 99 786	VGDISP	E7,1762	=	124 8 291 910
VARALARM	5770		1489 4 167 1440	VECAGREE	00,3007		1174 2 1171 1175	VGPREV	E7,1720	=	128 5 717 738
VARDELAY	5260		1223 5 150 1420	VECANG1	27,2420		400 1 399	VGTEMP	E7,1645	=	127 4 717 731
VARGAINS	16,3065		951	VECANG2	27,2422		400 1 399	VGTIG	E7,1720	=	128 13 128 723
VARIANCE	E7,1525	=	125 13 125 1253	VECLEAR	27,2230		398 1 398	VGTLI	E7,1724	=	124 5 182 530
VARK	E6,1632	=	109 4 109 976	VECMODE	22,3635		1501	VHFCNT	0771		77 9 77 904
VARST0	E6,1511	=	108 7 108 957	VECOEM	E4,1436	=	92 5 93 791	VHFGOOD	27,2576		590 1 590
VARST5	E6,1516	=	108 1 957	VECOFANG	22,2716		414 2 414	VHFRANGE	1113	=	79 4 579 590
VARSUBL	31,3505		639 2 631	VECPOINT	27,2225		398 3 394 601	VHFRBIT	4760	=	64
VARSUBL3	31,3506		639	VECPT	27,2000	=	32 1 397	VHFREAD	27,2536		589 2 140
VATT	0006	=	1353 26 457 1329	VECPTRET	27,2352		399 1 400	VHFRFLAG	0215	=	64 4 208 578
VATTI	0024	=	1353 5 457 515	VECQTEMP	E6,1710	=	117 2 398 400	VHFTIME	1007	=	77 5 185 589
VBARS	E7,1665	=	123 8 123 870	VECSHIFT	22,3320		502 4 655 688	VHHDOT	34,2304		541 1 541
VBCOARK	43,2133		253 1 249	VECTAB	E4,1615	=	93 8 93 1351	VINIT	E7,1575	=	126 11 126 717
VBFANDIR	41,2145		336 1 336	VEHOPT	24,2064		506 1 517	VINTFBIT	4766	=	53
VBPROC	40,3301		374 4 337 375	VEHRET	0734		76 4 506 519	VINTFLAG	0071	=	53 17 227 1348
VBRELDSP	40,3325		376 1 326	VEHUPBIT	4761	=	49	VIO	E7,1724	=	123 6 122 813
VBRESEQ	40,3323		375 1 337	VEHUPFLG	0026	=	49 11 271 1259	VIPRIME	E7,1611	=	126 12 126 730
VBRQEXEC	41,3433		374 1 337	VEL	E7,1515	=	122 4 122 856	VL	E7,1756	=	123 13 293 872
VBRQWAIT	41,3462		374 1 337	VEL/C	E7,1451	=	121 9 121 787	VLAUN	E5,1520	=	103 5 440 441
VBSP1LD	4353	=	385 2 353 355	VELSC	33,3430		452 1 440	VLAUNS	E5,1472	=	102

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
VLMIN	26,3205	888	1 864	VPRED	E7,1756	= 124	11 123 909	V04N06	4537	488	2 906 1465
VLOAD	6454	1125	1 1117	VPROJ	7361	1146	1 1117	V04N12	43,3131	279	1 279
VLOAD*	6056	= 1204	1 1124	VQUIT	26,3215	888	2 864 878	V04N46	42,2055	266	1 265
VLOADCOD	4752	= 1204	1 1124	VRCALC	04,3744	820	2 812 820	V05N00M1	10,3731	1476	1 1470
VLTEST	25,3056	872		VRCONT	26,3261	889	1 862	V05N09	5023	1201	7 467 1487
VMAGI	E7,1722	= 123	11 123 895	VRECT	E3,1510	= 89	10 89 1346	V05N30E	33,3252	449	1 449
VMAX	E4,1403	92	1 582	VRECTCSM	E3,1562	90	2 528 653	V05N70	31,3512	639	2 562 628
VMIN	26,3325	= 888	1 859	VRECTLEM	E3,1634	90		V05N7022	31,3512	= 562	1 562
VMODE	6470	1125	3 1146 1501	VRECT1	0030	= 89		V05N71	31,3513	639	2 562 630
VMOON	E5,1751	= 99	7 99 767	VREF	1311	= 84	4 873 874	V05N7122	31,3513	= 562	1 562
VN	1035	78	18 180 1326	VREFER	25,3634	884	6 878 879	V06N11	4603	669	1 665
VNBIT	4767	= 56	1 1473	VRIGHT2	00,2242	1159	1 1159	V06N13	4604	669	1 667
VNCADR	5545	1459	1 1459	VROTATEX	7354	1145	3 1155 1177	V06N14	33,3536	528	1 528
VNCON	43,2763	273	1 273	VROUND	7107	1138	6 1145 1146	V06N16N	24,2063	506	
VNDSPCON	40,2244	329	1 369	VRPREV	E7,1465	= 126	3 126 730	V06N16X	23,2446	519	1 518
VNFLAG	0111	= 56	3 1462 1474	VSHRRND	00,2073	1153	4 1155 1191	V06N18	5031	1202	3 394 627
VNFLASH	5535	1459	39 206 793	VSHR2	00,2060	1153	1 1153	V06N22	5025	1202	6 402 1202
VNFLASHR	5540	1459	6 458 792	VSQ	00,3244	1182	1 1119	V06N33	5026	1202	6 513 906
VNFLSH	10,2732	1462	1 1459	VSQ/4API	E6,1616	= 116	5 116 1084	V06N34	5027	1202	3 458 744
VNFLSHR	10,2735	1463	1 1459	VSQMIN	4355	= 1092	2 1083 1084	V06N34LP	30,2151	462	1 461
VNGODSP	5542	1459	1 1459	VSQSUB	00,3316	1183	3 1175 1182	V06N34UT	5027	= 560	1 556
VNLDOCDU	43,2226	255	1 255	VSQUARE	E7,1621	= 122	6 122 881	V06N37	4532	488	3 466 663
VNLODCDU	43,2163	254	2 254 260	VSSL	00,2145	1156	3 1155 1161	V06N40	24,3514	714	8 698 713
VNLODDT	43,2341	258	1 258	VSSR	00,2127	1155	1 1159	V06N41	5032	1202	1 449
VNLODGYR	43,2256	256	1 256	VSTORE	6412	1123		V06N42	35,3553	645	1 644
VNOW	E7,1722	= 124	5 295 530	VSU	6716	1132	1 1117	V06N43	37,2164	458	1 458
VNPLANV	5035	= 787	1 787	VSUN	E5,1743	= 99	9 99 786	V06N43LP	30,2152	462	2 458 462
VNRCADR	5546	1459	1 1459	VSI	E7,1671	= 123	5 123 873	V06N45B	30,2257	562	1 561
VNRET	10,3607	1474	1 1473	VTARGET	E5,1704	= 100	4 100 1300	V06N47	42,2054	266	1 265
VNSTORE	E7,1753	= 132	3 132 903	VTARGTAG	E5,1703	= 100	5 100 1300	V06N49	5030	1202	4 585 1394
VNO629	43,3165	453	1 453	VTEMP	1063	= 79	2 79 80	V06N49EE	5030	= 623	1 616
VN1	1076	= 79	4 79 1329	VTIG	E7,1637	= 127	10 127 716	V06N51	42,3625	941	1 941
VN1645	35,3027	485	9 469 905	VTPRIME	E7,1617	= 126	8 126 494	V06N55	4533	488	3 466 663
VN1645AD	35,3136	486	1 486	VV/SC	7563	1150		V06N58	4534	488	1 468
VN1645R	35,3107	486	1 486	VVEC	E5,1745	= 100	17 100 1305	V06N59	35,3157	488	
VONE	E4,1725	= 94	12 94 1374	VVXSC	7340	1145		V06N60	5033	1202	2 793 906
VONE'	E4,1761	= 96	4 96 1380	VXM	7273	1143	1 1117	V06N61	5034	1202	3 792 906
VPASS1	E7,1511	= 133	3 662 683	VXM/MXV	7276	1144	1 1143	V06N62	34,2617	548	1 541
VPASS2	E5,1616	= 105	5 105 688	VXSC	7335	1145	1 1117	V06N64	26,2426	798	1 795
VPASS3	E7,1561	= 126	13 126 683	VXV	7414	1147	1 1117	V06N66	26,2510	804	1 804
VPASS36	E4,1717	= 94	3 94 505	VZC	E7,1633	= 125	4 125 634	V06N74	26,2437	800	1 800
VPASS4	E7,1637	= 127	2 468 479	V01N25	10,3720	1476	2 1465 1466	V06N75	4605	669	2 662 668
VPAST	E7,1461	= 128	3 128 530	V01N70	14,3003	756	1 756	V06N78UT	36,2470	560	1 553
VPDVL	6542	1127		V01N70UT	36,2471	560	1 556	V06N79UT	36,2472	560	1 553
VPPREC	E7,1611	= 127	2 473 476	V01N71	14,3635	781	1 781	V06N81	4535	488	4 484 906

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SYMBOL	DEF	H	REFERENCES			SYMBOL	DEF	H	REFERENCES			SYMBOL	DEF	H	REFERENCES		
V06N82	04,3545		663	1	663	V2T115	32,3255		927	2	927	V53N45	37,2331		570	1	570
V06N84	13,2237		515	1	513	V2T120	32,3266		927	1	927	V57CALL	43,3102		279	1	249
V06N85B	24,3511		714	2	709 738	V2T125	32,3277		927	2	927	V59FLAG	0116	=	56	2	568
V06N87NB	37,2257		568	1	568	V2T130	32,3305		928	1	927	V59FLBIT	4755	=	56	1	244
V06N88	5035		1202	3	560 787	V2T135	32,3316		928	2	928	V59NB	37,2260		568	1	568
V06N88UT	5035	=	560	1	556	V2T140	32,3321		928	4	926 928	V6N33RTE	5026	=	906	2	898 904
V06N89	5036		1202	2	623 746	V2T145	32,3327		928	3	927 928	V6N34	5027	=	456	1	456
V06N89*	5036	=	746	1	745	V2T150	32,3334		928	1	928	V6N39RTE	36,3257		906	1	902
V06N89B	5036	=	623	2	563 617	V2T155	32,3346		928	1	928	V6N60RTE	5033	=	906	2	898 902
V06N90	5037		1202	1	685	V2T160	32,3353		928	1	928	V6N61RTE	5034	=	906	1	902
V06N92	14,3265		761	1	760	V2T165	32,3361		929	2	929	V6N81RTE	4535	=	906	1	902
V06N93	5040		1202	2	451 755	V2T175	32,3401		929	1	928	V6N99INP	40,3654		640		
V06N94B	17,2162		786	1	785	V2T177	32,3413		929	1	929	V60	43,2273		257	1	249
V06N95	33,3537		528	1	528	V2T179	32,3416		929	1	929	V61	43,2301		257	1	249
V06N95B	24,3513		714	1	700	V2T185	32,3423		929	1	928	V62	43,2304		257	1	249
V06N96	24,2103		506	1	505	V2T195	32,3445		930	1	930	V63	43,2307		257	1	249
V06N99A	40,3770		642	1	640	V2T200	32,3453		930	1	930	V67	43,3054		276	1	249
V06N99DS	40,3642		640	1	640	V2T205	32,3456		930	2	930	V67CALL	40,3636		640	1	277
V06N9933	40,3650		640	1	640	V2T300	32,3460		930	6	929	V67COMEX	40,3704		641	1	640
V0648	42,2053		266	1	266	V37	04,2007		208	2	276 373	V67DEC2	40,3773		642	1	640
V0694	37,2332		570	1	569	V37BAD	04,2127		210	1	214	V67EXITX	40,3702		641	2	640
V1	0325	=	73	18	73 876	V37FLAG	0162	=	61	5	510 834	V67WMID	40,3677		641	1	640
V1LEAD	25,2433		863	1	863	V37FLBIT	4763	=	61	3	210 1488	V67WORB	40,3672		640	1	640
V1N70DSP	36,2227		556	1	556	V37KLEAN	05,2550		196	1	212	V67WW	40,3706		641	1	640
V1ST02S	22,3644		1502	6	399 1359	V37NOND	04,2375		214	2	208 210	V67XXX	40,3753		641	1	641
V16N20	14,2275		748	1	747	V37N99	04,2006		206	1	206	V70UPDAT	43,3656		1492	1	249
V16N40	24,3515		714	1	708	V37QCAD	04,3052		224	1	213	V71UPDAT	43,3660		1492	1	249
V16N44	23,2371		518	2	518 521	V37XEQ	04,2736		221			V72UPDAT	43,3662		1492	1	249
V16N45	4536		488	2	485 645	V37XEQ+3	04,2741		221	1	224	V73UPDAT	43,3664		1492	4	249 1492
V16N53	31,2136		509	1	507	V37XEQC	04,2762		221			V74	43,2706	=	271		
V16N54	31,2135		509	1	507	V4N06RTE	4537	=	906	1	903	V82CALL	23,2330		517	1	267
V16N63	26,2425		798	1	793	V41K	14,3565		776	1	774	V82EMBIT	4754	=	64		
V16N67	26,2544		806	1	804	V5LOOP1	20,2003		223	1	223	V82EMFLG	0211	=	63	5	522 524
V16N69	26,2472		802	1	801	V5LOOP2	20,2036		223	1	224	V82FLAGS	E4,1733	=	95	6	95 520
V16N85B	24,3512		714	2	712 738	V5N09RTE	5023	=	907	1	907	V82GOFF1	23,2373		518	1	517
V16N95	36,2015		532	1	532	V5OUT1	20,2025		223	1	223	V82GOFLP	23,2343		517	1	518
V1683	24,3516		714	1	741	V5OUT2	20,2052		224	1	224	V82GON	23,2551		521	1	517
V2(T1)7	E7,1677	=	131	7	131 936	V5UN00	10,3721		1476	1	1471	V82GON1	23,2567		521	2	521 522
V2TERROR	32,3112		925	1	925	V5UN18BT	4752	=	52			V82GON2	23,2602		521	1	522
V2T1X	32,3462		930	2	928 932	V5UN18FL	0055	=	52	5	210 597	V82GON3	23,2622		521	1	521
V2T100	32,3102		925	2	900 919	V5UN25	07,2060		242	1	242	V82PERF	43,2557		267	1	250
V2T101	32,3115		925	1	925	V5UN25P	31,3514		639	1	629	V82REDSP	23,2561		521	1	521
V2T102	32,3213		926	1	926	V5UPASTE	10,3427		1471	1	1471	V82STALL	23,2354		517	1	518
V2T105	32,3220		926	1	926	V51N45	37,2261		568			V83	31,2026		507	1	509
V2T110	32,3225		927	1	926	V52	43,3037		276	1	249	V83CALL	31,2031		507	2	35 507

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SYMBOL	DEF	H	REFERENCES
V83PERF	43,2564		267 3 219 267
V85PERF	43,2574		267 1 250
V86PERF	43,2621		269 1 250
V89CALL	31,2377		626 1 272
V89PERF	43,2722		272 1 250
V89RECL	31,2421		626 2 626
V89TAG	31,2000	=	32 1 626
V90PERF	43,3022		276 1 250
V94ENTER	31,2474		629 1 639
V94FLAG	0213	=	64 3 275 630
V94FLBIT	4756	=	64 1 275
V94NTR	31,3532		639 1 231
V96ONBIT	4766	=	63
V96ONFLG	0204	=	63 2 276 1314
V97E	24,3320		710
V97EJOB	24,3322		710 1 234
V97E40.6	24,3334		710
V97NOC	10,3746		1477 1 1471
V97P	24,3407		711 1 710
V97PJOB	24,3411		711 1 233
V97T	24,3363		711 1 710
V97TJOB	24,3365		711 1 236
V97TRCS	24,3374		711
V99E	24,3434		712
V99EJOB	24,3440		712
V99FLASH	24,3352		711
V99P	24,3471		713 1 712
V99P/TIG	24,3506		713 2 713
V99PSTE	4755	=	1477 1 1471
V99T	24,3376		711 1 712
V99TJOB	24,3402		711
W	E5,1400	=	97 62 97 1348
WAITADR	0063	=	69 3 1223 1227
WAITBANK	0062	=	69 1 1226
WAITBB	5254		1223 3 140 1232
WAITEXIT	0061	=	69 5 1223 1481
WAITF2	4000	=	27 3 1222 1233
WAITLIST	5233		1223 29 150 1427
WAITMASK	5045	=	1477 1 1467
WAITONE	27,2523		589 2 578
WAITONE1	27,2525		589 2 588 589
WAITTEMP	0064	=	69 3 1230
WAIT1/2	16,3362		987
WAIT2	01,3213		1226 2 1223
WAKECAD	00,3766		1482 1 1481
WAKECADR	10,3725		1476 3 1468
WAKEPLAY	10,3253		1468 1 1473
WAKEP62	26,2375		797 2 233 1078
WAKER	00,3760		1481 1 1482
WAKESTAL	13,3565		1325 2 1324 1325
WAKETEST	01,3035		1216 1 1216
WANGI	E5,1446	=	102
WANGO	E5,1444	=	102
WANGT	E5,1450	=	102 1 102
WASCMC	34,2357		543
WASINIT	34,2356		543
WASIU	34,2355		543
WATLST0=	5247		1223 4 1223 1234
WBODY	E6,1525	=	112 18 112 1029
WBODY1	E6,1527	=	112 7 136 1027
WBODY2	E6,1531	=	112 7 112 1027
WCALC	22,2745		416 1 416
WDAGAIN	41,3357		370 1 370
WDCNT	0137	=	71 4 368 370
WDRET	0115	=	70 7 368 370
WEARTH	26,3650		1251 1 1249
WEIGHT/G	E6,1475		107 6 695 957
WHICHALF	15,2754		1083
WHIMPER	7720		1487 3 1488 1489
WHOCARES	E7,1777	=	134 10 134 1466
WHOLECON	42,3444		363 3 362
WITCHONE	10,3431		1471 3 1464 1468
WIXA	1107	=	79 6 79 1258
WIXB	1110	=	79 4 79 1258
WL	21,3447		1028 2 1032
WL-H/SLP	5006	=	1028 2 1030 1031
WLH	21,3443		1028 1 1030
WLH/SLOP	21,3442		1028 1 1030
WLMH	21,3445		1028 1 1031
WLOOP	12,3056		1292 1 1292
WMATEND	11,3650		1349 1 1347
WMATRXNG	43,2731		272 1 250
WMIDPOS	E6,1400		106 2 633 641
WMIDVEL	E6,1401		106 1 641
WORBPOS	E4,1404		92 2 610 640
WORBVEL	E4,1405		92 1 640
WORKW	0000	=	623 2 621
WOZERO	05,3536		1098 2 1097 1102
WPLATI	E5,1570	=	103
WPLATO	E5,1474	=	102
WRDTIME	E4,1771	=	98 2 96 586
WRENDPOS	E4,1400		92 3 486 640
WRENDVEL	E4,1401		92 1 640
WRTN17	21,3265		1022 1 1021
WRTN22	21,3223		1021
WTABORT	01,3342		1229 1 1227
WTEMP	E6,1513	=	112 13 112 1031
WTGTSMPL	33,2321		437 1 437
WTLISTNT	33,2303		437 1 235
WTLST2	01,3347		1230 8 1228 1229
WTLST4	01,3237		1227 1 123
WTLST5	01,3267		1228 1 1226
WTLTCADR	01,3463		1235 3 1412 1415
WTOPTION	1331		84 7 170 195
WWOPT	E4,1715	=	94 4 295 641
WWPOS	E4,1711	=	94 1 295 642
WWVEL	E4,1713	=	94 7 295 641
X	0024	=	1306 22 1278 1293
X(T1)	E7,1721	=	131 23 131 936
X(T2)	E7,1725	=	132 12 899 925
X(T2)PRE	E7,1723	=	132 3 915 919
XACTOQ	43,2432		261
XAD	01,2375		1193 1 1118
XAD2	01,2400		1193 2 1193
XCHNYLOC	10,3446		1471 1 1468
XCHQADD	10,3752		1477 1 1468
XCHSLEEP	10,3217		1468 1 1477
XCHTOEND	10,3445		1471 3 1464 1468
XCHX	01,2367		1193 1 1118
XCOMMON	12,3131		1293 1 1295
XD/360	E6,1615	=	116 5 116 1085
XDC	E5,1713	=	99 12 99 1361
XDELVBIT	4761	=	51
XDELVFLG	0045	=	51 8 494 905
XDIFF	12,2230		1278
XDSPBIT	4770	=	56 2 1459 1460
XDSPFLAG	0112	=	56
XI	0030	=	1306 7 1279 1298
XKEP	E3,1552	=	89 3 89 1346
XKEPCSM	E3,1624		90
XKEPLEM	E3,1676		90
XKEPNEW	E4,1676	=	93 3 93 1334
XLNMASK	17,2623		1039 2 1038

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XLNNDX	17,2647		1039 8 1040 1057	YAWANG	0024	=	941 2 940 941	YTAUPOS	17,3227		1 51 1 1051
XLNINDX	17,2760		1042 4 1043 1056	YAWLAP	20,3042		970 1 981	YTMP1	E6,1555	=	109 3 109 973
XMAX	0012	=	1306 9 1277 1280	YAWLIM	15,2624		1079 2 1076	YTMP2	E6,1557	=	109 3 109 973
XMIN	0014	=	1306 6 1278 1281	YAWTIME	17,3217		1051 2 1054	YTMP3	E6,1561	=	109 3 109 973
XMIN/360	15,3377		1092 1 1084	YAWT5	20,3620		981 1 966	YTMP4	E6,1563	=	109 3 109 973
XNB	E5,1713	=	99 25 299 1505	YBIAS	24,3543		714 1 696	YTMP5	E6,1565	=	109 3 109 973
XNBADR	33,2221		432 1 427	YBLASTOK	17,3255		1051 1 1051	YTMP6	E6,1567	=	109 3 109 973
XNBEB	22,3727		1505 1 1505	YBYPASS	17,3525		1057 1 1051	YUNIT	04,3755		1206 1 34
XNB1	E5,1554	=	97 15 97 1505	YCDUDOTS	20,3051		970	YV	0754	=	77 11 77 1349
XNB1EB	22,3730		1505 1 1505	YCDUYPST	E6,1640	=	109 4 109 974	YWORD	17,2665		1040
XNDX1	E6,1513	=	112 7 112 1054	YCDUZPST	E6,1641	=	109 4 109 974	YWORD1	E6,1454	=	107 4 107 1060
XNDX2	E6,1514	=	112 6 112 1057	YCMD	E6,1624	=	109 7 109 973	YWORD2	E6,1455	=	107 4 107 1061
XOLDBUF	E6,1536	=	120 4 120 831	YCOPY	20,3170		973 2 963 972	YZTABLE	17,314		1048 4 1043 1056
XPIPBUF	E6,1533	=	120 4 120 831	YCOPYCYC	20,3166		972	==========			
XPREV	E3,1552	=	89 2 1278 1282	YCSM	E3,1755	=	91 3 91 685	Z	0005	=	4 15 282 1487
XPRODUCT	16,2306		727	YDAPEND	20,3167		972	ZBLAST	17,3711		1061 1 1060
XREG	1206		82 10 283 357	YDC	E5,1721	=	99 6 99 1361	ZBLAST1	17,3714		1061 1 1060
XREGLP	1211		82 3 329 357	YDELOFF	E6,1607	=	109 7 109 971	ZBLAST2	17,3717		1061 1 1060
XRNGERR	E7,1675	=	123 1 293	YDOTC	E3,1757	=	91 2 91 294	ZDC	E5,1727	=	99 6 99 1361
XROT	27,2403		400 1 400	YDOTL	E3,1761	=	91 1 294	ZERINFLT	23,2263		306
XS/360	15,3401		1092 2 1084 1092	YDOTLIM	15,2622		1079 2 1076	ZERO	4772		1200 288 143 1506
XSCREF	0306	=	74 6 697 724	YERORLIM	20,3113		971	ZEROANS	07,3375		1184 2 1184
XSM	E5,1671	=	99 32 99 1358	YERRB	E6,1577	=	109 4 109 973	ZERODNLK	13,2306		565 1 565
XSMADR	33,2222		432 1 444	YFORWARD	20,3114		971	ZERODP	4,3761	=	1206
XSMD	0306	=	74 12 36 782	YINDEX	E6,1521	=	112 3 112 1041	ZEROER	21,3025		1017 1 1018
XSQC(XI)	0034	=	1306 5 1281 1287	YINTEGRL	20,3065		970	ZEROERGR	20,2203		423 1 415
XSTORE	01,2343		1192 3 1192	YJETCODE	15,2631		1080 2 1074 1078	ZEROICDU	5511		1417 4 151 1419
XSU	01,2406		1193 1 1118	YJETS	17,2723		1041 3 1041 1061	ZEROING	33,2134		430 3 427 444
XTMP1	0006	=	623 3 622 623	YK1K2	32,2237		650 1 649	ZEROING1	33,2136		430 1 430
XTRANS	E6,1631	=	113 4 113 1039	YMANNDX	E6,1660	=	114 4 118 1024	ZEROJET	21,2642		1014 5 262 1014
XTILIM	32,3741		937 2 926	YMISC	20,3213		973	ZERONDX	E5,1655	=	103 1 103
XTILIMX	32,3773		937 1 937	YNB	E5,1721	=	99 7 299 1358	ZERONDX1	E5,1655	=	103 5 427 444
XTILIM2	32,3765		937 1 937	YNB1	E5,1562	=	97 4 97 299	ZEROO	26,3335		1260
XTILIM3	32,3767		937 1 937	YNDX	E6,1515	=	112 10 112 1055	ZERORTE	26,3327	=	938 5 910 937
XTILIM5	32,3771		937 1 937	YOFFSET	20,3126		971	ZEROT5	21,2560		1012 1 1012
XUNIT	04,3757		1206 7 34 1340	YOLDBUF	E6,1537	=	120 3 120 828	ZEROVEC	04,3761		1206 23 34 1352
XXXALT	E7,1455	=	126 4 126 498	YOUT	20,3132		971	ZEROVECS	26,3335		1205 38 34 1260
X1	0046	=	41 88 442 1504	YPIPBUF	E6,1534	=	120 3 120 828	ZI	E5,1706	=	101 24 1252 1261
X1CON	32,2267		650 1 648	YPRECOMP	20,3140		971	ZIXA	1111	=	79 5 79 1258
X2	0047	=	41 38 457 1375	YREG	1207		82 3 354 362	ZIXB	1112	=	79 5 79 1258
X789	E3,1700		90 9 614 1259	YREGLP	1212		82 2 82 362	ZMEASBIT	4757	=	47
==========				YSCREF	0314	=	74 5 697 724	ZMEASURE	0005	=	47 3 633 634
YACLIM	20,3131		971	YSM	E5,1677	=	99 8 99 1358	ZNB	E5,1727	=	99 7 299 1358
YACTOFF	E6,1424		106 8 181 953	YSMD	0314	=	74 6 74 748	ZNB=S1	23,2145		300 1 299
YACTTMP	E6,1657	=	110 4 110 953	YTAUNEG	17,3225		1051 1 1051	ZNB1	E5,1570	=	97 5 97 300

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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
ZNDX	E6,1516	=	112 9 112 1056	1/ERRLIM	4766	=	981 1 974	1P5SPT1	01,2017	=	717
ZOLDBUF	E6,1540	=	120 1 829	1/GMAX	26,3333	=	889 1 880	1P7SPT1	01,2022	=	395
ZONE	1327		84 4 171 176	1/GYRO	06,3513		314 3 314 316	1REV	12,2141		1277 1 1277
ZOPALARM	06,3073		170	1/KA1	26,3305		889 1 861	1RTEB1	26,3333	=	938 7 916 926
ZOPFINI	06,3101		170 3 170 171	1/KB1	26,3211		888 1 874	1RTEB13	35,3571		938 2 899 903
ZOPFINZ	06,3102		170	1/K44	26,3277		889 1 862	1RTEB17	35,3573		938 3 600 927
ZOPTCNT	1332		84 4 170 171	1/MU	0016	=	1305 4 1277 1290	1RTEB2	26,3325	=	938 6 674 913
ZOPTCS	4766	=	85 2 170	1/PIPA	06,3276		308 2 439 832	1RTEB25	35,3575		938 2 937 939
ZOPTOES	06,3053		169	1/PIPADT	1277		83 10 83 838	1RTEB28	35,3577		938 4 901 932
ZPIPBUF	E6,1535	=	120 3 120 829	1/PIPAGT	33,3211		448 1 444	1RTEB3	34,3766	=	938 2 916 918
ZPRIME	0026	=	74 7 1354 1355	1/PIPAI	06,3306		308 1 308	1RTEB4	34,3770	=	938 1 916
ZREG	1210		82 3 335 362	1/ROOTMU	0022	=	1305 5 1277 1287	1SEC	5016		1201 13 365 1481
ZREGLP	1213		82 2 82 362	1/RTLIM	20,3621		981 1 966	1SECDELY	00,3730		1481 4 485 522
ZROCLOCK	34,2015		536	1/RTMU	34,3756		1386 1 812	1SECX	5016	=	432
ZROPTFIN	4757	=	85 2 172 175	1/RTMUE	23,2451		519 2 522 814	1SECXT	E5,1644	=	103
ZRUPT	0015	=	40	1/RTMUM	23,2447		519 1 522	1SECXT1	E5,1644	=	103 2 437 444
ZSCREF	0322	=	74 8 697 724	1/SQRT3	35,3271		603 1 603	1SEC2D	16,2623	=	733
ZSM	E5,1705	=	99 7 99 1358	1/SQR3	14,3730		787 1 787	1SHOTCHK	16,3075		951
ZSMD	0322	=	74 7 74 748	1/TMXFIR	4766	=	996 1 992	1SHOTOK	16,3115		952 2 951
ZTOCSC	06,3132		171 1 169	1/WIE	23,2253		305 2 305	1STOR2ND	10,3407		1471 1 1470
ZTOMAN	06,3071		170 1 170	1/WLOOP	12,3214		1294 1 1294	1ST02S	22,3640		1502 3 300 452
ZUNIT	04,3753		1206 4 34 1343	1/10FPS	05,3305	=	685 1 683	1T02SUB	22,3661		1502 4 1502
ZV	0762	=	77 9 77 1349	1/12TH	26,3150		887 1 869	1 DEGS-	23,2321		307 1 297
Z123	36,3272		1252 1 1253	1/16A1	15,3375	=	1092 1 1082	1 RTE	35,3605		938 3 915 927
==========			==========	1/16TH	34,3770	=	887 2 865 873	10SEC	20,2330		529 1 528
0.5SEC	37,2772		831	1/2SECX	5011	=	448 1 444	10SECS	26,2647		809 1 809
0.6SECT5	21,2041		734 1 734	1/200	34,3755		600 1 599	10 8-14	16,2623		733 3 733
0EBANK	43,3273		1396	1/24TH	26,3253		888 1 870	10 MST5	7661	=	551 2 550
==========			==========	1/3RD	26,3151		887 2 87	10 SEC	20,2353		529 1 529
1.0B18	31,3502		639 1 635	1/6TH	14,3004		756 1 754	11,12	5050	=	178 1 178
1.1RTEB1	35,3611		938 1 934	1BITDP	27,2424		400 3 647 860	11,14,9	06,2037		143 1 143
1.11SPOT	01,2025		230 7 415 834	1B1	04,3757	=	1251 1 1241	11DSPIN	40,3247		371 4 330 369
1.13SPOT	01,2030		230 2 558 834	1DAPCAS	20,3306		975	114ALM	07,2216		245
1.2SPOT	01,2052	=	230 2 230 231	1DPB2	15,3411	=	671 1 672	12DD	36,3765		1260 1 1258
1.3SPOT	01,2014		230 2 230 829	1DPB28	15,3431	=	671 2 673 678	12 MRUPT	06,2041		143 1 145
1.5SPOT	01,2017		230 1 717	1DSQR3	31,3530		639 1 639	12 MS	5775	=	168
1.7SPOT	01,2022		230 1 395	1P11SPT2	01,2025	=	415	13-11,1	40,3635		393
1.8SEC	14,3311		761 1 761	1P11SPT3	01,2025	=	554	13,14,15	7673		1203 7 175 1476
1-CSTH	E5,1735	=	100 4 100 1297	1P11SPT4	01,2025	=	555	130DEG	35,2204		469 1 466
1-E(-AT)	20,3622		981 2 968 972	1P11SPT5	01,2025	=	559	130DEGLO	04,3377		654 1 663
1/ACTSAT	20,3615		981 1 975	1P11SPT6	01,2025	=	572	14,12,7	7646		1203 2 250 1461
1/ATTLIM	17,2527		949 1 945	1P11SPT7	01,2025	=	834	15/16	11,3756		1352 1 1340
1/C	16,2641		767 2 602 767	1P11SPT8	01,2025	=	834	15ADRERS	01,2424		1194 7 1192 1196
1/CHECK	06,3507		314 1 312	1P13SPT1	01,2030	=	558	15BITADR	6221		1115 1 1121
1/CONACC	E6,1631	=	109 5 109 991	1P3SPT1	01,2014	=	829	17DECML	4352	=	448

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
17TO20	43,3575		1400	2SATSTCK	4540		551 3 55	3AXISFLG	0124	=	57 9 394 698
18SEC	24,3523		714 1 698	2SEC(22)	37,3372		841 1 841	3CASFLTR	20,3534		979
180/8ATT	15,3375		1092 4 1083 1092	2SECS	5017		12 1 6 540 1424	3CSECS	05,3754		1330 1 1330
19.77DEG	37,2262		568 1 568	2T/TCDU	5004	=	1092 1 1081	3DAPCAS	20,3344		976 1 975
19DECML	4351	=	448 1 438	2VEXHUST	16,2631		733 2 726 732	3DDZ	15,2430		1076 1 1076
==========	==========		==========	2? 48SEC	35,3573	=	600 1 600	3MINCON	23,3136		587 1 587
2.11SPOT	01,2044		231 1 275	2 8IAS	40,2562		346 2 346	3P11SPT1	01,2071	=	536
2.13SPOT	01,2047		231 1 588	2?DEG-	23,2326		307 1 300	3P13SPT1	01,2074	=	536
2.2SPOT	01,2052	=	231 1 230	2?DEGS	06,3671		317 1 171	3P15SPT1	01,2077	=	528
2.3SPOT	01,2033		231 2 230 1314	2?DEGS-	23,2324		307 1 300	3P2SPT1	01,2052	=	529
2.4SECDP	14,3270		761 1 758	2?DEGSMN	14,3274		761 1 759	3P3SPT1	01,2060	=	701
2.5SPOT	01,2036		231 4 212 1313	2?J	37,3400		841 1 840	3P3SPT2	01,2060	=	711
2.7SPOT	01,2041		231 1 554	2?KFT/S	26,3011		814 1 813	3P5SPT1	01,2063	=	704
273	11,3770	=	1352 1 1340	2?MRUPT	7663	=	145 3 143 145	3P5SPT2	01,2063	=	706
28LANK	40,2473		333 6 330 382	2?08+19	33,3670		532 1 530	3P7SPT1	01,2066	=	537
2CASFLTR	20,3451		977	2?CS	16,2522		731 3 723 730	3ZEROS	26,3335	=	887 6 853 877
2C1HS	26,3273		889 3 863 876	2?MS	4124	=	174 2 170 172	3?RDMSK	06,2764		168 1 147
2D/SDZ	15,2456		1076 2 1074	2?8DEGLO	04,3401		654 1 663	3?KFT	23,2455	=	815 1 813
2DAPCAS	20,3320		975	21/22REG	0115	=	70 3 326 392	3?480RTE	35,3617		938 1 910
2DZERO	04,3761	=	1240	217ALARM	14,3766		788 4 747 788	328NM	35,3160		600 1 596
2EBANK	43,3307		1396 1 1397	22DSPBIT	4754	=	51	33DEC	5003		1201 1 214
2HS	26,3263		889 2 875 880	22DSPFLG	0040	=	50 2 611 615	33OPTMON	06,3010		169
2HSGMXSQ	26,3265		889 1 880	22SUBSCL	E7,1743	=	134 9 134 637	33RDMSK	5055	=	168 2 153
2INTOUT	40,2616		347 1 345	25DECML	4125	=	437 2 437	34DEC	4260		381 2 215 381
2J	37,3402		841 1 840	25NM	26,3223		888 1 868	35DEGANG	36,2466		560 1 553
2JETT	5020	=	1092 2 1085 1086	25THOUS	04,3375		654 1 654	35KFT/S	26,3007		814 1 813
2J3RE/J2	13,3747		1353 2 1341	26P50S	26,2000	=	31 1 783	360CHECK	12,3165		1294 2 1292
2K	4756	=	1204 3 1112 1216	27TO30	43,3603		1400	360LAMB	12,3524		1299 1 1296
2NDPERF	4754	=	1477 3 1469 1471	270DEG	23,2322		307 1 300	360SW	0206	=	63 3 1292 1294
2NDRETRN	22,3157		420 2 419	290KFT	26,3005		814 1 812	360SWBIT	4770	=	63
2PHSCHNG	5362		1406 35 270 1068	==========	==========		==========	37BLANK	36,3225		905 1 902
2PI/M	17,2534		949 1 948	3.1SEC	04,3054		224 1 209	38TRDEG	14,3266		761 2 759 761
2PISC	15,3427		1288 5 653 1295	3.11SPOT	01,2071		232 1 536	3990DEC	33,2223	=	432
2P11SPT1	01,2044	=	275	3.13SPOT	01,2074		232 1 536	==========	==========		==========
2P13SPT1	01,2047	=	588	3.15SPOT	01,2077		232 1 528	4.11SPOT	01,2135		233 1 711
2P13SPT2	01,2030	=	834	3.2SPOT	01,2052		231 3 230 529	4.13SPOT	01,2140		233 1 711
2P3SPT1	01,2033	=	1314	3.3SPOT	01,2060		231 3 230 711	4.15SPOT	01,2143		233 1 449
2P5SPT1	01,2036	=	212	3.5SPOT	01,2063		231 2 704 706	4.17SPOT	01,2146		233 1 259
2P5SPT2	01,2036	=	213	3.7SPOT	01,2066		231 1 537	4.2SPOT	01,2102		232 2 230 700
2P5SPT3	01,2036	=	555	3/32	11,3754		1352 1 1340	4.21SPOT	01,2151		233 1 699
2P5SPT4	01,2036	=	1313	3/4	11,3760		1352 5 34 1351	4.23SPOT	01,2154		233 2 699 738
2P7SPT1	01,2041	=	554	3/4LOWDP	11,3760	=	34	4.25SPOT	01,2157		233
2REDOSAT	43,2515		262 1 262	3/5	11,3744		1352 1 1340	4.27SPOT	01,2162		233 1 702
2ROUND	40,3044		361 4 359 361	3/64	11,3752		1352 1 1340	4.3SPOT	01,2124		232 2 230 702
2RTEB1	26,3343	=	938 5 915 937	3AXISBIT	4763	=	57	4.31SPOT	01,2165		233 1 755

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SYMBOL	DEF	H	REFERENCES
4.33SPOT	01,2170		233 1 1077
4.35SPOT	01,2173		233 1 704
4.37SPOT	01,2176		233 1 700
4.4SPOT	01,2110		232 1 700
4.41SPOT	01,2201		234 1 883
4.43SPOT	01,2204		234 1 808
4.45SPOT	01,2207		234 1 808
4.47SPOT	01,2212		234 1 869
4.5SPOT	01,2127		232 1 703
4.51SPOT	01,2215		234 1 538
4.53SPOT	01,2220		234 1 710
4.55SPOT	01,2223		234 1 801
4.57SPOT	01,2226		234 1 740
4.6SPOT	01,2116		232 1 700
4.61SPOT	01,2231		234 1 531
4.7SPOT	01,2132		232 1 701
4D/SDZ	15,2446		1076
4D/SLIM	15,2621		1079 2 1076
4JETT	15,3376		1092 2 1086
4P11SPT1	01,2135	=	711
4P13SPT1	01,2140	=	711
4P15SPT1	01,2143	=	449
4P17SPT1	01,2146	=	259
4P2SPT1	01,2102	=	700
4P21SPT1	01,2151	=	699
4P23SPT1	01,2154	=	699
4P23SPT2	01,2154	=	738
4P27SPT1	01,2162	=	702
4P3SPT1	01,2124	=	702
4P31SPT1	01,2165	=	755
4P33SPT1	01,2170	=	1077
4P35SPT1	01,2173	=	704
4P37SPT1	01,2176	=	700
4P4SPT1	01,2110	=	700
4P41SPT1	01,2201	=	883
4P43SPT1	01,2204	=	808
4P45SPT1	01,2207	=	808
4P47SPT1	01,2212	=	869
4P5SPT1	01,2127	=	703
4P51SPT1	01,2215	=	538
4P53SPT1	01,2220	=	710
4P55SPT1	01,2223	=	801
4P57SPT1	01,2226	=	740
4P6SPT1	01,2116	=	700
4P61SPT1	01,2231	=	531
4P7SPT1	01,2132	=	701
4SEC	33,3664		532 1 530
4SECS	5020		1201 3 151 1092
400KFT	26,3025		815 2 814
==========			
5.11SPOT	01,2261		235 1 438
5.13SPOT	01,2264		235 1 437
5.15SPOT	01,2267		235 1 446
5.17SPOT	01,2272		235 1 808
5.2SPOT	01,2234		234 3 230 827
5.21SPOT	01,2275		235 1 439
5.23SPOT	01,2300		235 1 438
5.25SPOT	01,2303		235 1 446
5.27SPOT	01,2306		235 1 446
5.3SPOT	01,2250		235 17 230 883
5.31SPOT	01,2311		236 1 829
5.33SPOT	01,2314		236 1 447
5.4SPOT	01,2242		234 1 829
5.5SPOT	01,2253		235 1 828
5.6SECS	05,3772		1331 1 1330
5.7SPOT	01,2256		235 2 435 447
5/128	11,3766		1352 1 1341
5/8	13,3755		1353 6 1317 1342
5BLANK	40,2431		332 6 332 382
5BLANK1	40,2452		332
5B10	01,2473		1196
5DEGREES	16,2637		767 1 767
5P11SPT1	01,2261	=	438
5P13SPT1	01,2264	=	437
5P15SPT1	01,2267	=	446
5P17SPT1	01,2272	=	808
5P2SPT1	01,2234	=	540
5P2SPT2	01,2234	=	827
5P21SPT1	01,2275	=	439
5P23SPT1	01,2300	=	438
5P25SPT1	01,2303	=	446
5P27SPT1	01,2306	=	446
5P3SPT1	01,2250	=	541
5P3SPT10	01,2250	=	833
5P3SPT11	01,2250	=	833
5P3SPT12	01,2250	=	833
5P3SPT13	01,2250	=	834
5P3SPT14	01,2250	=	855
5P3SPT15	01,2250	=	883
5P3SPT16	01,2250	=	531
5P3SPT2	01,2250	=	706
5P3SPT3	01,2250	=	717
5P3SPT4	01,2250	=	725
5P3SPT5	01,2250	=	728
5P3SPT6	01,2250	=	728
5P3SPT7	01,2250	=	740
5P3SPT8	01,2250	=	801
5P3SPT9	01,2250	=	832
5P31SPT1	01,2311	=	829
5P33SPT1	01,2314	=	447
5P4SPT1	01,2242	=	829
5P5SPT1	01,2253	=	828
5P7SPT1	01,2256	=	435
5P7SPT2	01,2256	=	447
5SEC	24,3525		714 3 698 701
5SECDP	24,3524		714 1 699
5SECOND	16,2625	=	733
5008-14	16,2625		733 2 733
500SEC	25,2111		854 1 854
504AZ	0022	=	1251 3 1249
504F	0006	=	1251 5 1247 1248
504LM	E4,1411		92 3 1243 1343
504LPL	0016	=	1251
504RM	13,2700		1242 1 1242
504RPR	0000	=	1251 4 1243 1245
540D	36,3763		1260 1 1256
59.99SEC	42,3452		363 1 362
59MIN	42,3451		363 1 362
==========			
6.11SPOT	01,2336		236 1 1068
6.2SPOT	01,2317		236 3 230 711
6.3SPOT	01,2325		236 5 230 738
6.5SPOT	01,2330		236 1 1497
6.7SPOT	01,2333		236 1 711
6D0	36,3764		1260 1 1258
6P11SPT1	01,2336	=	1068
6P2SPT1	01,2317	=	699
6P2SPT2	01,2317	=	711
6P3SPT1	01,2325	=	645
6P3SPT2	01,2325	=	703
6P3SPT3	01,2325	=	738
6P3SPT4	01,2325	=	528
6P5SPT1	01,2330	=	1497
6P7SPT1	01,2333	=	711
60GENRET	E6,1773	=	119 7 119 858

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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
60MIN	05,3266		671 6 662 668	==========			==========	9DWN	0014	=	623 4 621 622
60SECDP	26,2650		809 1 578	9716	11,3764		1352 1 1340	9DWN=N+3	30,3555		622 1 621
600MS	07,3665		1439 1 1422	9,6,4	05,3250		205 1 199	9DWNEXEP	30,3530		621 1 621
600SEC	37,2160		458 4 458 682	9DWAAA	30,3504		621 1 621	9DWP	0010	=	623 7 619 621
600SECS	13,2730		1314 3 231 1314	9DWAAB	30,3505		621	9DWSETI2	30,3422		620 1 620
==========				9DWAAC	30,3525		621 1 621	9DWSETJ2	30,3441		620 1 620
7.9SEC	5025	=	1202 2 151 1419	9DWEPCAL	30,3377		619 2 620	9DWSETWX	30,3552		622 1 621
7712	11,3762		1352 1 1340	9DWEXITX	30,3577		622 1 621	9DWTESTJ	30,3426		620 1 620
74K	7675	=	141	9DWEXXXA	30,3607		622 1 622	9DWTO6DW	30,3363		619 2 618
77DECML	33,2701		443 1 435	9DWFIG6	30,3445		620 1 620	9DWXX	1053	=	79 2 619 622
==========				9DWI	0012	=	623 11 619 622	9DW26D	32,2017		623 4 620 622
8KK	E7,1745	=	134 9 134 614	9DWI=J	30,3374		619 2 620	9X9LOC1	E5,1444	=	97 1 105
8NN	E7,1747	=	134 8 134 616	9DWI=JA	30,3463		620 2 622	9X9LOC2	E5,1532	=	97 1 105
8192AUG	07,3516		1432 1 1432	9DWID	32,2021		623 4 620 622	90MSCALR	04,3301		592 1 592
89TEST	40,2064		327 2 326	9DWJ	0016	=	623 12 619 622	90SECS	06,3670		317 2 150

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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL	DEF	H	PAGE
-MUOT(M)	37,3370		841
==========			
ABORT	7706	=	1489
ABORT2	5735		1488
ABVAL	00,3200		1180
ACOSABRT	00,3720		1191
ACROLL	17,2747		1042
ACYCHECK	17,3055		1044
ADDRESS	6052		1110
ADERCOMP	33,3127		447
ADRS+1	43,3557		1400
ADVTKBIT	4757	=	62
ALCGKK	33,2444		440
ALKCG	33,2447		440
ALLOOP3	33,2352		438
AMOONBIT	4767	=	48
APSESBIT	4764	=	63
ASTNV99P	24,3476		713
ATERSET	34,2470		546
ATTCHFLG	0166	=	61
ATTDISPR	33,3713		544
AUTOCONT	21,3304		1024
AVEMCBIT	4770	=	65
AVFLBIT	4764	=	51
==========			
BDZCHECK	17,2773		1042
BEE17	15,3402		1288
BESTTRIM	24,3075		705
BHIZ	01,2447		1195
BITS3&4	5775	=	1439
BITS4,5	5001	=	1002
BITS5-6	5010	=	536
BITS7&8	06,2775		168
BIT7-8	04,3050		224
BLANKCHK	10,3356		1470
BLNKR1	4770	=	1477
BLNKR2	4767	=	1477
BLNKR3	4766	=	1477
BMAGX	0042	=	40
BMAGY	0043	=	40
BMAGZ	0044	=	40
BNKCHK	43,3650		1401
BNKOPTN	43,3247		1395
BSTOBB	01,2462		1195
==========			
C*MM*N1	23,3634		1367
CADRMARK	0372		75
CAGEBIT	4756	=	84
CALCUT	16,2115		723
CALC2BIT	4767	=	52
CAL53A	14,2335		749
CAL53RET	14,2405		749
CORVE	06,2012		142
CDUINC	22,3675		1503
CDULIMIT	E5,1453	=	102
CG.CORR	16,3137		952
CGTRACK	16,2231		726
CHAN76	0076	=	42
CHKCTR	37,3003		831
CHKFAIL1	5705		1486
CHKLIST	05,3463		1097
CHKSAB	16,2662		768
CLOKNOW	33,3522		528
CM/ATUP	37,3571		894
CM/DAP2C	20,3705		1068
CM/DUMPR	15,3337		1090
CM/POSE3	37,3664		895
CM/TRIO	37,3443		890
CMDAPARM	0135	=	58
CMENTRO7	05,2101	=	188
CMOONBIT	4755	=	62
CMTR1	37,3572		894
CMTR2	37,3643		895
CNTRCHK	43,3420		1397
COARFINE	14,2362		749
COFMAXGO	22,2170		405
COGAFBIT	4765	=	63
COMPMAT	13,2126		514
COMPTBIT	4761	=	57
COMPUTER	0122	=	57
COPY40.9	16,2465		730
CORFOUND	01,2631		1212
COUNTPL	E5,1552	=	102
CSISBIT	4763	=	67
CULTBIT	4762	=	53
CYCLSHFT	43,3427		1398
==========			
DAPT5	20,3617		981
DCDUINCR	21,2372		1005
DEC-12	04,3771		1206
DECNEG23	4616		1025
DECTWO	35,3152		488
DEC15	4777	=	887
DEC57	4351	=	432
DELBARP	20,2766		968
DELBARY	20,3152		971
DELOGAC	16,3405		988
DELRDONE	32,2073		648
DEX2	0144	=	72
DFRNT	40,3227		371
DIMOBIT	4770	=	54
DISP14	33,3503		528
DISP45	35,3520		645
DL101	E6,1424	=	181
DL102	E6,1624	=	181
DL103	0025	=	181
DL104	E6,1624	=	182
DL105	1340	=	182
DL1055	E7,1722	=	182
DL1056	E7,1724	=	182
DL106	0035	=	182
DL107	E6,1533	=	182
DL108	E6,1533	=	182
DL109	0033	=	182
DL110	E6,1477	=	182
DL111	E6,1500	=	182
DL112	E6,1501	=	182
DL113	E6,1573	=	182
DL114	E6,1574	=	182
DL115	0776	=	182
DL116	E6,1573	=	182
DL117	E6,1574	=	182
DL118	0375	=	182
DL119	0037	=	182
DL120	0040	=	182
DL121	0041	=	182
DL122	E6,1473	=	182
DL123	E6,1466	=	182
DL124	E6,1570	=	182
DL125	E6,1571	=	182
DL126	E6,1525	=	182
DL127	1307	=	182
DL128	1334	=	182
DL201	0303	=	184
DL202	E4,1744	=	184
DL203	E6,1424	=	184
DL204	0025	=	184
DL205	E5,1761	=	184
DL206	E5,1763	=	184
DL301	E7,1703	=	186
DL3015	0772	=	186
DL302	E5,1462	=	186
DL303	E4,1713	=	186
DL304	0025	=	186
DL305	E7,1402	=	186
DL306	E7,1760	=	186
DL401	E6,1701	=	188
DL402	E6,1702	=	188
DL403	E6,1703	=	188
DL404	0301	=	188
DL405	0302	=	188
DL406	0303	=	188
DL407	E6,1714	=	188
DL408	E7,1677	=	188
DL409	E7,1701	=	188
DL410	E7,1402	=	188
DL411	E6,1666	=	188
DL412	0025	=	188
DL413	0776	=	188
DL414	E6,1570	=	188
DL415	E6,1571	=	188
DL416	E6,1572	=	188
DL417	E6,1573	=	188
DL418	E6,1574	=	188
DL419	E6,1701	=	188
DL420	E6,1702	=	188
DL421	E6,1703	=	188
DL422	E6,1473	=	188
DL423	E6,1466	=	188
DL424	E6,1715	=	188
DL425	1340	=	188
DL426	0375	=	188
DL501	0025	=	190
DMENFBIT	4760	=	57
DMPINCP2	30,3171		616
DMPINTEG	30,2544		610
DNLSTADR	0332	=	74
DOALARM	5205	=	1489
DOBRATE?	15,2115		1063
DODNADR	05,3455		1097

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SYMBOL	DEF	H	PAGE
DCDNCHAN	05,3523		1097
DCSPSOFF	24,3024		704
DCTIXBR	01,2421		1193
DCTVCRCS	24,3027		704
DRIFTT	E5,1452	=	102
DRIVEDAC	21,2537		1010
DSKYFLAG	0113	=	56
DSPLV	41,3374		370
DSP0633	35,3437		644
DUMPCNIC	27,3217		1375
DUMPFISH	26,3047		816
DUMPP61	26,2276		793
DUMPRPRA	27,3255		1377
DUMPTFF1	27,3340		1381
DUMPTFF2	27,3435		1382
DUMPTRIG	27,3070		820
DUMPVGAM	26,3076		818
DURATION	16,3351		987
DVTHRUSH	4775	=	835
DXTEST	05,3340		956
D60R9BIT	4767	=	54
E/BKCALL	13,2036		424
E/CALL	13,2055		425
E/JOBWAK	12,2000		426
E/SWITCH	13,2053		424
EARTCNTR	13,2363		766
EARTHL	26,3617		1250
EGFLGBIT	4761	=	59
EIGHT	4765	=	1204
END-E7	E7,1777	=	134
ENDALM	4201		372
ENDBLFF	4305	=	382
ENDCOPY	37,3072		833
ENDDCM	22,2522	=	411
ENDDPDEC	40,2673		352
ENDGTSAL	33,3043		446
ENDIDLE	10,3516		1472
ENDIGN	24,2772		703
ENDJETS	17,3556		1058
ENDLAMB	16,2423		729
ENDMASSP	05,3403		957
ENDMONDO	41,3336		366
ENDMRC	17,2204		944
ENDNVSB1	41,3555		380
ENDPINBF	4463	=	388
ENDPINSI	40,3636	=	393
ENDRDLO	40,2656		348
ENDROLL	10,2306		422
ENDRQDAT	41,2313		339
ENDRQWT	41,3465		374
ENDSLECT	17,3727	=	1061
ENDSPF	41,3350		367
ENDSPMIN	42,3360		351
ENDSPOCT	40,3257		372
ENDSYS-4	E4,1641	=	96
ENDSYS-5	E5,1657	=	103
ENDS40.6	20,2457		720
ENDTVCIN	17,2343		946
ENDVPUSH	6507		1126
ENDV97E	24,3362		711
ENDV97P	24,3426		712
ENDV99P	24,3510		713
ENDV99PI	24,3504		713
END2DEC	40,3145		369
ENGONFLG	0123	=	57
ENTPASHI	41,2010		334
ERADFBIT	4754	=	49
ERMINUS	40,3615		392
ETPIBIT	4762	=	51
EXDAPOFF	43,2526		262
EXECPHS	16,3225		961
EXTENTST	16,3657		992
FAILDSP	24,3313		710
FAZA1	36,3524		1257
FAZB1	36,3602		1257
FDAIDSP1	21,2422		1007
FIGTIME	35,2333		474
FIG2EXIT	30,2476		609
FINEK2	43,2246		256
FIRELOOK	16,3647		992
FIRSTBIT	4762	=	51
FIXCLPAS	40,2277		330
FLAGEND	35,3025		484
FREECHK	21,2205		1002
FREEFBIT	4766	=	48
FREETAU	21,3112		1020
FZRTEBIT	4764	=	48
GAINCHNG	16,3067		951
GAMDIFSW	0136	=	58
GAMDV32	32,3550		933
GAMDV40	32,3563		933
GAMDV45	32,3570		933
GDTSETUP	20,2413		719
GENMARK	10,3250		1468
GENPL	E5,1444	=	102
GEOCOMPS	E5,1643	=	103
GEOSAVED	E5,1631	=	103
GETANGLE	25,2217		857
GODSP	10,2702		1462
GODSPR1	10,2711		1462
GODSP2	10,2703		1462
GOGOMARK	10,2634		1460
GONEBIT	4757	=	58
GOPERFRS	10,3151		1467
GOPERFS	10,3071		1465
GROUPKIL	04,2255		212
GTSUPNDZ	E5,1655	=	103
GTSWTLST	E5,1645	=	103
GUESSBIT	4767	=	50
GYMDIFSW	0150	=	60
GONBYBIT	4761	=	61
HABIT	4762	=	67
HALFNFLT	23,2265		306
HBCFADR	17,2522		949
HBD11/2	E6,1430		106
HBD12	E6,1431		106
HBD21/2	E6,1435		106
HBD22	E6,1436		106
HBD31/2	E6,1442		107
HBD32	E6,1443		107
HBN11/2	E6,1426		106
HBN12	E6,1427		106
HBN20	E6,1432		106
HBN21/2	E6,1433		106
HBN22	E6,1434		106
HBN30	E6,1437		107
HBN31/2	E6,1440		107
HBN32	E6,1441		107
HDSUPFLG	0232	=	66
HINDBIT	4763	=	59
ICORK2	43,2151		254
IDAD3TEM	0152		71
IDLEBIT	4763	=	49
IMPULCHK	24,2702		702
IMUBACK	33,2005		427
IMUZERO3	07,2706		1419
INCORBIT	4756	=	56
INFINBIT	4762	=	62
INRLBIT	4764	=	59
INTFLAG	0227	=	65
INTOTHIS	13,2176		514
INTVEC	E5,1476	=	103
INTYBIT	4765	=	53
INTZ	E5,1504	=	102
INVC107	32,2475		913
IRIGCOMP	06,3344		31
IRIGX	06,3346		31
IRIGY	06,3362		31
IRIGZ	06,3376		31
ISSUP	06,2320		151
ISSWOFF	06,2721		166
ISWRETRN	4727		1106
ITR0	6337		1120
ITR1	6326		1120
ITR10	6111		1111
ITR11	6151		1112
ITR12	6103		1111
ITR14	6206		1114
ITR15	6072		1111
ITR7	6230		1115
ITSWBIT	4753	=	60
JSWCHBIT	4753	=	47
KEYCALL	07,2142		243
KILLJETS	16,3752		995
KNOWNBIT	4761	=	59
KRESUME2	21,3177		1021
LARMENT	5703		1486
LASTGTS	33,3050		446
LASTMASP	E6,1522	=	108
LASTTIME	01,3453		1235
LEMNO	05,3321		956
LEMTEST	05,3315		956

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SYMBOL	DEF	H	PAGE
LGCLNGTM	01,3431		1234
LMOONBIT	4756	=	62
LOCHECK	16,2217		725
LODPMAX1	04,3774		1206
LOTEMIN	0124	=	70
LOUNITX	04,3757	=	34
LOUNITY	04,3755	=	34
LOUNITZ	04,3753	=	34
LRUPT	0011	=	40
LSDISP	14,2115		745
LUNABIT	4755	=	52
L350	25,3536		881
==========			
MANEUBIT	4764	=	66
MANUSTAL	22,3131		419
MARKFORM	10,2602		1460
MAXTST	16,3627		992
MAXVTIM2	15,3062		1085
MCLEANJR	17,2355		946
METHOD2	22,2210		406
MGLVFBIT	4767	=	57
MGLVFLAG	0130	=	57
MIDAVBIT	4767	=	65
MIDFLBIT	4754	=	47
MID1FBIT	4766	=	65
MINLIMAP	16,3537		990
MINTST	16,3622		992
MKOVFLAG	0110	=	55
MKRQST	4752	=	1477
MKV85C	07,2054		242
MKVRET	07,2050		242
MONIT1	41,3226		364
MOONBIT	4755	=	47
MRKIDBIT	4752	=	54
MRKIDFLG	0074	=	54
MRKNVFLG	0102	=	55
MRUPTFLG	0106	=	55
MU(P)	0032	=	1353
MULTEXIT	5722		1486
MUM	13,3735	=	1353
MWAITBIT	4756	=	54
MWAITFLG	0100	=	54
==========			
NDCMPTST	41,2435		343
NDRMSBIT	4757	=	60
NEEDLEUP	16,3063		951
NEG7	5736	=	224
NETZERO	6070		1111
NEWIBIT	4754	=	62
NEWLMBIT	4753	=	62
NEWTBIT	4757	=	56
NEXBNKSS	33,3336		450
NEXTBNKS	33,3322		450
NO.13-15	16,3705		993
NO.16-14	16,3726		993
NOMDNLST	05,2113	=	179
NORESET	07,3347		1429
NORFBIT	4756	=	47
NORFINAL	13,3405		1323
NORMTEST	00,3507		1186
NOSAM	14,3664		787
NOSWBIT	4762	=	59
NRMIDBIT	4754	=	54
NRMIDFLG	0076	=	54
NRMNVBIT	4761	=	55
NRMNVFLG	0103	=	55
NRUPTBIT	4765	=	55
NRUPTFLG	0107	=	55
NUFAZ+10	4140		238
NUVLEM	E3,1652		90
NVSUBCOM	4212		378
NVSUBUSY	10,3476		1472
NWAITBIT	4757	=	55
NWAITFLG	0101	=	54
NWNGL17D	22,3073		418
NXXTBNN	33,2717		444
N45NORM	35,3075		486
==========			
OCT00010	4765	=	221
OCT00060	21,3061		1018
OCT00300	21,3062		1018
OCT01120	04,3051		224
OCT10000	4754	=	201
OCT10001	7617	=	1204
OCT140	5015	=	1204
OCT25	4353	=	1204
OCT27/24	4615	=	714
OCT30000	4346	=	201
OCT30002	6440	=	1204
OCT54	5005	=	143
OCT55000	40,3634		393
OLDAZ1	E5,1637	=	103
OMEGACLC	16,2323		727
OMEGAXB	E6,1533	=	108
OMEGAXC	E6,1525	=	108
ONCEMORE	33,2612		442
OPDEGIN2	40,2766		360
OPFAILON	06,3232		173
OPMD2BIT	4765	=	85
OPT2	10,2046		176
ORBWFBIT	4763	=	53
ORDERBIT	4763	=	63
OUT	13,2227		515
OVERNOUT	25,3575		881
==========			
PACLIM	20,2745		967
PARAM30	35,3505		644
PARTRACK	43,3103		279
PBIASY	E3,1454		88
PBIASZ	E3,1456		88
PCDUDOTS	20,2653		966
PCDUPYCYC	20,3002		968
PDAPEND	20,3003		968
PERFCHEK	10,3361		1470
PERFERAS	33,2607		442
PERORLIM	20,2727		967
PFORWARD	20,2730		967
PHASE2	1160		81
PHASE3	1162		81
PHASE4	1164		81
PHASE6	1170		81
PHSBB1	E3,1437		88
PHSBB2	E3,1441		88
PHSBB3	E3,1443		88
PHSBB4	E3,1445		88
PHSBB5	E3,1447		88
PHSBB6	E3,1451		88
PHSCHK2	16,3302		962
PHSNAME2	E3,1440		88
PHSNAME3	E3,1442		88
PHSNAME4	E3,1444		88
PHSNAME6	E3,1450		88
PINBRBIT	4763	=	55
PINTEST	43,2002	=	389
PIPASCFY	E3,1455		88
PIPASCFZ	E3,1457		88
PIPUSE1	07,3220		1426
PITCHANG	0026	=	941
PMINM	35,3564		672
PMISC	20,3027		969
POFFSET	20,2742		967
POOBIT	4760	=	53
POOH	04,2216		211
POSTPOLY	34,2371		543
POSVEL3	35,3135		486
POUT	20,2746		967
PPRECOMP	20,2754		967
PREBJUMP	5351		1402
PRECIBIT	4761	=	53
PREC150	32,2617		916
PREC155	32,2632		916
PREC170	32,2710		917
PREC205	32,3012		918
PRIODFLG	0075	=	54
PRIODSPY	4762	=	1477
PRIO2	4756	=	1204
PROCEEDE	06,2076		144
PROCESSW	06,3050		169
PROCKEY1	40,3317		375
PROG22C	30,2247		562
PRONVBIT	4762	=	55
PRONVFLG	0104	=	55
PTV93BIT	4765	=	66
PULSEM	14,2712		755
PUTXY	41,2727		355
PUTXYZ	41,2625		353
P15INTEG	20,2343		529
P20R52JB	36,2211		555
P21DSP	37,2120		457
P21ONENN	37,2162		458
P22MKBIT	4756	=	53
P23.00	31,2455		628
P23.06	31,2471		628
P23.15	31,3362		637
P23.17	31,3450		638
P23.57	31,2560		630
P23.85	31,2612		630
P29BIT	4770	=	48
P31ONWRD	04,3350		653
P34/P74E	35,2103		467

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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL	DEF	H	PAGE
P35BIT	4761	=	66
P37N	36,3040		903
P40CLK	24,3623		737
P40GMB	24,2473		698
P40MINDB	24,3447		712
P40SNEWM	24,2534		699
P40TSK	24,2577		700
P47/DSP	24,3743		741
P47BOD	24,3736		741
P51FIVE	4773	=	776
P52I	14,2611		753
P60S7	06,2000	=	28
P67.3	26,2542		806
P82CONT2	04,2550		217
P86CONT2	04,2626		218
P89CONT1	04,2671		218
==========			
QUICKIGN	24,3346		711
QUITBIT	4764	=	65
==========			
RANGBIT	4760	=	66
RANGER	25,2571		867
RANGERD	34,2707		578
RATEDEN	16,3514		990
RATENUM	16,3530		990
RATEZRO	24,3104		706
RCSUP	21,2032		734
RDAPEND	16,3745		994
RDM	13,3765		1353
READPIPS	22,3621		1501
RECAL3	40,3427		383
RECT.1	31,3026		633
REDOMANN	27,2076		394
REDO5.31	37,2613		826
REFTEST	35,3507		644
REGION6	16,3464		989
REG1TST	16,3420		988
REG2TST	16,3450		989
REG3TST	16,3426		988
REG4TST	16,3454		989
REG5TST	16,3463		989
REJCTBIT	4755	=	66
RELVBIT	4760	=	59
RENDP79	04,2033		208
REPLACEP	17,3673		1061
REPLACEY	17,3702		1061
REQEXLOC	41,2206		337
RESA	26,2200		791
RETROBIT	4753	=	56
RMM	04,3174		227
ROLLPREP	16,3046		951
RPAD1	22,3172	=	1386
RPQFLBIT	4752	=	62
RRECT1	0022	=	89
RSTRTST	20,2405		719
RTENCK3A	31,3655		922
RTE299	36,2517		898
RTE320	36,2572		899
RTE505	36,2765		902
RTE625	36,3004		902
RVSWBIT	4760	=	61
RWORD	17,2736		1042
R23,END	31,2755		632
R23.05	31,3004		633
R23.6	31,2735		632
R23.8	31,2751		632
R40CHECK	24,3146		706
R40ENABL	24,3422		712
R40START	24,3151		706
R53B	14,3617		781
R53OUT	14,3632		781
R53Z	14,3625		781
R55	14,2710		755
R55.1	14,2713		755
R61C1	37,2366		572
R61DMPTG	37,2360		572
==========			
S+2	4767	=	1393
S+3	6214	=	1393
S+4	4766	=	1393
S+5	4773	=	1393
S+6	6211	=	1393
S-2	7701	=	1394
S-3	7700	=	1394
S-4	6061	=	1394
SAMEJETS	16,3673		993
SATSTKON	43,2502		262
SAVECBIT	4757	=	64
SBIT1	4770	=	1393
SBIT10	4757	=	1393
SBIT13	4754	=	1393
SBIT14	4753	=	1393
SBIT2	4767	=	1393
SBIT3	4766	=	1393
SBIT5	4764	=	1393
SBIT6	4763	=	1393
SBIT8	4761	=	1393
SECAD	22,2016		403
SETCLOCK	24,3242		709
SETMARK	10,2772		1463
SETPRIO	10,2754		1463
SETUPGC	33,2736		444
SETUPTIG	24,3667		740
SETXTACT	43,2105		250
SETZOEND	06,3062		170
SFRET1	41,3041		356
SHAFTSF	E3,1771	=	91
SHORTMP2	7262		1142
SIDETRAK	25,2716		869
SIM2CADR	05,2374		194
SLOPEBIT	4766	=	50
SLOWBIT	4754	=	56
SNAPAGN	05,3567		1098
SNAPEND	05,3606		1099
SOLNSBIT	4766	=	57
SOMEERRR	33,2652		443
SOPTION2	43,3255		1395
SOPTION3	43,3256		1395
SOPTION4	43,3257		1395
SOPTION5	43,3260		1395
SOPTION6	43,3261		1395
SOPTION7	43,3262		1395
SOPTON10	43,3263		1395
SOUPLY	33,2675		443
SOURCBIT	4761	=	64
SPITGYRO	33,3143		447
SPSCODE	4760	=	1417
SPSOFF97	24,3330		710
SPSON	24,2674		702
SPVQUIT	37,3427		890
STARTMNV	27,2137		395
STARTSIM	05,2372		194
STARTSTO	6403		1123
STARTSW	05,2371		194
STATEBIT	4764	=	53
STATEST	31,2031	=	35
STBYDUMP	15,2303		1072
STEERING	16,2307		727
STEERULL	24,2761		703
STEP2CK	34,3452		596
STICKOUT	21,2030		551
STOPVEH	36,2434		559
STORHAPO	23,2707		524
STORHPER	23,2721		525
STRATGY	14,2526		752
SUPERRSM	5320		1232
SUPER100	4762	=	1201
SURFFBIT	4761	=	62
SXTOPTN	E5,1413	=	102
SYSTSPR1	E5,1422		102
SYSTSPR2	E5,1430		102
S2BVTRS	30,3124		615
S2GETUM	30,2542		610
S2INCP1	30,3130		615
S2INTS1	30,3025		614
S2RPTR	30,3065		614
S2RTRP	30,3057		614
S22F244	30,3223		616
S32BIT1	4752	=	67
S32BIT2	4753	=	67
S32BIT3A	4754	=	67
S3229T3B	4755	=	67
S3435.25	35,2601		479
S40.1	24,2241		694
S52.2.1	11,2267		782
==========			
TARG2BIT	4760	=	49
TBASE3	1263		83
TCALARM2	43,3216		1394
TCCSM	E3,1622		90
TCLEM	E3,1674		90
TCPIN	17,2030		274
TCTSKOVR	5313	=	385
TESTVB	41,2043		335
TETOTHER	E3,1642	=	90
TET1	0036	=	89
TFFSWBIT	4770	=	61
TFFTICK	23,2537		520
TGOCALC	16,2244		726
THTD123	34,3716		599

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SYMBOL	DEF	H	PAGE
TICKTPER	23,2475		519
TICKTTE	37,3040		832
TIMETST	15,3154		1087
TMANUCHK	22,3125		419
TMEXITL	05,3640		1099
TMODE	6446		1125
TMRESUME	05,3642		1099
TOBALLC	27,2124		394
TOLDAZMT	E5,1641	=	103
TOLDAZI	E5,1641	=	103
TORQINCH	33,2635		442
TPIMNBIT	4766	=	66
TRNVNREF	34,2204		539
TRTAGXPI	15,2723		1082
TSSR	00,2025		1152
TSTLTS3	40,3470		390
TSTPOINT	23,3731		1369
TVCINIT2	17,2227		944
TVCINIT3	17,2260		945
T5RPTBB	4055		140
T6ADR	0111		69
==========			
UPDNLIST	05,2211	=	179
UPDTMEND	43,2340		258
UPD8MASS	16,2225		726
UPLOCKFL	0164	=	61
UPOK	07,3750		1446
UPPART3	27,3556	=	1496
UPRPT1	07,3731		1446
UPWAKE	27,3550		1496
==========			
V(24K)	32,2247		650
V(28K)	32,2243		650
VAC1	0401		75
VAC2	0455		76
VAC3	0531		76
VAC4	0605		76
VARGAINS	16,3065		951
VARSUBL3	31,3506		639
VCVLEM	E3,1666		90
VECMODE	22,3635		1501
VEHUPBIT	4761	=	49
VERIFLAG	0165	=	61
VFLAGBIT	4757	=	53
VHFRBIT	4760	=	64

SYMBOL	DEF	H	PAGE
VINTFBIT	4766	=	53
VLAUNS	E5,1472	=	102
VLTEST	25,3056		872
VPDVL	6542		1127
VRECTLEM	E3,1634		90
VRECT1	0030	=	89
VSTORE	6412		1123
VV7SC	7563		1150
VVXSC	7340		1145
V06N16N	24,2063		506
V06N59	35,3157		488
V37XEQ	04,2736		221
V37XEQC	04,2762		221
V50N18BT	4752	=	52
V51N45	37,2261		568
V6N99INP	40,3654		640
V74	43,2706	=	271
V82EMBIT	4754	=	64
V96ONBIT	4766	=	63
V97E	24,3320		710
V97E40.6	24,3334		710
V97TRCS	24,3374		711
V99E	24,3434		712
V99EJOB	24,3440		712
V99FLASH	24,3352		711
V99TJOB	24,3402		711
==========			
WAIT1/2	16,3362		987
WANGI	E5,1446	=	102
WANGO	E5,1444	=	102
WASCMC	34,2357		543
WASINIT	34,2356		543
WASIU	34,2355		543
WHICHALF	15,2754		1083
WPLATI	E5,1570	=	103
WPLATO	E5,1474	=	102
WRTN22	21,3223		1021
==========			
XACTOQ	43,2432		261
XDELVBIT	4761	=	51
XDIFF	12,2230		1278
XDSPFLAG	0112	=	56
XKEPCSM	E3,1624		90
XKEPLEM	E3,1676		90
XPRODUCT	16,2306		727

SYMBOL	DEF	H	PAGE
==========			
YACLIM	20,3131		971
YCDUDOTS	20,3051		970
YCDUPYCYC	20,3166		972
YDAPEND	20,3167		972
YERORLIM	20,3113		971
YFORWARD	20,3114		971
YINTEGRL	20,3065		970
YMISC	20,3213		973
YOFFSET	20,3126		971
YOUT	20,3132		971
YPRECOMP	20,3140		971
YWORD	17,2665		1040
==========			
ZERINFLT	23,2263		306
ZERODP	04,3761	=	1206
ZEROO	26,3335	=	1260
ZMEASBIT	4757	=	47
ZOPALARM	06,3073		170
ZOPFINZ	06,3102		170
ZOPTDES	06,3053		169
ZROCLOCK	34,2015		536
ZRUPT	0015	=	40
==========			
0.5SEC	37,2772		831
0EBANK	43,3273		1396
==========			
1DAPCAS	20,3306		975
1P11SPT2	01,2025	=	415
1P11SPT3	01,2025	=	554
1P11SPT4	01,2025	=	555
1P11SPT5	01,2025	=	559
1P11SPT6	01,2025	=	572
1P11SPT7	01,2025	=	834
1P11SPT8	01,2025	=	834
1P13SPT1	01,2030	=	558
1P3SPT1	01,2014	=	829
1P5SPT1	01,2017	=	717
1P7SPT1	01,2022	=	395
1SECX	5016	=	432
1SECXT	E5,1644	=	103
1SEC2D	16,2623	=	733
1SHOTCHK	16,3075		951
114ALM	07,2216		245
120MS	5775	=	168

SYMBOL	DEF	H	PAGE
13-11,1	40,3635		393
17DECML	4352	=	448
17TO20	43,3575		1400
==========			
2CASFLTR	20,3451		977
2DAPCAS	20,3320		975
2DZERO	04,3761	=	1240
2P11SPT1	01,2044	=	275
2P13SPT1	01,2047	=	588
2P13SPT2	01,2030	=	834
2P3SPT1	01,2033	=	1314
2P5SPT1	01,2036	=	212
2P5SPT2	01,2036	=	213
2P5SPT3	01,2036	=	555
2P5SPT4	01,2036	=	1313
2P7SPT1	01,2041	=	554
22DSPBIT	4754	=	51
27TO30	43,3603		1400
==========			
3/4LOWDP	11,3760	=	34
3AXISBIT	4763	=	57
3CASFLTR	20,3534		979
3P11SPT1	01,2071	=	536
3P13SPT1	01,2074	=	536
3P15SPT1	01,2077	=	528
3P2SPT1	01,2052	=	529
3P3SPT1	01,2060	=	701
3P3SPT2	01,2060	=	711
3P5SPT1	01,2063	=	704
3P5SPT2	01,2063	=	706
3P7SPT1	01,2066	=	537
33OPTMON	06,3010		169
360SWBIT	4770	=	63
3990DEC	33,2223	=	432
==========			
4.25SPOT	01,2157		233
4D/SDZ	15,2446		1076
4P11SPT1	01,2135	=	711
4P13SPT1	01,2140	=	711
4P15SPT1	01,2143	=	449
4P17SPT1	01,2146	=	259
4P2SPT1	01,2102	=	700
4P21SPT1	01,2151	=	699
4P23SPT1	01,2154	=	699
4P23SPT2	01,2154	=	738

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SYMBOL	DEF	H	PAGE
4P27SPT1	01,2162	=	702
4P3SPT1	01,2124	=	702
4P31SPT1	01,2165	=	755
4P33SPT1	01,2170	=	1077
4P35SPT1	01,2173	=	704
4P37SPT1	01,2176	=	700
4P4SPT1	01,2110	=	700
4P41SPT1	01,2201	=	883
4P43SPT1	01,2204	=	808
4P45SPT1	01,2207	=	808
4P47SPT1	01,2212	=	869
4P5SPT1	01,2127	=	703
4P51SPT1	01,2215	=	538
4P53SPT1	01,2220	=	710
4P55SPT1	01,2223	=	801
4P57SPT1	01,2226	=	740
4P6SPT1	01,2116	=	700
4P61SPT1	01,2231	=	531
4P7SPT1	01,2132	=	701
==========			
5BLANK1	40,2452		332
5B10	01,2473		1196
5P11SPT1	01,2261	=	438
5P13SPT1	01,2264	=	437
5P15SPT1	01,2267	=	446
5P17SPT1	01,2272	=	808
5P2SPT1	01,2234	=	540
5P2SPT2	01,2234	=	827
5P21SPT1	01,2275	=	439
5P23SPT1	01,2300	=	438
5P25SPT1	01,2303	=	446
5P27SPT1	01,2306	=	446
5P3SPT1	01,2250	=	541
5P3SPT10	01,2250	=	833
5P3SPT11	01,2250	=	833
5P3SPT12	01,2250	=	833
5P3SPT13	01,2250	=	834
5P3SPT14	01,2250	=	855
5P3SPT15	01,2250	=	883
5P3SPT16	01,2250	=	531
5P3SPT2	01,2250	=	706
5P3SPT3	01,2250	=	717
5P3SPT4	01,2250	=	725
5P3SPT5	01,2250	=	728
5P3SPT6	01,2250	=	728
5P3SPT7	01,2250	=	740
5P3SPT8	01,2250	=	801
5P3SPT9	01,2250	=	832
5P31SPT1	01,2311	=	829
5P33SPT1	01,2314	=	447
5P4SPT1	01,2242	=	829
5P5SPT1	01,2253	=	828
5P7SPT1	01,2256	=	435
5P7SPT2	01,2256	=	447
5SECOND	16,2625	=	733
504LPL	0016	=	1251
==========			
6P11SPT1	01,2336	=	1068
6P2SPT1	01,2317	=	699
6P2SPT2	01,2317	=	711
6P3SPT1	01,2325	=	645
6P3SPT2	01,2325	=	703
6P3SPT3	01,2325	=	738
6P3SPT4	01,2325	=	528
6P5SPT1	01,2330	=	1497
6P7SPT1	01,2333	=	711
==========			
74K	7675	=	141
==========			
9DWAAB	30,3505		621

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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
0000	40	A	0010	1241	GAMRP	0016	1371	CDELF/2	0026	40	TIME3	0034	1306	XSQC(X1)
0000	604	UTSAP	0010	1251	CVECTR	0016	1371	TFFQ1	0026	49	VEHUPFLG	0034	1371	TFFNP
0000	604	UTUXP	0010	1251	DVECTR	0016	1377	RPER	0026	74	PDA	0035	40	CDUT
0000	604	UTZ	0010	1251	SINNODI	0017	40	BRUPT	0026	74	ZPRIME	0035	42	DNTM2
0000	623	WORKW	0010	1306	ALPHA	0017	48	NJETSFLG	0026	123	GAMMAL1	0035	50	AVEGFLAG
0000	1251	504RPR	0010	1307	COGAMIN	0020	40	CYR	0026	941	PITCHANG	0035	182	DL106
0000	1353	RATT	0010	1307	MIN	0020	48	STIKFLAG	0026	1307	ITERCTR	0036	40	CDUS
0001	40	L	0011	40	LRUPT	0020	74	COSTH	0026	1371	TFF1/ALF	0036	50	DRIFTFLG
0001	42	LCHAN	0011	42	DSALMOUT	0020	767	CSUN	0027	40	TIME4	0036	89	TET1
0001	47	JSWITCH	0011	48	R53FLAG	0020	1305	ROOTMU	0027	49	UPDATFLG	0036	604	UTUZ
0002	40	Q	0012	40	QRUPT	0020	1371	NRTERM	0030	40	TIME5	0036	623	S22D
0002	42	QCHAN	0012	42	CHAN12	0020	1377	RAPO	0030	42	CHAN30	0036	1306	T
0002	47	MIDFLAG	0012	48	F2RTE	0021	40	SR	0030	49	IDLEFAIL	0036	1307	DEP
0002	941	R	0012	623	9DWI	0021	49	ERADFLAG	0030	89	VRECT1	0036	1371	TFF/RTMU
0002	941	RCM	0012	1306	XMAX	0022	40	CYL	0030	132	RPRE	0037	40	PIPAX
0003	40	EBANK	0012	1371	TFFDELQ	0022	49	NODOP01	0030	604	UTOGA	0037	50	R21MARK
0003	42	HISCALAR	0013	40	SAMPTIME	0022	74	SINTH	0030	604	UTSB	0037	182	DL119
0003	47	MOONFLAG	0013	42	CHAN13	0022	89	RRECT1	0030	604	UTUY	0040	40	PIPAY
0004	40	FBANK	0013	48	CYC61FLG	0022	604	UTSA	0030	623	S221X3	0040	50	22DSPFLG
0004	42	LOSCALAR	0014	42	CHAN14	0022	604	UTUX	0030	1306	X1	0040	74	STARM
0004	47	NORMHOR	0014	48	FREEFLAG	0022	623	S223X1	0030	1307	COSF	0040	182	DL120
0005	40	Z	0014	604	UTUZP	0022	767	CMOON	0030	1371	TFFRTALF	0040	623	S22RHO
0005	42	CHAN5	0014	623	9DWN	0022	1251	504AZ	0031	40	TIME6	0040	1251	COB
0005	42	PYJETS	0014	1306	XMIN	0022	1305	1/ROOTMU	0031	42	CHAN31	0040	1306	R1
0005	47	ZMEASURE	0014	1307	DCOGA	0022	1353	COSPHI/2	0031	50	TRACKFLG	0040	1353	TDEC1
0006	40	BBANK	0014	1307	DELINDEP	0022	1371	RTERM	0032	40	CDUX	0040	1371	NRMAG
0006	42	CHAN6	0014	1353	TAT	0023	40	EDOP	0032	42	CHAN32	0041	40	PIPAZ
0006	42	ROLLJETS	0014	1371	RMAG1	0023	49	ENG2FLAG	0032	50	MARKFLG	0041	51	P21FLAG
0006	47	NEEDLFLG	0015	40	ZRUPT	0024	40	TIME2	0032	132	P/RPRE	0041	182	DL121
0006	604	UTAMG	0015	42	MNKEYIN	0024	49	TARG1FLG	0032	467	DELELO	0042	40	BMAGX
0006	604	UTSBP	0015	48	AMOONFLG	0024	74	THETA	0032	604	UTIGA	0042	41	LVSQUARE
0006	604	UTUYP	0016	40	BANKRUPT	0024	941	YAWANG	0032	1251	BVECTR	0042	51	STEERSW
0006	623	XTMP1	0016	42	NAVKEYIN	0024	1251	AVECTR	0032	1306	S(X1)	0042	1251	SOB
0006	1251	504F	0016	48	P29FLAG	0024	1251	MMATRIX	0032	1353	MU(P)	0042	1306	KEPC1
0006	1353	VATT	0016	623	9DWJ	0024	1306	X	0032	1353	TVEC	0042	1371	TFFX
0006	1408	BB	0016	753	CSS	0024	1353	UZ	0032	1371	TFFALFA	0043	40	BMAGY
0007	42	SUPERBNK	0016	767	CEARTH	0024	1353	VATT1	0033	40	CDUY	0043	51	SKIPVHF
0007	47	IMUSE	0016	941	URP	0024	1371	TFFVSQ	0033	42	CHAN33	0044	40	BMAGZ
0007	179	ERASZERO	0016	1251	TIMSUBM	0025	40	TIME1	0033	50	SLOPESW	0044	41	LV
0007	179	SPARE	0016	1251	504LPL	0025	49	TARG2FLG	0033	182	DL109	0044	51	IMPULSW
0010	40	ARUPT	0016	1305	1/MU	0025	181	DL103	0034	40	CDUZ	0044	604	UTZINIT
0010	42	OUTO	0016	1307	COGAMAX	0025	184	DL204	0034	42	DNTM1	0044	1261	NORMZI
0010	48	RNDVZFLG	0016	1307	MAX	0025	186	DL304	0034	50	GUESSW	0044	1306	KEPC2
0010	623	9DWP	0016	1353	RATT1	0025	188	DL412	0034	132	R/APRE	0044	1371	TFFTEM
0010	941	UR	0016	1353	URPV	0025	190	DL501	0034	604	UTMGA	0045	40	INLINK

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
0045	51	XDELVFLG	0063	69	WAITADR	0102	55	MRKNVFLG	0122	70	SGNON	0140	71	POLYCNT
0046	40	RNRAD	0063	1408	TEMPNM	0102	58	FLAGWRD6	0122	70	VBUF	0141	59	EGSW
0046	41	X1	0064	53	PRECIFLG	0102	852	CM/FLAGS	0123	57	ENGONFLG	0141	59	KNOWNFLG
0046	51	ETPIFLAG	0064	69	ITEMP4	0103	55	NRMNVFLG	0123	70	HITEMIN	0141	71	DSREL
0046	51	FIRSTFLG	0064	69	LOCCTR	0103	60	FLAGWRD7	0123	70	NVTEMP	0141	71	POLYRET
0047	40	GYROCMD	0064	69	WAITTEMP	0104	55	PRONVFLG	0123	70	SFTEMP1	0141	71	TEM1
0047	41	X2	0064	1408	TEMPBB	0104	61	FLAGWRD8	0123	70	SGNOFF	0142	59	NOSWITCH
0047	51	FINALFLG	0065	53	COLTFLAG	0105	55	PINBRFLG	0124	57	3AXISFLG	0142	71	DEXDEX
0047	227	NO.MMS	0065	69	ITEMP5	0105	63	FLAGWRD9	0124	70	CODE	0142	71	DSMAG
0050	40	CDUXCMD	0065	69	NEWLOC	0106	55	MRUPTFLG	0124	70	LOTEMIN	0142	71	TEM2
0050	41	S1	0065	1408	TEMPSW	0106	65	FLGWRD10	0124	70	SFTEMP2	0143	59	HIND
0050	52	AVFLAG	0066	53	ORBWFLAG	0107	55	NRUPTFLG	0125	57	GRRBKFLG	0143	71	COUNT
0050	1251	RPREXIT	0066	69	ITEMP6	0107	67	FLGWRD11	0125	70	MIXTEMP	0143	71	TEM3
0050	1308	TWEEKIT	0066	1408	TEMPSW2	0110	55	MKOVFLAG	0127	57	SOLNSW	0143	72	DEX1
0051	40	CDUYCMD	0067	53	STATEFLG	0110	69	T6LOC	0130	57	MGLVFLAG	0143	72	DEX1
0051	41	S2	0067	69	NEWJOB	0111	56	VNFLAG	0130	70	BUF	0144	59	INRLSW
0051	52	PFRATFLG	0070	53	INTYPFLG	0111	69	T6ADR	0130	70	INDEXLOC	0144	71	DSPWDRET
0051	1242	SETREX	0070	69	RUPTREG1	0112	56	XDSPFLAG	0130	70	SWWORD	0144	71	RELRET
0051	1251	EARTHMXX	0070	1408	TEMPPR	0112	70	T5LOC	0131	57	RENDWFLG	0144	71	SEPMNRET
0052	40	CDUZCMD	0071	53	VINTFLAG	0113	56	DSKYFLAG	0131	70	SWBIT	0144	71	SEPSCRET
0052	41	QPRET	0071	69	RUPTREG2	0114	56	RETROFLG	0132	58	DAPBIT1	0144	71	TEM4
0052	52	P24MKFLG	0071	1408	TEMPG2	0114	70	DSEXIT	0133	58	DAPBIT2	0144	72	DEX2
0053	40	CDUTCMD	0072	53	D60R9FLG	0114	70	EXITEM	0133	70	BUF2	0145	59	LATSW
0053	40	TVCYAW	0072	69	RUPTREG3	0114	70	INTBI5+	0133	72	TERMITMP	0145	71	NOUNADD
0053	52	CALCMAN2	0072	1408	TEMPP2	0115	56	SLOWFLG	0134	58	ENTRYDSP	0145	71	TEM5
0054	41	CDUSCMD	0073	54	DIMOFLAG	0115	70	DECRET	0134	58	STROLLSW	0145	72	RTNSAVER
0054	41	TVCPITCH	0073	69	DSRUPTEM	0115	70	INTBIT15	0135	58	CMDAPARM	0146	59	.05GSW
0054	52	NODOFLAG	0073	69	KEYTEMP1	0115	70	WDRET	0135	70	MPTEMP	0146	71	NNADTEM
0055	52	V50N18FL	0073	69	RUPTREG4	0115	70	21/22REG	0136	58	GAMDIFSW	0147	60	CM/DSTBY
0056	52	GLOKFAIL	0073	1408	TEMPBBCN	0116	56	V59FLAG	0136	71	DOTINC	0147	71	NNTYPTEM
0057	52	REFSMFLG	0074	47	FLAGWRD0	0116	70	ADDRWD	0136	71	DVSIGN	0150	60	GYMDIFSW
0060	52	LUNAFLAG	0074	54	MRKIDFLG	0117	56	INCORFLG	0136	71	ENTEXIT	0150	71	IDAD1TEM
0061	53	P22MKFLG	0074	69	STATE	0117	70	CHAR	0136	71	ENTRET	0151	60	TERMIFLG
0061	69	EXECTEM1	0075	48	FLAGWRD1	0117	70	DECOUNT	0136	71	ESCAPE	0151	71	IDAD2TEM
0061	69	ITEMP1	0075	54	PRIODFLG	0117	70	ERCNT	0137	58	GONEPAST	0152	60	ITSWICH
0061	69	WAITEXIT	0076	42	CHAN76	0117	70	POLISH	0137	71	DOTRET	0152	71	IDAD3TEM
0061	1408	TEMPG	0076	50	FLAGWRD2	0117	70	UPDATRET	0137	71	DVNORMCT	0153	60	IGNFLAG
0062	53	VFLAG	0076	54	NRMIDFLG	0120	56	NEWTFLAG	0137	71	ESCAPE2	0153	71	RUTMXTEM
0062	69	EXECTEM2	0077	42	CHAN77	0120	70	FIXLOC	0137	71	INREL	0154	60	ASTNFLAG
0062	69	ITEMP2	0077	52	FLAGWRD3	0121	56	DMENFLG	0137	71	WDCNT	0154	73	MPAC
0062	69	WAITBANK	0077	54	PDSPFLAG	0121	70	OVFIND	0140	58	RELVELSW	0154	1416	TEMPPHS
0062	1408	TEMPP	0100	54	FLAGWRD4	0122	57	COMPUTER	0140	71	DSPMMTEM	0154	1476	FACEREG
0063	53	POOFLAG	0100	54	MWAITFLG	0122	70	DECTEM	0140	71	MATINC	0155	60	TIMRFLAG
0063	69	ITEMP3	0101	54	NWAITFLG	0122	70	DISTEM	0140	71	MAXDVSW	0155	1416	TEMPZG
0063	69	NEWPRIO	0101	56	FLAGWRD5	0122	70	NOUNTEM	0140	71	MIXBR	0155	1476	PLAYTEM1

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
0156	60	NORMSW	0213	64	V94FLAG	0304	73	STARIND	0454	76	VAC2USE	1016	78	N26/PRI
0156	1416	POINTER	0214	64	SAVECFLG	0304	73	UPBUFF	0455	76	VAC2	1017	78	N26/2CAD
0157	61	RVSW	0215	64	VHFRFLAG	0305	73	SW/NDX	0530	76	VAC3USE	1021	78	TEVENT
0157	1416	TEMPSWCH	0216	64	SOURCFLG	0306	74	XSCREF	0531	76	VAC3	1021	78	TLIFTOFF
0157	1476	COPMPAC	0217	64	R22CAFLG	0306	74	XSMD	0604	76	VAC4USE	1023	78	NORMEX
0157	1476	PLAYTEM3	0220	64	N22ORN17	0314	74	YSCREF	0605	76	VAC4	1024	78	TRUNBIAS
0160	61	GONEBY	0221	64	QUITFLAG	0314	74	YSMD	0660	76	VAC5USE	1025	78	EPSILONT
0160	1476	PLAYTEM4	0222	65	R31FLAG	0322	74	ZSCREF	0661	76	VAC5	1027	78	RN
0160	1476	TEMPOR2	0223	65	MID1FLAG	0322	74	ZSMD	0705	76	GOLOC	1035	78	VN
0162	61	V37FLAG	0224	65	MIDAVFLG	0324	73	ENDBUF	0734	76	VEHRET	1043	78	PIPTIME
0162	347	MPAC+6	0225	65	AVEMIDSW	0325	73	V1	0735	76	TRATE	1045	78	GDT/2
0162	1476	GENMASK	0226	65	PCMANFLG	0327	73	A0	0736	76	SRATE	1045	79	CSMPOS
0163	73	MODE	0227	65	INTFLAG	0330	73	UPTEMP	0737	76	NO.PASS	1053	79	GOBL/2
0163	1476	USERPRIO	0230	65	REINTFLG	0330	74	PACTEMP	0740	76	TOLD	1053	79	LEMPOS
0164	61	UPLOCKFL	0231	66	REJCTFLG	0331	73	UPVERBSV	0741	76	SOLD	1053	79	S22UOFF
0164	73	LOC	0232	66	HDSUPFLG	0332	74	DNLSTADR	0742	76	TEMK	1053	79	9DWXX
0164	1476	COPINDEX	0233	66	BURNFLAG	0332	74	DNLSTCOD	0743	76	SQ	1061	79	AVEGEXIT
0165	61	VERIFLAG	0234	66	RANGFLAG	0333	74	CTLIST	0744	77	TDEC	1061	79	AVGEXIT
0165	73	BANKSET	0235	66	P35FLAG	0334	74	DNTMGOTO	0746	77	LANDLAT	1061	79	MARKTIME
0165	1476	MPAC2SAV	0236	66	AUTOSEQ	0335	74	DNECADR	0746	77	LAT	1063	79	TEMX
0166	61	ATTCHFLG	0240	66	MANEUFLG	0335	74	DUMPLOC	0750	77	LONG	1063	79	VTEMP
0166	73	PUSHLOC	0241	66	PTV93FLG	0335	74	TMINDEX	0752	77	ALT	1063	80	RADTIME
0167	61	TFFSW	0242	66	TPIMNFLG	0336	74	SUBLIST	0754	77	YV	1064	79	TEMY
0167	73	PRIORITY	0243	66	FULTKFLG	0337	74	DNTMBUFF	0762	77	ZV	1064	80	RADDEL
0170	62	RPCFLAG	0244	67	PCFLAG	0353	74	MKNDX	0770	77	COLREG	1065	79	TEMZ
0171	62	NEWLMFLG	0245	67	S32.1F1	0354	74	MKT2TI	0771	77	RATETEMP	1066	79	PIPCTR
0172	62	NEWIFLG	0246	67	S32.1F2	0356	74	MKCDUY	0771	77	VHFCNT	1067	79	PIPAGE
0173	34	MOONTHIS	0247	67	S32.1F3A	0357	74	MKCDUS	0772	77	TRKMKCNT	1070	79	RN1
0173	62	CMOONFLG	0250	67	S32.1F3B	0360	74	MKCDUZ	0772	186	DL3015	1071	79	UM
0174	35	MOONOTH	0254	67	AZIMFLAG	0361	75	MKCDUT	0773	77	IRETURN1	1076	79	VN1
0174	62	LMOONFLG	0255	67	HAFLAG	0362	75	MKCDUX	0774	77	RATEINDX	1077	79	MARKDATA
0175	62	ADVTRK	0256	67	CSISFLAG	0363	75	AOPOLD	0775	77	OPTION1	1101	79	USTAR
0176	62	UTFLAG	0300	73	COMPNUMB	0365	75	RESTREG	0776	77	OPTION2	1104	79	PIPTIME1
0177	62	SURFFLAG	0300	73	QMAJ	0366	75	NVWORD	0776	182	DL115	1106	79	GDT1/2
0200	62	INFINFLG	0301	73	MARKINDX	0367	75	MARKNV	0776	188	DL413	1107	79	WIXA
0201	62	ORDERSW	0301	73	UPOLDMOD	0370	75	NVSAVE	0777	77	NVWORD1	1110	79	WIXB
0202	63	APSESW	0301	188	DL404	0371	75	CADRFLSH	1000	77	DELAYLOC	1111	79	ZIXA
0203	63	COGAFLAG	0302	73	BESTI	0372	75	CADRMARK	1004	77	TEMPR60	1112	79	ZIXB
0204	63	V96ONFLG	0302	73	UPVERB	0373	75	TEMPFLSH	1005	77	PRIOTIME	1113	79	DELTAX
0205	63	R67FLAG	0302	188	DL405	0374	75	C31FLWRD	1006	77	POINTEX	1113	79	S22UOT
0206	63	360SW	0303	73	BESTJ	0375	75	FAILREG	1006	77	TIME2SAV	1113	79	VHFRANGE
0207	63	SWTOVER	0303	73	UPCOUNT	0375	182	DL118	1007	77	VHFTIME	1113	80	TEMPMM
0210	63	P24FLAG	0303	184	DL201	0375	188	DL426	1010	77	SCALSAVE	1113	80	TRIPA
0211	63	V82EMFLG	0303	188	DL406	0400	75	VAC1USE	1012	77	AUTPOINT	1114	79	GOBL1/2
0212	64	MAXDBFLG	0304	73	CMTMTIME	0401	75	VAC1	1013	78	CPHIX	1114	80	EBUF2

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
1116	80	TEMPVAR	1206	82	XREG	1273	83	DSPFLG	1345	86	HORIZALT	E3,1455	88	PIPASCFY
1116	80	UPSUM	1207	82	YREG	1273	83	EBANKSAV	1347	86	ALTVAR	E3,1456	88	PBIASZ
1122	79	ENTRYVN	1210	82	ZREG	1274	83	MARKFLAG	1350	86	EMDOT	E3,1457	88	PIPASCFZ
1126	80	LIFTTEMP	1211	82	XREGLP	1275	83	EBANKTEM	1351	86	OPTNTYPE	E3,1460	88	NBDX
1127	79	UCL	1212	82	HITEMOUT	1276	83	MARK2PAC	1352	86	AZIMANGL	E3,1461	88	NBDY
1130	80	TEPHEMI	1212	82	YREGLP	1277	83	OLOBT1	1354	87	SWSAMPLE	E3,1462	88	NBDZ
1131	80	PASSCNT	1213	82	LOTEMOUT	1277	83	1/PIPADT	1355	87	R67TIME	E3,1463	89	ADIAX
1133	80	PGNCSALT	1213	82	ZREGLP	1300	83	LONGCADR	1355	87	UTSTARNO	E3,1464	89	ADIAY
1135	80	PADLONG	1214	82	MODREG	1302	83	LONGBASE	1356	87	AUTTEMP	E3,1465	89	ADIAZ
1135	80	TEMPORI	1215	82	DSPLOCK	1304	83	LONGTIME	1357	87	SELFERAS	E3,1466	89	ADSRAX
1137	80	RUPTAGN	1216	82	REQRET	1306	83	REDOCTR	1357	87	SFAIL	E3,1467	89	ADSRAY
1137	81	KEYTEMP2	1217	82	LOADSTAT	1307	83	CPHI	1360	87	ERESTORE	E3,1470	89	ADSRAZ
1140	81	STARCODE	1220	82	CLPASS	1307	83	THETAD	1361	87	SELFRET	E3,1471	89	COMMAND
1141	81	SINCDU	1221	82	NOUT	1307	84	RDOTREF	1362	87	SMODE	E3,1471	89	GCOMP
1141	81	SINCDUY	1222	82	NOUNCADR	1307	182	DL127	1363	87	ALMCADR	E3,1474	89	CDUIND
1141	81	STARALGN	1223	82	MONSAVE	1310	84	CTHETA	1365	87	ERCOUNT	E3,1477	89	GCOMPSW
1143	81	SINCDUZ	1224	82	MONSAVE1	1311	84	CPSI	1366	87	SCOUNT	E3,1500	89	DIFEQCNT
1145	81	SINCDUX	1225	82	MONSAVE2	1311	84	VREF	1371	87	SKEEP1	E3,1501	89	UPSVFLAG
1147	81	COSCDU	1226	82	DSPTAB	1312	84	DESOPTT	1372	87	SKEEP2	E3,1502	89	RRECT
1147	81	COSCDUY	1242	82	NVQTEM	1313	84	DESOPTS	1373	87	SKEEP3	E3,1510	89	VRECT
1151	81	COSCDUZ	1243	82	NVBNKTEM	1314	84	DELV	1374	87	SKEEP4	E3,1516	89	TET
1153	81	COSCDUX	1244	82	VERBSAVE	1314	84	DELVX	1375	87	SKEEP5	E3,1520	89	TDELTAV
1155	81	-PHASE1	1245	82	CADRSTOR	1316	84	DELVY	1376	87	SKEEP6	E3,1526	89	TNUV
1156	81	PHASE1	1246	82	DSPLIST	1320	84	DELVZ	1377	87	SKEEP7	E3,1534	89	RCV
1157	81	-PHASE2	1247	82	EXTVBACT	1322	84	DSRUPTSW	E3,1400	88	LST1	E3,1542	89	VCV
1160	81	PHASE2	1250	82	DSPTEM1	1323	84	OPTIND	E3,1410	88	LST2	E3,1550	89	TC
1161	81	-PHASE3	1250	82	NORMTEM1	1324	84	LGYRO	E3,1432	88	RSBBQ	E3,1552	89	XKEP
1162	81	PHASE3	1253	82	DSPTEM2	1325	84	COMMANDO	E3,1434	88	LONGEXIT	E3,1552	89	XPREV
1163	81	-PHASE4	1254	82	DSPTEMX	1327	84	ZONE	E3,1436	88	PHSNAME1	E3,1554	90	RRECTCSM
1164	81	PHASE4	1255	82	OPTIONX	1330	84	DESOPMOD	E3,1437	88	PHSBB1	E3,1554	90	RRECTHIS
1165	81	-PHASE5	1256	83	OPTIONEV	1331	84	WTOPTION	E3,1440	88	PHSNAME2	E3,1562	90	VRECTCSM
1166	81	PHASE5	1257	83	TBASE1	1332	84	ZOPTCNT	E3,1441	88	PHSBB2	E3,1570	90	TETCSM
1167	81	-PHASE6	1260	83	PHSPRDT1	1333	84	IMODES30	E3,1442	88	PHSNAME3	E3,1570	90	TETTHIS
1170	81	PHASE6	1261	83	TBASE2	1334	85	IMODES33	E3,1443	88	PHSBB3	E3,1572	90	DELTACSM
1171	81	CDUSPOT	1262	83	PHSPRDT2	1334	182	DL128	E3,1444	88	PHSNAME4	E3,1600	90	NUVCSM
1171	81	CDUSPOTY	1263	83	TBASE3	1335	85	IMUCADR	E3,1445	88	PHSBB4	E3,1606	90	RCVCSM
1173	81	CDUSPOTZ	1264	83	MMTEMP	1335	85	MODECADR	E3,1446	88	PHSNAME5	E3,1614	90	VCVCSM
1175	81	CDUSPOTX	1264	83	PHSPRDT3	1336	85	OPTCADR	E3,1447	88	PHSBB5	E3,1622	90	TCCSM
1177	81	MINDEX	1265	83	BASETEMP	1337	85	OPTMODES	E3,1450	88	PHSNAME6	E3,1624	90	XKEPCSM
1200	81	MMNUMBER	1265	83	TBASE4	1340	86	HOLDFLAG	E3,1451	88	PHSBB6	E3,1626	90	RRECTLEM
1201	82	DSPCNT	1266	83	PHSPRDT4	1340	182	DL105	E3,1452	88	PBIASX	E3,1626	90	RRECTOTH
1202	82	DSPCOUNT	1267	83	TBASE5	1340	188	DL425	E3,1452	88	PIPABIAS	E3,1634	90	VRECTLEM
1203	82	DECBRNCH	1270	83	PHSPRDT5	1341	86	CDUCHKWD	E3,1453	88	PIPASCF	E3,1642	90	T-OTHER
1204	82	VERBREG	1271	83	TBASE6	1342	86	RTED1	E3,1453	88	PIPASCFX	E3,1642	90	TETLEM
1205	82	NOUNREG	1272	83	PHSPRDT6	1344	86	OVTHRESH	E3,1454	88	PBIASY	E3,1642	90	TETOTHER

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E3,1644	90	DELTALEM	E4,1540	93	VESQ	E4,1725	94	UNP36	E5,1423	102	POSITON	E5,1514	103	DRIFTI
E3,1652	90	NUVLEM	E4,1546	93	OMEGAES	E4,1725	94	VONE	E5,1424	102	QPLAC	E5,1520	103	VLAUN
E3,1660	90	RCVLEM	E4,1550	93	PBODY	E4,1733	94	BASETIME	E5,1425	102	QPLACE	E5,1522	103	ACCWD
E3,1666	90	VCVLEM	E4,1551	93	ALPHAV	E4,1733	94	UNA36	E5,1426	102	QPLACES	E5,1530	103	POSNV
E3,1674	90	TCLEM	E4,1557	93	BETAV	E4,1733	95	URONE	E5,1427	102	RUN	E5,1532	97	9X9LOC2
E3,1676	90	XKEPLEM	E4,1565	93	PHIV	E4,1733	95	V82FLAGS	E5,1430	102	SYSTSPR2	E5,1532	103	DPIPAY
E3,1700	90	X789	E4,1573	93	PSIV	E4,1734	95	TFF	E5,1431	102	SOUTHDR	E5,1532	105	VACT2
E3,1706	90	TEPHEM	E4,1601	93	FV	E4,1736	95	-TPER	E5,1431	102	TARG1/2	E5,1536	103	DPIPAZ
E3,1706	91	TIMSUBO	E4,1607	93	BETAM	E4,1740	95	THETA(1)	E5,1432	102	TAZEL1	E5,1540	103	ALTIM
E3,1711	90	-AYO	E4,1611	93	H	E4,1742	95	HAPOX	E5,1440	102	TEMPTIME	E5,1540	105	RACT1
E3,1711	90	UNITW	E4,1613	93	IRETURN	E4,1744	95	HPERX	E5,1442	102	TMARK	E5,1541	103	ALTIMS
E3,1713	90	AXO	E4,1614	93	NORMGAM	E4,1744	184	DL202	E5,1444	97	9X9LOC1	E5,1542	103	ALDK
E3,1717	90	R-OTHER	E4,1615	93	VECTAB	E4,1746	95	AOPTIME	E5,1444	102	AINLA	E5,1546	105	T1TOT2
E3,1725	90	V-OTHER	E4,1623	93	BASEOTP	E4,1746	95	RSP-RREC	E5,1444	102	GENPL	E5,1550	105	COUNT3MK
E3,1733	90	REFSMMAT	E4,1637	93	BASEOTV	E4,1750	95	LANDLONG	E5,1444	102	WANGO	E5,1551	105	N90RET
E3,1755	91	UNITR	E4,1637	93	ERADM	E4,1750	95	TCSI2	E5,1444	105	DELVEET1	E5,1552	102	COUNTPL
E3,1755	91	YCSM	E4,1641	93	INCORPEX	E4,1752	95	LANDALT	E5,1446	102	WANGI	E5,1552	105	BURNTMP1
E3,1757	91	YDOTC	E4,1641	96	ENDSYS-4	E4,1754	95	KT	E5,1450	102	TORQNDX	E5,1554	97	S22RL
E3,1761	91	YDOTL	E4,1653	93	BASETHP	E4,1754	96	DTF	E5,1450	102	WANGT	E5,1554	97	XNB1
E3,1763	91	EIMPISEC	E4,1661	93	BASETHV	E4,1754	96	HAPO	E5,1452	102	DRIFTT	E5,1560	103	DELM
E3,1764	91	EFIMP01	E4,1661	93	RPQV	E4,1754	96	NOMTPI	E5,1452	105	RACT2	E5,1560	105	BURNTMP2
E3,1765	91	EFIMP16	E4,1667	93	KEPRTN	E4,1755	96	VC/D	E5,1453	102	COULIMIT	E5,1562	97	YNB1
E3,1766	91	E3J22R2M	E4,1667	93	ORIGEX	E4,1756	95	ANEXIT	E5,1454	102	ALX1S	E5,1566	105	BURNTMP3
E3,1767	91	E32C31RM	E4,1670	93	RPSV	E4,1756	95	QSAVED	E5,1455	102	CMPX1	E5,1570	97	EMATRIX
E3,1770	91	TRUNSF	E4,1676	93	XKEPNEW	E4,1756	96	HPER	E5,1456	102	ALK	E5,1570	97	ZNB1
E3,1771	91	SHAFTSF	E4,1700	93	ALPHAM	E4,1757	95	RTRN	E5,1460	102	THETAX	E5,1570	103	WPLAT1
E4,1400	92	ERASPIP	E4,1702	93	TAU.	E4,1760	95	SUBEXIT	E5,1460	103	THETAX1	E5,1574	105	BURNTMP4
E4,1400	92	WRENDPOS	E4,1704	93	DT/2	E4,1761	96	VONE'	E5,1460	105	TCDH	E5,1576	97	SAVQR52
E4,1400	96	TRANSM1	E4,1706	94	R63TIME	E4,1767	96	HAMDELH	E5,1462	105	TCSI	E5,1577	97	R52BNKSV
E4,1401	92	WRENDVEL	E4,1710	94	EGRESS	E4,1771	96	WRDTIME	E5,1462	186	DL302	E5,1577	103	RESTARPT
E4,1402	92	RMAX	E4,1711	94	HPERMIN	E4,1772	96	MINBLKTM	E5,1464	105	TTPI0	E5,1600	97	AUTOY
E4,1403	92	VMAX	E4,1711	94	RANGE	E4,1773	96	TBEFCOMP	E5,1466	102	THETAN	E5,1600	97	PLANVEC
E4,1404	92	WORBPOS	E4,1711	94	RHOSB	E4,1774	96	BRNBLKTM	E5,1466	103	THETAN1	E5,1602	97	CMYDOT
E4,1405	92	WORBVEL	E4,1711	94	WWPOS	E4,1775	96	MAXWTIME	E5,1472	102	VLAUNS	E5,1604	97	LMYDOT
E4,1406	92	S22WSUBL	E4,1713	94	GAMMASB	E4,1776	96	FINCMPTM	E5,1474	102	WPLATO	E5,1606	97	TSIGHT
E4,1407	92	RPVAR	E4,1713	94	RPADTEM	E4,1777	96	INTVAR	E5,1474	103	FILDELV	E5,1610	97	DVLOS
E4,1411	92	504LM	E4,1713	94	RRATE	E5,1400	97	W	E5,1474	103	FILDELV1	E5,1610	98	STARSAV1
E4,1417	92	EMSALT	E4,1713	94	WWVEL	E5,1400	102	AZIMUTH	E5,1476	103	INTVEC	E5,1610	105	UP1
E4,1421	92	ATIGINC	E4,1713	186	DL303	E5,1402	102	LATITUDE	E5,1476	103	INTVEC1	E5,1616	97	UNRM
E4,1422	96	ALFDK	E4,1715	94	RRATE2	E5,1404	102	ERVECTOR	E5,1500	102	INTY	E5,1616	98	STARSAV2
E4,1423	92	PTIGINC	E4,1715	94	RTHETA	E5,1412	102	LENGTHOT	E5,1502	102	ANGZ	E5,1616	98	US
E4,1425	92	RLS	E4,1715	94	TSTART82	E5,1413	102	LOSVEC	E5,1504	102	INTZ	E5,1616	105	VPASS2
E4,1433	92	TIMEMO	E4,1715	94	WWOPT	E5,1413	102	SXTOPTN	E5,1506	102	ANGY	E5,1624	97	ULOS
E4,1436	92	VECDEM	E4,1717	94	RONE	E5,1421	102	NDXCTR	E5,1510	102	ANGX	E5,1624	105	RPASS2
E4,1532	93	RESQ	E4,1717	94	VPASS36	E5,1422	102	SYSTSPR1	E5,1512	103	DRIFTO	E5,1631	103	GEOSAVED

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E5,1631	103	GEOSAVE1	E5,1664	100	R2VEC	E5,1761	100	TERRLAMB	E6,1450	107	RWORD1	E6,1511	116	COSM
E5,1632	97	ACTCENT	E5,1664	101	HOLDW	E5,1761	184	DL205	E6,1451	107	RWORD2	E6,1512	112	KMPTEMP
E5,1632	103	PREMTRXC	E5,1671	99	XSM	E5,1763	99	MGC	E6,1452	107	PWORD1	E6,1512	116	SINO
E5,1632	103	PREMTRX1	E5,1672	100	TDESIRED	E5,1763	100	DEPREV	E6,1453	107	PWORD2	E6,1513	112	WTEMP
E5,1632	105	DIFFALT	E5,1674	100	GEOMSGN	E5,1763	100	TPREV	E6,1454	107	YWORD1	E6,1513	112	XNDX1
E5,1633	103	LAUNCHAZ	E5,1675	100	UN	E5,1763	184	DL206	E6,1455	107	YWORD2	E6,1513	116	COSO
E5,1633	103	LUNCHAZ1	E5,1677	99	YSM	E5,1765	99	STAR	E6,1456	107	BLAST	E6,1514	112	XNDX2
E5,1634	98	DELVTPI	E5,1703	100	VTARGTAG	E5,1773	99	SAC	E6,1460	107	BLAST1	E6,1514	116	SINOCOSM
E5,1634	98	TDEC2	E5,1704	100	VTARGET	E5,1775	99	PAC	E6,1462	107	BLAST2	E6,1515	112	DELTEMPX
E5,1635	103	NEWAZMTH	E5,1705	99	ZSM	E5,1777	99	QMIN	E6,1464	107	T5PHASE	E6,1515	112	EDOT
E5,1635	103	NEWAZ1	E5,1706	101	ZI	E6,1400	106	WMIDPOS	E6,1465	107	DAPDATR1	E6,1515	112	YNDX
E5,1636	98	DELVTPF	E5,1712	100	RTNAPSE	E6,1401	106	WMIDVEL	E6,1466	107	DAPDATR2	E6,1515	116	COSOCOSM
E5,1637	103	OLDAZMTH	E5,1712	100	RTNLAMB	E6,1402	106	RVAR	E6,1466	182	DL123	E6,1516	108	VARST5
E5,1637	103	OLDAZ1	E5,1712	100	RTNTR	E6,1404	106	RVARMIN	E6,1466	188	DL423	E6,1516	112	ZNDX
E5,1640	98	POSTTPI	E5,1712	100	RTNTT	E6,1407	106	LADPAD	E6,1467	107	IXX	E6,1517	112	AERR
E5,1640	98	T3TOT4	E5,1713	99	XDC	E6,1410	106	LODPAD	E6,1470	107	IAVG	E6,1517	112	DELTEMPY
E5,1641	103	TOLDAZMT	E5,1713	99	XNB	E6,1411	106	ALFAPAD	E6,1471	107	IAVG/TLX	E6,1517	112	RINDEX
E5,1641	103	TOLDAZ1	E5,1713	100	U2	E6,1412	106	P37RANGE	E6,1472	107	LEMMASS	E6,1520	112	EDOTVEL
E5,1642	97	END-W	E5,1721	99	YDC	E6,1413	106	ETDECAY	E6,1473	107	CSMMASS	E6,1520	112	PINDEX
E5,1642	100	DELX	E5,1721	99	YNB	E6,1414	106	EKPRIME	E6,1473	182	DL122	E6,1521	112	DELTEMPZ
E5,1642	101	OMEGAM1	E5,1721	100	MAGVEC2	E6,1416	106	EKTLX/I	E6,1473	188	DL422	E6,1521	112	YINDEX
E5,1643	103	GEOCOMPS	E5,1721	100	R2	E6,1421	106	EREPFRAC	E6,1475	107	WEIGHT/G	E6,1522	108	LASTMASP
E5,1643	103	GEOCOMP1	E5,1723	100	UR1	E6,1423	106	PACTOFF	E6,1476	107	AK	E6,1522	112	AERRVEL
E5,1644	100	DELT	E5,1727	99	ZDC	E6,1424	106	YACTOFF	E6,1476	117	PAXERR	E6,1522	112	NRJETS
E5,1644	103	1SECXT	E5,1727	99	ZNB	E6,1424	181	DL101	E6,1477	107	AK1	E6,1523	112	ADBVEL
E5,1644	103	1SECXT1	E5,1731	100	SNTH	E6,1424	184	DL203	E6,1477	182	DL110	E6,1523	112	NPJETS
E5,1645	103	GTSWTLST	E5,1733	100	CSTH	E6,1425	106	HBN10	E6,1500	107	AK2	E6,1524	112	NYJETS
E5,1645	103	GTSWTLT1	E5,1735	99	CULTRIX	E6,1426	106	HBN11/2	E6,1500	182	DL111	E6,1525	108	OMEGAC
E5,1646	100	URRECT	E5,1735	99	STARAD	E6,1427	106	HBN12	E6,1501	107	RCSFLAGS	E6,1525	108	OMEGAXC
E5,1646	103	ERECTIME	E5,1735	99	VEARTH	E6,1430	106	HBD11/2	E6,1501	182	DL112	E6,1525	108	TVCRCS
E5,1646	103	ERECTIM1	E5,1735	100	1-CSTH	E6,1431	106	HBD12	E6,1502	107	T5TEMP	E6,1525	112	WBODY
E5,1647	103	ERCOMP	E5,1737	100	CSTH-RHO	E6,1432	106	HBN20	E6,1503	108	EDRIVEX	E6,1525	120	ASPS(TM)
E5,1647	103	ERCOMP1	E5,1741	100	P	E6,1433	106	HBN21/2	E6,1504	108	EDRIVEY	E6,1525	182	DL126
E5,1650	101	OMEGAM2	E5,1743	99	VSUN	E6,1434	106	HBN22	E6,1505	108	EDRIVEZ	E6,1527	108	OMEGAYC
E5,1654	100	RCNORM	E5,1743	100	R1A	E6,1435	106	HBD21/2	E6,1506	108	INTTEMP	E6,1527	112	WBODY1
E5,1655	103	GTSOPNDZ	E5,1745	100	VVEC	E6,1436	106	HBD22	E6,1506	108	PHI333	E6,1531	108	OMEGAZC
E5,1655	103	ZERONDX	E5,1751	99	VMOON	E6,1437	107	HBN30	E6,1506	112	SPNDX	E6,1531	112	WBODY2
E5,1655	103	ZERONDX1	E5,1753	100	ECC	E6,1440	107	HBN31/2	E6,1506	116	CALFA	E6,1533	108	OMEGAB
E5,1656	98	TRTEMP	E5,1755	100	RTNPRM	E6,1441	107	HBN32	E6,1507	108	PSI333	E6,1533	108	OMEGAXB
E5,1656	100	RVEC	E5,1756	100	SGNRDOT	E6,1442	107	HBD31/2	E6,1507	112	DPNDX	E6,1533	110	OGARATE
E5,1656	100	R1VEC	E5,1757	99	OGC	E6,1443	107	HBD32	E6,1507	116	SALFA	E6,1533	112	ADOT
E5,1656	101	OMEGAM3	E5,1757	99	SAX	E6,1444	107	MRKRTMP	E6,1510	108	TEMP333	E6,1533	120	XPIPBUF
E5,1656	103	PERFDLAY	E5,1757	100	RDESIRED	E6,1444	107	TEMPDAP	E6,1510	112	KMPAC	E6,1533	182	DL107
E5,1657	98	SRTEMP	E5,1761	99	IGC	E6,1446	107	CNTR	E6,1510	116	SINM	E6,1533	182	DL108
E5,1657	103	ENDSYS-5	E5,1761	100	DELDEP	E6,1447	107	OGAD	E6,1511	108	VARST6	E6,1534	120	YPIPBUF

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E6,1535	108	OMEGAYB	E6,1571	188	DL415	E6,1617	109	DAP2	E6,1643	109	MCDUZDOT	E6,1670	115	AIG/PIP
E6,1535	112	ADOT1	E6,1572	109	ROLLWORD	E6,1617	113	ATTKALMN	E6,1643	114	AMGB7	E6,1671	115	AMG/PIP
E6,1535	120	ZPIPBUF	E6,1572	113	THETADX	E6,1617	116	JNDX	E6,1644	110	TVCEXPHS	E6,1671	118	NEXTIME
E6,1536	120	XOLDBUF	E6,1572	117	QAXERR	E6,1620	113	KMJ	E6,1644	114	AMGB8	E6,1672	110	TMP2
E6,1537	108	OMEGAZB	E6,1572	188	DL416	E6,1620	116	JNDX1	E6,1645	110	OGANOW	E6,1672	115	ROLL/PIP
E6,1537	112	ADOT2	E6,1573	109	TEMREG	E6,1621	109	DAP3	E6,1645	114	CAPSI	E6,1672	118	TTEMP
E6,1537	120	YOLDBUF	E6,1573	113	THETADY	E6,1621	113	KMJ1	E6,1646	110	OGAPAST	E6,1673	115	ALFA/PIP
E6,1540	120	ZOLDBUF	E6,1573	117	RAXERR	E6,1621	117	TON1	E6,1646	114	CDUXD	E6,1673	118	POLYLOC
E6,1541	108	PTMP1	E6,1573	182	DL113	E6,1622	113	KMJ2	E6,1647	110	OGA	E6,1674	110	TMP3
E6,1541	112	MERRORX	E6,1573	182	DL116	E6,1622	117	TIBITS	E6,1647	110	OGAERR	E6,1674	115	BETA/PIP
E6,1543	108	PTMP2	E6,1573	188	DL417	E6,1623	109	PCMD	E6,1650	110	DELOGART	E6,1674	118	BIASTEMP
E6,1543	112	MERRORY	E6,1574	109	TVCDUMMY	E6,1623	113	J/M	E6,1650	114	CDUYD	E6,1675	115	-DELAOG
E6,1545	108	PTMP3	E6,1574	113	THETADZ	E6,1623	117	CM/SAVE	E6,1651	110	SGNRT	E6,1676	110	TMP4
E6,1545	112	MERRORZ	E6,1574	120	Q7	E6,1624	109	YCMD	E6,1652	110	DELOGA	E6,1676	115	-DELAIG
E6,1547	108	PTMP4	E6,1574	182	DL114	E6,1624	113	J/M1	E6,1652	114	CDUZD	E6,1677	115	-DELAMG
E6,1547	112	DFT	E6,1574	182	DL117	E6,1624	117	JETEM2	E6,1653	110	I	E6,1700	110	TMP5
E6,1550	112	DFT1	E6,1574	188	DL418	E6,1624	181	DL102	E6,1654	110	IOGARATE	E6,1700	115	CMDAPMOD
E6,1551	109	PTMP5	E6,1575	109	PERRB	E6,1624	182	DL104	E6,1654	114	SLOPE	E6,1700	118	SATRLRT
E6,1551	112	DFT2	E6,1575	113	DELCDUX	E6,1625	109	T5TVCDT	E6,1655	110	PACTTMP	E6,1701	115	PREL
E6,1552	112	DRHO	E6,1577	109	YERRB	E6,1625	113	J/M2	E6,1655	114	ADB	E6,1701	188	DL401
E6,1553	109	PTMP6	E6,1577	113	DELCDUY	E6,1626	109	KPRIMEDT	E6,1656	114	RMANNDX	E6,1701	188	DL419
E6,1554	112	DRHO1	E6,1601	109	DELPBAR	E6,1626	113	RACFAIL	E6,1657	110	YACTTMP	E6,1702	110	TMP6
E6,1555	109	YTMP1	E6,1601	113	DELCDUZ	E6,1627	113	RBDFAIL	E6,1657	114	PMANNDX	E6,1702	115	QREL
E6,1556	113	DRHO2	E6,1603	109	DELYBAR	E6,1630	109	KTLX/I	E6,1660	114	YMANNDX	E6,1702	118	RPSTART
E6,1557	109	YTMP2	E6,1603	113	DCDU	E6,1630	113	ACORBD	E6,1661	110	CNTRTMP	E6,1702	188	DL402
E6,1560	113	ATTSEC	E6,1603	116	ALFACOM	E6,1631	109	I/CONACC	E6,1661	115	AOG	E6,1702	188	DL420
E6,1561	109	YTMP3	E6,1604	116	BETACOM	E6,1631	113	XTRANS	E6,1661	118	BCDU	E6,1703	115	RREL
E6,1561	113	TAU	E6,1605	109	PDELOFF	E6,1632	109	VARK	E6,1661	118	POLYNUM	E6,1703	118	POLYSTOP
E6,1562	113	TAU1	E6,1605	116	TOFF	E6,1632	113	CH31TEMP	E6,1662	110	DELBRTMP	E6,1703	188	DL403
E6,1563	109	YTMP4	E6,1606	116	TBITS	E6,1633	109	KEPFRAC	E6,1662	115	AIG	E6,1703	188	DL421
E6,1563	113	TAU2	E6,1607	109	YDELOFF	E6,1633	113	CHANTEMP	E6,1663	115	AMG	E6,1704	110	COEFFADR
E6,1564	113	BIAS	E6,1607	116	TON2	E6,1634	109	VCNTR	E6,1664	110	ERRBTMP	E6,1704	115	BETADOT
E6,1565	109	YTMP5	E6,1610	116	T2BITS	E6,1634	113	T5TIME	E6,1664	115	ROLL/180	E6,1704	119	SPOLYARG
E6,1565	113	BIAS1	E6,1611	109	TTMP1	E6,1635	109	TVCPHASE	E6,1664	118	KSPNDX	E6,1705	110	N10
E6,1566	113	BIAS2	E6,1611	110	PHASETMP	E6,1635	113	RHO	E6,1665	115	ALFA/180	E6,1705	115	PHIDOT
E6,1567	109	YTMP6	E6,1611	113	DTHETASM	E6,1636	109	PCDUYPST	E6,1665	118	KDPNDX	E6,1705	119	BOOSTEMP
E6,1567	113	ERRORX	E6,1611	116	OUTTAG	E6,1636	113	RHO1	E6,1666	110	CMDTMP	E6,1706	115	OLDELP
E6,1567	117	VOT/180	E6,1612	116	NOJET	E6,1637	109	PCDUZPST	E6,1666	115	BETA/180	E6,1707	115	OLDELQ
E6,1570	113	ERRORY	E6,1613	109	TTMP2	E6,1637	113	RHO2	E6,1666	118	MFISYM	E6,1710	115	OLDELR
E6,1570	117	-VT/180E	E6,1613	110	RTRNLOC	E6,1640	109	YCDUYPST	E6,1666	118	NCDU	E6,1710	117	VECQTEMP
E6,1570	182	DL124	E6,1613	116	-VT/180	E6,1640	113	AMGB1	E6,1666	118	TMFI	E6,1710	118	BRATE
E6,1570	188	DL414	E6,1614	116	LCX/360	E6,1641	109	YCDUZPST	E6,1666	118	TMIS	E6,1710	118	COFSKEW
E6,1571	109	ROLLFIRE	E6,1615	109	DAP1	E6,1641	113	AMGB4	E6,1666	188	DL411	E6,1710	119	SATRATE
E6,1571	113	ERRORZ	E6,1615	116	XD/360	E6,1642	109	MCDUYDOT	E6,1667	115	AOG/PIP	E6,1711	115	JETAG
E6,1571	182	DL125	E6,1616	116	VSQ/4API	E6,1642	114	AMGB5	E6,1670	110	TMP1	E6,1712	115	TUSED

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E6,1713	115	PAXERR1	E7,1402	188	DL410	E7,1473	122	RT	E7,1557	134	MUSUBC	E7,1631	131	RTEDVD
E6,1714	115	ROLLTM	E7,1404	121	DELVLVC	E7,1473	126	TNIT	E7,1561	126	VPASS3	E7,1633	122	L/D
E6,1714	119	SATSW	E7,1404	121	DELVSLV	E7,1473	133	VACT4	E7,1561	131	UV1/	E7,1633	125	VZC
E6,1714	188	DL407	E7,1412	121	TIG	E7,1475	126	TNITPREV	E7,1561	132	UH/	E7,1633	131	RTEGAM2D
E6,1715	115	ROLLC	E7,1412	132	SPRTETIG	E7,1501	122	UNI	E7,1563	122	UBX/2	E7,1635	122	L/D1
E6,1715	119	BIASAK	E7,1414	121	RTARG	E7,1501	125	BVECTOR	E7,1565	134	MUSUBS	E7,1635	131	RCON
E6,1715	188	DL424	E7,1422	121	DELLT4	E7,1501	125	N49DISP	E7,1567	126	RINIT	E7,1637	122	D
E6,1716	118	CAM	E7,1424	121	ECSTEER	E7,1501	125	S22UMRL	E7,1567	127	VAPREC	E7,1637	127	VPASS4
E6,1716	118	TM	E7,1425	121	DVTOTAL	E7,1501	133	RDOTV	E7,1571	122	UBY/2	E7,1637	127	VTIG
E6,1717	116	ROLLHOLD	E7,1425	121	END-DELV	E7,1502	126	INTIME	E7,1573	134	MUSUBN	E7,1637	131	R(T1)/
E6,1720	116	JETEM	E7,1425	125	DEL	E7,1503	133	VACT1	E7,1575	126	VINIT	E7,1641	122	DLEWD
E6,1720	118	MIS	E7,1425	125	MFI	E7,1504	126	ITCTR	E7,1575	127	RAPREC	E7,1641	125	UCLSTAR
E6,1720	119	SATSCALE	E7,1425	125	MFS	E7,1507	122	UNITV	E7,1577	122	UBZ/2	E7,1643	122	K2ROLL
E6,1722	116	GAMA	E7,1427	121	TGO	E7,1511	133	VPASS1	E7,1603	125	UBARC	E7,1645	122	GOTOADDR
E6,1723	116	GAMDOT	E7,1431	121	DELVREF	E7,1515	122	VEL	E7,1603	126	RTARG1	E7,1645	127	DELVEET3
E6,1724	110	NBRCYCLS	E7,1447	121	NOMTIG	E7,1523	122	TIME/RTO	E7,1603	133	P21CRIG	E7,1645	127	DELVSIN
E6,1724	116	POSEXIT	E7,1447	125	END-KALC	E7,1523	125	DELTAQ	E7,1604	133	P21BASER	E7,1645	127	VGTEMP
E6,1725	110	NBRCYCLP	E7,1447	125	TX789	E7,1525	122	-VREL	E7,1604	134	P29BASER	E7,1645	131	R(T1)
E6,1725	116	CM/GYMDT	E7,1447	126	DELTEEO	E7,1525	125	VARIANCE	E7,1605	122	DTEARGT	E7,1646	122	TEM1B
E6,1726	110	DELVSUM	E7,1451	121	END-SVCR	E7,1530	125	RCLP	E7,1607	122	DIFF	E7,1647	125	USSTAR
E6,1726	116	HEADSUP	E7,1451	121	VEL/C	E7,1533	122	OLDUYA	E7,1611	122	DIFFOLD	E7,1647	131	DT21PR
E6,1727	116	P63FLAG	E7,1451	122	RTINIT	E7,1536	125	GRP2SVQ	E7,1611	125	UBAR1	E7,1650	122	MM
E6,1734	110	DELVSUMP	E7,1451	126	DELEL	E7,1537	125	SVMRKDAT	E7,1611	126	VIPRIME	E7,1651	122	GRAD
E6,1734	111	MASSTMP	E7,1453	126	SECMAX	E7,1537	126	DELVOV	E7,1611	127	VPPREC	E7,1651	131	MAMAX1
E6,1742	118	COF	E7,1455	125	GAMMA	E7,1537	126	RACT3	E7,1612	133	P21BASEV	E7,1652	122	FX
E6,1750	118	SCAXIS	E7,1455	126	XXXALT	E7,1537	133	P21TIME	E7,1612	134	P29BASEV	E7,1653	122	LEQ
E6,1750	118	UTX	E7,1457	121	R53EXIT	E7,1537	134	P29BASET	E7,1613	122	FACTOR	E7,1653	127	DELVSAB
E6,1756	118	POINTVSM	E7,1457	122	RTEAST	E7,1541	122	URH	E7,1615	122	FACT1	E7,1653	131	MAMAX2
E6,1756	118	UTY	E7,1457	125	OMEGA	E7,1541	122	UXA/2	E7,1617	122	FACT2	E7,1655	122	DHOOK
E6,1764	118	AM	E7,1457	126	VG	E7,1541	134	PASSTIME	E7,1617	125	UBAR2	E7,1655	127	TPASS4
E6,1766	118	RAD	E7,1457	128	AVEGDT	E7,1543	134	LONGFOR	E7,1617	126	VTPRIME	E7,1655	131	R(T2)/
E6,1770	119	GENRET	E7,1457	128	DV47TEMP	E7,1545	126	OPTFLAG	E7,1617	127	RPPREC	E7,1655	133	T2TOT3
E6,1770	119	TEMPROLL	E7,1457	133	POSTCSI	E7,1545	126	VACT3	E7,1620	133	P21ALT	E7,1657	122	AHOOKDV
E6,1771	119	SAVBNK	E7,1460	121	MARK2DWN	E7,1545	131	NN2	E7,1621	122	VSQUARE	E7,1657	127	QTEMP
E6,1771	119	TEMPALFA	E7,1461	128	VPAST	E7,1545	133	UNVEC	E7,1622	133	P21VEL	E7,1660	127	TTOGO
E6,1772	119	RATEPTC	E7,1461	133	DELVCSI	E7,1545	134	DELTLONG	E7,1623	122	LAD	E7,1661	123	DVL
E6,1772	119	TEMPBETA	E7,1463	128	TLITMP	E7,1547	122	UYA/2	E7,1624	133	P21GAM	E7,1662	127	TTPI
E6,1773	119	DBPTC	E7,1463	133	DELDV	E7,1547	131	RTENCKEX	E7,1625	122	LOD	E7,1663	123	A1
E6,1773	119	60GENRET	E7,1465	122	RTNORM	E7,1547	134	FUDGE	E7,1625	125	RZC	E7,1663	131	RD
E6,1774	119	R61CNTR	E7,1465	126	VRPREV	E7,1550	131	CONICXI	E7,1625	126	+MGA	E7,1664	127	DELVCTL
E6,1774	119	S61DT	E7,1465	128	T-TO-ADD	E7,1551	131	T2	E7,1627	122	L/DCMINR	E7,1664	127	END-P30S
E6,1775	120	HORISLP	E7,1465	133	GAMPREV	E7,1551	134	MUSUBE	E7,1627	126	COZY4	E7,1664	127	VGBODY
E7,1400	121	LAT(SPL)	E7,1467	133	DVPREV	E7,1553	126	RPASS3	E7,1631	122	KLAT	E7,1664	129	TITER
E7,1402	121	LNG(SPL)	E7,1471	133	HAFPA1	E7,1553	131	UR1/	E7,1631	127	END-IN/M	E7,1664	129	TSTRT
E7,1402	186	DL305	E7,1471	133	POSTCDH	E7,1555	122	UZA/2	E7,1631	127	RTIG	E7,1664	133	CSIALRM

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E7,1665	123	VBARS	E7,1720	128	VGPREV	E7,1746	131	CFPA	4052	140	UPRPTBB	4537	906	V4N06RTE
E7,1665	131	DRCON	E7,1720	128	VGTIG	E7,1747	130	RTMU	4076	107	DPCONFIG	4615	385	VBSP3LD
E7,1666	133	DELVEET2	E7,1721	123	GMAX	E7,1747	134	8NN	4076	366	BIT15/14	4615	714	OCT27/24
E7,1667	123	COSG/2	E7,1721	131	X(T1)	E7,1750	131	PHI2	4076	1204	OCT60000	4751	1200	LIMITS
E7,1667	129	S22TOFF	E7,1722	123	VMAGI	E7,1750	134	S22LOC	4124	174	200MS	4751	1203	-BIT14
E7,1667	131	RPRE,	E7,1722	124	VNOW	E7,1751	130	RTSR1/MU	4124	214	DEC20	4752	48	NJETSBIT
E7,1671	123	VS1	E7,1722	129	MRKBUF1	E7,1751	134	LANDMARK	4125	437	25DECML	4752	50	DRFTBIT
E7,1671	129	S22TPRIM	E7,1722	182	DL1055	E7,1752	131	SPRTEX	4170	366	ENDINST	4752	52	V5N18BT
E7,1671	131	V(T1)/	E7,1723	131	T12	E7,1752	134	HORIZON	4171	1476	VERBMASK	4752	54	MRKIDBIT
E7,1672	127	P40TMP	E7,1723	132	X(T2)PRE	E7,1753	130	CENTANG	4223	378	PINSUPBT	4752	56	DSKYBIT
E7,1673	123	V	E7,1724	122	LEWD	E7,1753	132	VNSTORE	4260	215	DEC34	4752	58	DAP1BIT
E7,1673	129	S22EORM	E7,1724	123	VIO	E7,1753	134	P22DEX	4305	382	ENDBLFF	4752	60	TERMIBIT
E7,1674	128	DELVIMU	E7,1724	124	VGTLI	E7,1754	132	BETA12	4321	1178	FOURTEEN	4752	62	RPQFLBIT
E7,1674	129	MARKDOWN	E7,1724	182	DL1056	E7,1754	134	TRUNION	4321	1178	OCT16	4752	63	SWTOVBIT
E7,1675	123	LATANG	E7,1725	131	DELTAT	E7,1755	133	RPASS1	4322	1200	OCT11	4752	65	PCMANBIT
E7,1675	123	XRNGERR	E7,1725	132	X(T2)	E7,1756	123	VL	4322	1204	NINE	4752	67	S32BIT1
E7,1677	123	RDOT	E7,1726	123	L/DCALC	E7,1756	124	VPRED	4342	214	DEC31	4752	84	TLIMBIT
E7,1677	131	V2(T1)/	E7,1726	123	TTE	E7,1760	123	GAMMAL	4342	1201	OCT37	4752	1081	HALFPR
E7,1677	188	DL408	E7,1726	128	F	E7,1760	123	PREDANG	4344	1116	FBANKMSK	4752	1204	NEGMAX
E7,1701	123	THETAH	E7,1727	131	NN1A	E7,1760	124	GAMMAE1	4344	1204	BANKMASK	4752	1204	VLOADCOD
E7,1701	188	DL409	E7,1730	123	ASKEP	E7,1760	186	DL306	4344	1394	-MAXADRS	4752	1393	SBIT15
E7,1702	128	CSTEER	E7,1730	123	ASPS	E7,1761	123	JJ	4346	201	OCT30000	4752	1477	MKRQST
E7,1703	123	ALP	E7,1730	128	QTEMP1	E7,1762	124	VGDISP	4346	1204	BIT13-14	4753	47	JSWCHBIT
E7,1703	129	RM	E7,1731	123	ASP1	E7,1763	133	LOOPCT	4346	1204	PRIO30	4753	49	STIKBIT
E7,1703	129	S22RTNEX	E7,1731	129	CNT3TEMP	E7,1765	131	NN1	4346	1485	FAILBIT	4753	50	R21BIT
E7,1703	186	DL301	E7,1731	130	PLANVCUT	E7,1765	133	NN	4350	1394	S8BITS	4753	52	GLOKFBIT
E7,1704	128	BDT	E7,1732	123	ASPUP	E7,1767	130	COGA	4351	432	DEC57	4753	54	PRIODBIT
E7,1704	129	Q611	E7,1732	124	TTE1	E7,1767	130	INDEP	4351	448	19DECML	4753	56	RETROBIT
E7,1704	129	STARSAV3	E7,1733	123	ASPDWN	E7,1771	130	EPSILONL	4351	949	NINETEEN	4753	58	DAP2BIT
E7,1705	123	C/DD	E7,1733	130	OLDMKTME	E7,1777	134	END-E7	4351	1204	OCT23	4753	60	ITSWBIT
E7,1705	129	Q6111	E7,1734	123	ASP3	E7,1777	134	WHOCARES	4352	354	OCT21	4753	62	NEWLMBIT
E7,1705	131	DV	E7,1734	124	TTE2	4000	27	EXECF2	4352	432	DEC17	4753	63	P24BIT
E7,1706	129	SAVEPOS	E7,1735	130	AGEOFW	4000	27	FFTAG1	4352	448	17DECML	4753	65	INTFLBIT
E7,1707	123	DD	E7,1736	124	ALTI	4000	27	FFTAG10	4353	385	VBSP1LD	4753	67	S32BIT2
E7,1707	131	V(T2)/	E7,1737	130	UTPIT	4000	27	FFTAG12	4353	1204	OCT25	4753	84	TONISSBT
E7,1711	123	Q2	E7,1740	124	HDOT	4000	27	FFTAG2	4353	1495	UP21	4753	85	PROCDBIT
E7,1712	128	UT	E7,1741	130	UTYAW	4000	27	FFTAG3	4354	1476	LOWLOAD	4753	1092	KTRCS
E7,1713	123	RTGO	E7,1743	130	ELEV	4000	27	FFTAG4	4355	143	TABLNTH	4753	1204	HALF
E7,1713	124	RTGON64	E7,1743	131	BETA1	4000	27	FFTAG7	4355	714	OCT12	4753	1204	POS1/2
E7,1713	124	RTGON67	E7,1743	134	22SUBSCL	4000	27	FFTAG8	4355	996	-ROLL1	4753	1204	PRIO20
E7,1714	129	SAVEVEL	E7,1744	134	CXOFF	4000	27	P30SUBS	4355	1069	CM/SWIC2	4753	1393	SBIT14
E7,1715	123	DNRNGERR	E7,1745	130	RTX1	4000	27	STOPRAT	4355	1092	VSQMIN	4753	1477	REFLSH
E7,1715	131	T1	E7,1745	131	P(T1)	4000	27	WAITF2	4355	1204	TEN	4754	47	MIDFLBIT
E7,1717	123	KAT	E7,1745	134	BKK	4051	140	DWNRPTBB	4463	388	ENDPINBF	4754	49	ERADFBIT
E7,1717	131	PCON	E7,1746	130	RTX2	4052	140	KEYRPTBB	4535	906	V6N81RTE	4754	51	22DSPBIT

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
4754	52	REFSMBIT	4756	62	LMOONBIT	4761	59	EGFLGBIT	4764	48	F2RTEBIT	4766	996	1/TMXFIR
4754	54	NRMIDBIT	4756	64	V94FLBIT	4761	59	KNOWNBIT	4764	50	TRACKBIT	4766	1013	RCSINIT
4754	56	SLOWBIT	4756	66	HDSUPBIT	4761	61	GUNBYBIT	4764	51	AVFLBIT	4766	1204	FOUR
4754	58	ENDSPBIT	4756	84	CAGEBIT	4761	62	SURFFBIT	4764	53	STATEBIT	4766	1393	S+4
4754	58	STRULBIT	4756	85	UPLKFAIL	4761	64	SOURCBIT	4764	55	MRUPTBIT	4766	1393	SBIT3
4754	60	IGNFLBIT	4756	1204	EBANK4	4761	66	P35BIT	4764	57	GRRBKBIT	4766	1477	BLNKR3
4754	62	NEWIBIT	4756	1204	PRIO2	4761	67	AZIMBIT	4764	59	INRLBIT	4767	48	AMOONBIT
4754	64	V82EMBIT	4756	1204	ZK	4761	84	ITNONZBT	4764	63	APSESBIT	4767	50	GUESSBIT
4754	65	REINTBIT	4756	1210	EXECBANK	4761	1393	SBIT8	4764	65	QUITBIT	4767	52	CALC2BIT
4754	67	S32BIT3A	4756	1393	SBIT11	4761	1439	IMUSEFLG	4764	66	MANEUBIT	4767	54	D6OR9BIT
4754	84	IMUFLBIT	4757	47	ZMEASBIT	4761	1477	DCMKPERF	4764	85	IMUZROBT	4767	56	VNBIT
4754	85	PIPZFLBT	4757	49	TARG1BIT	4762	48	RNDVZBIT	4764	85	NOACCALM	4767	57	MGLVFBIT
4754	201	OCT10000	4757	51	SKIPVBIT	4762	49	UPDATBIT	4764	85	OPMD1BIT	4767	60	CM/DSBIT
4754	953	FCORFRAC	4757	53	VFLAGBIT	4762	51	ETPIBIT	4764	1393	SBIT5	4767	61	ATTCHBIT
4754	981	ERRLIM	4757	55	NWAITBIT	4762	51	FIRSTBIT	4764	1477	PERFRQST	4767	63	R67BIT
4754	1204	PRIO1C	4757	56	NEWTBIT	4762	53	CULTBIT	4765	48	CYC61BIT	4767	65	MIDAVBIT
4754	1204	QUARTER	4757	58	GONEBIT	4762	55	PRONVBIT	4765	50	MARKBIT	4767	66	FULTKBIT
4754	1393	SBIT13	4757	60	NDRMSBIT	4762	57	ENGONBIT	4765	52	PFRATBIT	4767	85	DLAYFAIL
4754	1477	2NDPERF	4757	62	ADVTKBIT	4762	59	NOSWBIT	4765	53	INTYBIT	4767	86	DCDUINHT
4755	47	MOONBIT	4757	64	SAVECBIT	4762	62	INFINBIT	4765	55	NRUPTBIT	4767	1204	TWO
4755	49	NOPO1BIT	4757	66	BURNBIT	4762	64	R22CABIT	4765	59	LATSWBIT	4767	1393	S+2
4755	51	P21BIT	4757	84	PIPAFLBT	4762	66	AUTSQBIT	4765	61	UPLOCBIT	4767	1393	SBIT2
4755	52	LUNABIT	4757	85	ZROPTFIN	4762	67	HABIT	4765	63	COGAFBIT	4767	1477	BLNKR2
4755	54	PDSPFBIT	4757	1204	PRIO1	4762	85	ITNON1BT	4765	65	R31FLBIT	4767	1493	UP72
4755	56	V59FLBIT	4757	1393	SBIT10	4762	85	OCDUFBIT	4765	66	PTV93BIT	4770	48	P29BIT
4755	58	CMARMBIT	4760	47	NEEDLBIT	4762	1201	SUPER100	4765	85	IMUFINHT	4770	50	AVEGBIT
4755	60	ASTNBIT	4760	49	TARG2BIT	4762	1393	SBIT7	4765	85	OPMD2BIT	4770	52	NODOBIT
4755	62	CMCONBIT	4760	51	IMPULBIT	4762	1477	PRIODSPY	4765	221	OCT00010	4770	54	DIMCBIT
4755	64	MAXDBBIT	4760	53	POOBIT	4763	48	R53FLBIT	4765	1204	EIGHT	4770	56	XDSPBIT
4755	66	REJCTBIT	4760	55	MRKNVBIT	4763	49	IDLEBIT	4765	1393	SBIT4	4770	57	RENDWBIT
4755	67	S3229T3B	4760	57	DMENFBIT	4763	51	FINALBIT	4765	1477	FLSHRQST	4770	60	GYMD1BIT
4755	84	ICDUFLBT	4760	59	RELVBIT	4763	53	ORBWFBIT	4766	48	FREEFBIT	4770	61	TFFSWBIT
4755	85	DNLKFAIL	4760	61	RVSWBIT	4763	55	PINBRBIT	4766	50	SLOPEBIT	4770	63	360SWBIT
4755	333	BLANKCON	4760	62	UTBIT	4763	57	3AXISBIT	4766	52	P24MKBIT	4770	65	AVEMDBIT
4755	1204	PRIO4	4760	64	VHFRBIT	4763	59	HINDBIT	4766	53	VINTFBIT	4770	67	PCBIT
4755	1393	SBIT12	4760	66	RANGBIT	4763	61	V37FLBIT	4766	56	MKOVBIT	4770	85	ACCFINHT
4755	1477	V99PSTE	4760	84	IMUOPBIT	4763	63	ORDERBIT	4766	57	SOLNSBIT	4770	85	LMPTSTBT
4756	47	NORFBIT	4760	1393	SBIT9	4763	64	N2217BIT	4766	59	.05GBIT	4770	1204	ONE
4756	49	ENG2BIT	4760	1417	SPSCODE	4763	67	CSISBIT	4766	61	VERIFBIT	4770	1393	S+1
4756	51	STEERBIT	4761	47	IMUSEBIT	4763	85	IMUNITBT	4766	63	V96UNBIT	4770	1393	SBIT1
4756	53	P22MKBIT	4761	49	VEHUPBIT	4763	85	NOIMUDAP	4766	65	MID1FBIT	4770	1477	BLNKR1
4756	54	MWAITBIT	4761	51	XDELVBIT	4763	174	OCT40	4766	66	TPIMNBIT	4770	1493	UP71
4756	56	INCORBIT	4761	53	PRECIBIT	4763	214	DEC32	4766	85	ICDUINHT	4771	1394	S-ZERO
4756	58	GMDIFBIT	4761	55	NRMNVBIT	4763	1393	SBIT6	4766	85	ZOPTCS	4772	227	DNLADPOO
4756	60	TIMRBIT	4761	57	COMPTBIT	4763	1477	RETDSPY	4766	981	1/ERRLIM	4772	776	P51ZERO

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
4772	1393	S+ZERO	5011	1442	OCT62	5736	224	NEG7	7701	1048	=-2	01,2074	536	3P13SPT1
4772	1477	DSPONLY	5014	996	+ROLL2	5736	1394	S-7	7701	1394	S-2	01,2077	528	3P15SPT1
4772	1493	UP70	5014	1204	OCT120	5775	168	120MS	7701	1416	MINUS2	01,2102	700	4P2SPT1
4773	205	NUMGRPS	5015	1204	OCT140	5775	1039	TWELVE	7702	1204	MINUS1	01,2110	700	4P4SPT1
4773	776	P51FIVE	5016	365	MONDEL	5775	1439	BITS3&4	7702	1204	NEG1	01,2116	700	4P6SPT1
4773	996	+ROLL1	5016	432	1SECX	5775	1476	PERF4MSK	7702	1394	S-1	01,2124	702	4P3SPT1
4773	1393	S+5	5020	1092	2JETT	6000	27	FFTAG13	7704	390	SHOLTS	01,2127	703	4P5SPT1
4773	1495	UPDTPHAS	5023	907	V5N09RTE	6000	27	FFTAG6	7706	1489	ABORT	01,2132	701	4P7SPT1
4774	370	DSPMSK	5024	1204	EBANK3	6000	27	INTERF3	00,2000	27	DLAYJOB	01,2135	711	4P11SPT1
4774	1204	LOW3	5024	1394	ERASCON6	6043	1416	OCT177	00,2000	27	INTERBO	01,2140	711	4P13SPT1
4774	1393	S+7	5025	1202	7.9SEC	6056	1204	VLOAD*	01,2000	27	EXECB1	01,2143	449	4P15SPT1
4774	1478	OCT7	5026	906	V6N33RTE	6061	1048	=-4	01,2000	27	INTERB1	01,2146	259	4P17SPT1
4775	174	OCT13	5027	458	V6N34	6061	1394	S-4	01,2000	27	RESTART	01,2151	699	4P21SPT1
4775	835	DVTHRUSH	5027	560	V06N34OUT	6211	781	SIGHTSIX	01,2000	27	RC2	01,2154	699	4P23SPT1
4775	1204	NOUTCON	5030	623	V06N49EE	6211	1204	SIX	01,2000	230	PRDTTAB	01,2154	738	4P23SPT2
4776	748	ALRM15	5030	1394	ERASCON3	6211	1393	S+6	01,2001	230	CADRTAB	01,2162	702	4P27SPT1
4776	776	PRFMSTAQ	5031	627	VB06N18	6214	35	DELAYNUM	01,2014	829	1P3SPT1	01,2165	755	4P31SPT1
4776	1178	THIRTEEN	5033	906	V6N60RTE	6214	541	POWDNCOD	01,2017	717	1P5SPT1	01,2170	1077	4P33SPT1
4777	215	CKLSTAUT	5034	906	V6N61RTE	6214	1204	LOW2	01,2022	395	1P7SPT1	01,2173	704	4P35SPT1
4777	589	OCT17	5035	560	V06N88OUT	6214	1204	THREE	01,2025	415	1P11SPT2	01,2176	700	4P37SPT1
4777	887	DEC15	5035	787	VNPLANV	6214	1393	S+3	01,2025	554	1P11SPT3	01,2201	883	4P41SPT1
5000	224	EIGHTEEN	5036	623	V06N89B	6214	1493	UP73	01,2025	555	1P11SPT4	01,2204	808	4P43SPT1
5000	1447	ELRCODE	5036	746	V06N89*	6440	1204	OCT30002	01,2025	559	1P11SPT5	01,2207	808	4P45SPT1
5001	174	OCTHIRTY	5041	35	ERASID	6706	339	DPTEST1	01,2025	572	1P11SPT6	01,2212	869	4P47SPT1
5001	205	DPTINITR	5041	1394	S1OBITS	6710	1131	Q+2	01,2025	834	1P11SPT7	01,2215	538	4P51SPT1
5001	354	OCT30	5045	1204	EBANK6	7617	1204	OCT10001	01,2025	834	1P11SPT8	01,2220	710	4P53SPT1
5001	996	TMINFIRE	5045	1477	WAITMASK	7652	996	T6SCALE	01,2030	558	1P13SPT1	01,2223	801	4P55SPT1
5001	1002	BITS4,5	5050	178	11,12	7656	1204	B12T14	01,2030	834	2P13SPT2	01,2226	740	4P57SPT1
5001	1439	BITS4-5	5050	1394	SBNK03	7660	205	IM30INIR	01,2033	1314	2P3SPT1	01,2231	531	4P61SPT1
5001	1476	PERF2MSK	5053	1408	OCT14000	7661	551	100MST5	01,2036	212	2P5SPT1	01,2234	540	5P2SPT1
5003	214	DEC33	5054	168	OCT15000	7663	145	20MRUPT	01,2036	213	2P5SPT2	01,2234	827	5P2SPT2
5004	214	DEC40	5055	168	33RDMSK	7663	1001	DELTATT2	01,2036	555	2P5SPT3	01,2242	829	5P4SPT1
5004	282	MIXCON	5055	205	IM33INIT	7663	1039	DELATT20	01,2036	1313	2P5SPT4	01,2250	531	5P3SPT16
5004	336	LST2CON	5060	997	SPCOS1	7664	168	OC40010	01,2041	554	2P7SPT1	01,2250	541	5P3SPT1
5004	393	GL+NOATT	5060	997	SPCOS2	7664	1423	OCT40010	01,2044	275	2P11SPT1	01,2250	706	5P3SPT2
5004	1092	2T/TCDU	5061	997	SPSIN1	7664	1477	MARKFMSK	01,2047	588	2P13SPT1	01,2250	717	5P3SPT3
5004	1394	CNTRCON	5061	997	SPSIN2	7667	1477	ITISMASK	01,2052	230	1.2SPOT	01,2250	725	5P3SPT4
5004	1439	BITS4&6	5205	1489	DOALARM	7673	608	FURST3	01,2052	231	2.2SPOT	01,2250	728	5P3SPT5
5004	1476	CADRMASK	5254	140	T3RPTBB	7673	1476	PINMASK	01,2052	529	3P2SPT1	01,2250	728	5P3SPT6
5005	143	OCT54	5313	385	TCTSKOVR	7674	393	NOTBIT12	01,2060	701	3P3SPT1	01,2250	740	5P3SPT7
5006	1028	WL-H/SLP	5323	168	GLOCKOK	7674	1100	MINB12	01,2060	711	3P3SPT2	01,2250	801	5P3SPT8
5010	536	BITS5-6	5516	1476	LINUS	7675	141	74K	01,2063	704	3P5SPT1	01,2250	832	5P3SPT9
5010	1394	SIXTY	5524	250	TERMEXTV	7675	1477	IDLEMASK	01,2063	706	3P5SPT2	01,2250	833	5P3SPT10
5011	215	DEC50	5524	251	ENDEXTVB	7700	333	BRNCHCON	01,2066	537	3P7SPT1	01,2250	833	5P3SPT11
5011	448	1/2SECX	5524	1476	ENDEXT	7700	1394	S-3	01,2071	536	3P11SPT1	01,2250	833	5P3SPT12

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
01,2250	834	5P3SPT13	04,3757	1251	1B1	05,2211	187	CMENTRDL	13,2000	29	ORBITAL2	17,2000	30	DAPS5
01,2250	855	5P3SPT14	04,3761	34	LO6ZEROS	05,2267	189	CMPG22DL	13,2000	29	P24PROG	17,2000	30	DAPS7
01,2250	883	5P3SPT15	04,3761	1206	ZERODP	05,3305	685	1/10FPS	13,2000	29	P76LOC	17,2000	30	EXTVRBS1
01,2253	828	5P5SPT1	04,3761	1240	2DZERO	06,2000	28	CSIPROG	13,2000	29	SR52/1	17,2000	30	P50S3
01,2256	435	5P7SPT1	04,3761	1288	KEPZERO	06,2000	28	IMUCOMP	13,2345	766	LOCSAM	17,3727	1061	ENDSLECT
01,2256	447	5P7SPT2	04,3761	1352	DPZERO	06,2000	28	P6CS7	13,2761	34	ATOPTHIS	20,2000	30	DAPS1
01,2261	438	5P11SPT1	04,3770	215	NEG6	06,2000	28	T4RUP	13,2774	35	MOVATHIS	20,2000	30	DAPS2
01,2264	437	5P13SPT1	04,3772	1305	LOPOSMAX	06,2706	167	ICDUFAIL	13,3034	34	ATOPOTH	20,2000	30	DAPS6
01,2267	446	5P15SPT1	05,2000	28	CONICS4	06,2706	167	IMUFAIL	13,3145	35	THISPREC	20,2000	30	MANUSTUF
01,2272	808	5P17SPT1	05,2000	28	CSITAG1	06,3557	156	-15DEGS	13,3161	34	OTHPREC	20,2000	30	P15LOC
01,2275	439	5P21SPT1	05,2000	28	DAPMASS	07,2000	28	CSIPROG6	13,3735	1353	MUM	20,2000	30	P29TAG2
01,2300	438	5P23SPT1	05,2000	28	DOWNTELM	07,2000	28	KEYRUPT	14,2000	29	P50S	20,2000	30	VAC5LOC
01,2303	446	5P25SPT1	05,2000	28	FRANDRES	07,2000	28	MODESW	14,2000	29	P50S1	21,2000	30	DAPS3
01,2306	446	5P27SPT1	05,2000	28	INTINIT3	07,2000	28	RATEBNK	14,2000	29	RT53	21,2000	30	MYSUBS
01,2311	829	5P31SPT1	05,2001	180	CMPOWEDL	07,2000	28	SXTMARKE	14,2002	743	P54	21,2000	30	P11THREE
01,2314	447	5P33SPT1	05,2043	183	CMCSTA01	07,2073	242	MKRELEAS	14,3414	773	P53	22,2000	30	APOPERI
01,2317	699	6P2SPT1	05,2043	185	CMREND01	07,3133	1439	IMUFIN20	15,2000	29	CDHTAGS	22,2000	30	DAPS8
01,2317	711	6P2SPT2	05,2043	187	CMENTR01	07,3625	1435	IMUBAD	15,2000	29	CONICS1	22,2000	30	KALCMON1
01,2325	528	6P3SPT4	05,2043	189	CMPG2201	10,2000	28	COMGEOM2	15,2000	29	ETRYDAP	22,2000	30	KALCMON2
01,2325	645	6P3SPT1	05,2052	183	CMCSTA02	10,2000	28	CONICS5	15,2000	29	STARTAB	22,2000	30	RTBCODES
01,2325	703	6P3SPT2	05,2052	185	CMREND02	10,2000	28	CSIPROG8	15,3375	1092	1/16A1	22,2000	31	CSIPROG3
01,2325	738	6P3SPT3	05,2052	187	CMENTR02	10,2000	28	DISPLAYS	15,3400	1092	-VMT/180	22,2000	31	P36TAG
01,2330	1497	6P5SPT1	05,2052	189	CMPG2202	10,2000	28	KALCMON3	15,3401	1092	BUFLIM	22,2522	411	ENDDCM
01,2333	711	6P7SPT1	05,2057	183	CMCSTA03	10,2000	28	OPTDRV	15,3411	34	LODP1/4	22,2745	416	LOCSKIRT
01,2336	1068	6P11SPT1	05,2057	185	CMREND03	10,2000	28	PHASETAB	15,3411	671	1DPB2	22,3172	1386	RPAD1
01,2513	1199	SW7	05,2057	188	CMENTR03	10,2000	28	P60S4	15,3411	1352	DP1/4	23,2000	31	COMGEOM1
01,3024	1199	B3TOB4	05,2057	190	CMPG2203	10,2576	1476	GOXDSPF	15,3411	1352	DQUARTER	23,2000	31	CSIPROG4
04,2000	27	CSI/CDH1	05,2061	183	CMCSTA04	10,3315	1476	GOPLAY	15,3414	1288	BEE19	23,2000	31	INFLIGHT
04,2000	27	INTPRET2	05,2061	185	CMREND04	10,3732	1477	OCT700	15,3416	671	LOOPMX	23,2000	31	POWFLITE
04,2000	27	P5CS4	05,2061	188	CMENTR04	11,2000	29	CONICS3	15,3420	1288	BEE22	23,2000	31	POWFLIT1
04,2000	27	VERB37	05,2061	190	CMPG2204	11,2000	29	INTINIT1	15,3431	671	1DPB28	23,2000	31	POWFLIT2
04,2000	28	C13BANK	05,2063	183	CMCSTA05	11,2000	29	INTVEL	15,3432	663	HIGH1	23,2000	31	P20S2
04,2000	28	MIDDGIM	05,2063	186	CMREND05	11,2000	29	ORBITAL	16,2000	30	CSIPROG5	23,2000	31	R30LOC
04,2000	28	P31TAG	05,2072	183	CMCSTA06	11,2000	29	ORBITAL1	16,2000	30	DAPROLL	23,2455	815	300KFT
04,2000	28	P60S6	05,2072	186	CMREND06	11,2000	29	S52/2	16,2000	30	INTVEL1	23,3526	603	UT166
04,2007	373	MODROUTB	05,2072	190	CMPG2206	11,3760	34	3/4LOWDP	16,2000	30	LATLONG1	24,2000	31	CSIPROG7
04,3055	225	FCADRMM1	05,2101	183	CMCSTA07	11,3770	1352	2/3	16,2000	30	P40S1	24,2000	31	P20S5
04,3124	226	PREMM1	05,2101	186	CMREND07	12,2000	29	CONICS	16,2000	30	P50S2	24,2000	31	P40S
04,3173	227	EPREMM1	05,2101	188	CMENTR07	12,2000	29	CSI/CDH2	16,2000	30	RTE2	24,2000	31	RTBCODE1
04,3753	34	LOUNITZ	05,2101	190	CMPG2207	12,2000	29	CSIPROG2	16,2623	733	1SEC2D	24,2000	31	R36CM
04,3755	34	LOUNITY	05,2107	188	CMENTR09	12,2000	29	E/PROG	16,2625	733	5SECOND	25,2000	31	REENTRY
04,3757	34	LODPHALF	05,2113	179	NOMDNLST	12,2000	29	N90TAG	16,2657	768	R54	26,2000	31	EPHEM
04,3757	34	LOUNITX	05,2113	183	CMCSTADL	13,2000	29	E/PROG1	16,3331	963	TVCADDR	26,2000	31	INTPRET1
04,3757	1206	HALFDP	05,2146	185	CMRENDDL	13,2000	29	INTINIT	17,2000	30	CONICS2	26,2000	31	PLANTIN
04,3757	1239	DP1/2	05,2211	179	UPDNLIST	13,2000	29	LATLONG	17,2000	30	DAPS4	26,2000	31	P05P06

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
26,2000	31	P11FOUR	26,3333	938	CSUBT	27,3705	1499	UPCUT	33,2000	33	TESTLEAD	37,2000	33	BODYATT
26,2000	31	P30S1A	26,3333	938	IRTEB1	30,2000	32	LOWSUPER	33,2223	432	3990DEC	37,2000	33	CDHTAG3
26,2000	31	P60S	26,3333	1205	DPHALF	30,2000	32	P20S1	34,2000	33	P11ONE	37,2000	33	P20S
26,2000	31	P60S1	26,3335	34	HI6ZEROS	30,2000	32	P20S6	34,2000	33	P20S3	37,2000	33	RENDEZ
26,2000	31	P60S2	26,3335	887	3ZEROS	30,2000	32	P29TAG1	34,2000	33	P20S4	37,2000	33	SERVICES
26,2000	31	P60S3	26,3335	1260	ZEROO	30,2000	32	P40S3	34,2000	33	TOF-FF1	40,2000	34	PINBALL1
26,2000	31	REENTRY1	26,3335	1386	TFFZEROS	31,2000	32	CDHTAG2	34,3766	938	1RTEB3	40,2000	34	PINSUPER
26,2000	31	26P50S	26,3343	303	NEARLY1	31,2000	32	CSIPROG9	34,3770	791	ONEB4	40,2212	329	ELRCODE1
26,2643	806	SERVCAD2	26,3343	887	BARELY1	31,2000	32	MEASINC3	34,3770	887	C1/16	40,3377	1402	DSPMMJOB
26,3150	889	LATSLOPE	26,3343	889	Q7MIN	31,2000	32	P22S	34,3770	887	1/16TH	40,3636	393	ENDPINS1
26,3325	34	HIDP1/4	26,3343	938	2RTEB1	31,2000	32	RTE3	34,3770	938	1RTEB4	41,2000	34	PINBALL2
26,3325	623	DEC1B2	26,3343	1386	NEARONE	31,2000	32	RT23	35,2000	33	CSI/CDH	41,3001	334	LOADLV1
26,3325	888	VMIN	27,2000	32	CDHTAG	31,2000	32	R31	35,2000	33	INTINIT2	41,3513	334	NVSUBB
26,3325	889	FOURTH	27,2000	32	JANESUB	31,2000	32	R34	35,2000	33	P20S8	42,2000	34	EXTVBS
26,3325	938	1RTEB2	27,2000	32	MANUVER	31,2000	32	V89TAG	35,2000	33	P30S1	42,2000	34	PINBALL3
26,3325	1386	TFF1/4	27,2000	32	MANUVER1	31,2031	35	STATEST	35,2000	33	RTECON1	42,2000	34	SBAND
26,3327	34	HIUNITZ	27,2000	32	MGIM	31,3512	562	V05N7022	35,3171	627	R63COMP	42,2000	34	UPDATE3
26,3327	938	ZERORTE	27,2000	32	P40S5	31,3513	562	V05N7122	35,3573	600	20.48SEC	42,3626	1493	UPPART2
26,3331	34	HIUNITY	27,2000	32	P60S5	32,2000	32	DELRSPL1	35,3575	939	EPC9RTE	42,3750	1495	UPSTORE
26,3333	34	HIDPHALF	27,2000	32	R22S1	32,2000	32	IMUCAL3	36,2000	33	MEASINC	43,2000	34	EXTVERBS
26,3333	34	HIUNITX	27,2000	32	TOF-FF	32,2000	32	P20S9	36,2000	33	MEASINC1	43,2000	34	SELFCHEC
26,3333	35	THISAXIS	27,2000	32	UPDATE2	32,2000	32	RTE	36,2000	33	P15LOC2	43,2002	389	PINTEST
26,3333	448	GEOCONS5	27,2000	32	VECPT	33,2000	33	IMUCAL	36,2000	33	P20S7	43,2164	255	OPTCOARV
26,3333	888	Q19	27,3544	1385	TCDANZIG	33,2000	33	P11TWO	36,2000	33	RTE1	43,2706	271	V74
26,3333	889	HALVE	27,3556	1496	UPPART3	33,2000	33	P15LOC1	36,2000	33	S3435LOC	43,2735	273	GOSHOSUM
26,3333	889	1/CMAX												

SUMMARY OF SYMBOL TABLE LISTINGS

4964 DEFINED NORMALLY

2465 DEFINED BY EQUALS

TOTAL: 7429

MEMORY TYPE & AVAILABILITY DISPLAY

0000 TO 0057	SPECIAL OR NONEXISTENT MEMORY	
0060	AVAILABLE ERASABLE MEMORY	
0061 TO 1377	RESERVED ERASABLE MEMORY	
E3,1400 TO E3,1765	RESERVED SWITCHABLE ERASABLE MEMORY	
E3,1766 TO E3,1777	AVAILABLE SWITCHABLE ERASABLE MEMORY	
E4,1400 TO E4,1550	RESERVED SWITCHABLE ERASABLE MEMORY	
E4,1551 TO E4,1777	AVAILABLE SWITCHABLE ERASABLE MEMORY	
E5,1400 TO E5,1657	RESERVED SWITCHABLE ERASABLE MEMORY	
E5,1660 TO E5,1777	AVAILABLE SWITCHABLE ERASABLE MEMORY	
E6,1400 TO E6,1540	RESERVED SWITCHABLE ERASABLE MEMORY	
E6,1541 TO E6,1777	AVAILABLE SWITCHABLE ERASABLE MEMORY	
E7,1400 TO E7,1425	RESERVED SWITCHABLE ERASABLE MEMORY	
E7,1426 TO E7,1777	AVAILABLE SWITCHABLE ERASABLE MEMORY	
4000 TO 7730	RESERVED FIXED MEMORY	
7731 TO 7777	AVAILABLE FIXED MEMORY	
00,2000 TO 00,3771	RESERVED SWITCHABLE FIXED MEMORY	
00,3772 TO 00,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
01,2000 TO 01,3753	RESERVED SWITCHABLE FIXED MEMORY	
01,3754 TO 01,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
02,2000 TO 03,3777	SPECIAL OR NONEXISTENT MEMORY	
04,2000 TO 05,3776	RESERVED SWITCHABLE FIXED MEMORY	
05,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
06,2000 TO 11,3774	RESERVED SWITCHABLE FIXED MEMORY	
11,3775 TO 11,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
12,2000 TO 12,3774	RESERVED SWITCHABLE FIXED MEMORY	
12,3775 TO 12,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
13,2000 TO 13,3773	RESERVED SWITCHABLE FIXED MEMORY	
13,3774 TO 13,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
14,2000 TO 14,3775	RESERVED SWITCHABLE FIXED MEMORY	
14,3776 TO 14,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
15,2000 TO 17,3774	RESERVED SWITCHABLE FIXED MEMORY	
17,3775 TO 17,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
20,2000 TO 20,3752	RESERVED SWITCHABLE FIXED MEMORY	
20,3753 TO 20,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
21,2000 TO 21,3773	RESERVED SWITCHABLE FIXED MEMORY	
21,3774 TO 21,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
22,2000 TO 22,3775	RESERVED SWITCHABLE FIXED MEMORY	
22,3776 TO 22,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
23,2000 TO 23,3775	RESERVED SWITCHABLE FIXED MEMORY	
23,3776 TO 23,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
24,2000 TO 24,3772	RESERVED SWITCHABLE FIXED MEMORY	
24,3773 TO 24,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
25,2000 TO 25,3773	RESERVED SWITCHABLE FIXED MEMORY	
25,3774 TO 25,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
26,2000 TO 26,3775	RESERVED SWITCHABLE FIXED MEMORY	
26,3776 TO 26,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
27,2000 TO 27,3767	RESERVED SWITCHABLE FIXED MEMORY	
27,3770 TO 27,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
30,2000 TO 30,3771	RESERVED SWITCHABLE FIXED MEMORY	
30,3772 TO 30,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
31,2000 TO 31,3772	RESERVED SWITCHABLE FIXED MEMORY	
31,3773 TO 31,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
32,2000 TO 34,3774	RESERVED SWITCHABLE FIXED MEMORY	
34,3775 TO 34,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
35,2000 TO 35,3772	RESERVED SWITCHABLE FIXED MEMORY	
35,3773 TO 35,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
36,2000 TO 36,3770	RESERVED SWITCHABLE FIXED MEMORY	
36,3771 TO 36,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
37,2000 TO 37,3706	RESERVED SWITCHABLE FIXED MEMORY	
37,3707 TO 37,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
40,2000 TO 41,3560	RESERVED SWITCHABLE FIXED MEMORY	
41,3561 TO 41,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
42,2000 TO 43,3724	RESERVED SWITCHABLE FIXED MEMORY	
43,3725 TO 43,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
44,2000 TO 57,3777	SPECIAL OR NONEXISTENT MEMORY	
60,2000 TO 67,3777	AVAILABLE SWITCHABLE FIXED MEMORY	
70,2000 TO 73,3777	SPECIAL OR NONEXISTENT MEMORY	

ROUTINE:	COUNT	DATA FOR ROUTINE'S LAST REACH:	TOTAL:	CUMUL
	REF	0 LAST TO 27:	0	0
BANKSUM	REF	1 LAST 27 TO 139:	67	67
00/DELAY	REF	1 LAST 1481 TO 1483:	31	98
00/INTER	REF	2 LAST 1152 TO 1192:	969	1082
01/EXEC	REF	1 LAST 1211 TO 1220:	269	1351
01/INTER	REF	1 LAST 1192 TO 1200:	157	1508
01/RSROU	REF	3 LAST 1415 TO 1417:	49	1670
01/RSTAB	REF	1 LAST 230 TO 238:	225	1895
01/R02	REF	1 LAST 1440 TO 1442:	16	1911
01/WAIT	REF	2 LAST 1234 TO 1236:	34	2083
02/ALARM	REF	2 LAST 1488 TO 1492:	41	2153
02/BANK	REF	1 LAST 1104 TO 1108:	73	2226
02/CFAIL	REF	1 LAST 1485 TO 1486:	13	2239
02/CHN13	REF	1 LAST 592 TO 592:	4	2243
02/COMST	REF	1 LAST 432 TO 435:	18	2261
02/DAPAM	REF	1 LAST 1024 TO 1025:	4	2265
02/DAPEX	REF	1 LAST 1037 TO 1038:	1	2266
02/DPROG	REF	1 LAST 1096 TO 1096:	13	2279
02/DSPLA	REF	2 LAST 1485 TO 1485:	18	2322
02/EXEC	REF	2 LAST 1220 TO 1223:	6	2388
02/EXTVB	REF	1 LAST 1484 TO 1485:	4	2392
02/FCONS	REF	1 LAST 1200 TO 1202:	73	2465
02/FLAG	REF	1 LAST 1479 TO 1481:	32	2497
02/IMODE	REF	1 LAST 1417 TO 1418:	5	2502
02/INTER	REF	1 LAST 1207 TO 1208:	32	2534
02/KALC	REF	1 LAST 422 TO 423:	21	2555
02/PHASE	REF	4 LAST 1410 TO 1411:	4	2658
02/PIN	REF	6 LAST 384 TO 390:	110	2872
02/POO	REF	1 LAST 206 TO 206:	17	2889
02/P11	REF	1 LAST 551 TO 552:	2	2891
02/P30	REF	1 LAST 652 TO 653:	24	2915
02/P3272	REF	1 LAST 669 TO 670:	3	2918
02/P3474	REF	1 LAST 487 TO 488:	6	2924
02/RSROU	REF	2 LAST 1414 TO 1415:	17	2941
02/RUPTS	REF	1 LAST 139 TO 141:	51	2992
02/R22	REF	1 LAST 640 TO 640:	5	2997
02/R40	REF	1 LAST 713 TO 713:	6	3003
02/TRAN	REF	1 LAST 1483 TO 1484:	15	3018
02/T4RPT	REF	1 LAST 178 TO 179:	4	3022
02/V37	REF	1 LAST 208 TO 208:	2	3024
02/WAIT	REF	3 LAST 1233 TO 1234:	10	3106
03/ALARM	REF	1 LAST 1487 TO 1488:	16	3122
03/DAPEN	REF	1 LAST 1065 TO 1065:	6	3128
03/FCONS	REF	1 LAST 1202 TO 1205:	31	3159
03/INTER	REF	2 LAST 1120 TO 1152:	721	4085
03/WAIT	REF	1 LAST 1225 TO 1226:	3	4088
04/CHN13	REF	1 LAST 592 TO 595:	26	4114
04/ICONS	REF	1 LAST 1206 TO 1207:	19	4133
04/MIDG	REF	1 LAST 495 TO 498:	41	4174
04/MNKEY	REF	2 LAST 219 TO 219:	10	4376
04/POO	REF	2 LAST 211 TO 212:	20	4403
04/P3136	REF	1 LAST 653 TO 655:	64	4467
04/P3272	REF	1 LAST 661 TO 667:	120	4587
04/P3373	REF	2 LAST 668 TO 669:	28	4670
04/P5153	REF	1 LAST 776 TO 776:	11	4681
04/P79	REF	1 LAST 219 TO 219:	21	4702
04/S61.1	REF	1 LAST 820 TO 821:	18	4720
04/V37	REF	4 LAST 224 TO 227:	90	5110
05/CONIC	REF	1 LAST 1291 TO 1292:	29	5139
05/CSI	REF	1 LAST 671 TO 671:	21	5160
05/DLIST	REF	1 LAST 179 TO 194:	247	5407
05/DPROG	REF	1 LAST 1096 TO 1104:	169	5576
05/MASP	REF	1 LAST 956 TO 961:	91	5667
05/R41	REF	1 LAST 1330 TO 1331:	16	5683
05/START	REF	1 LAST 194 TO 206:	447	6130
06/CSI	REF	2 LAST 685 TO 685:	17	6199
06/ICOMP	REF	1 LAST 308 TO 326:	252	6451
06/T4RPT	REF	2 LAST 142 TO 175:	692	7153
07/CSI	REF	2 LAST 684 TO 685:	8	7209
07/IMODE	REF	1 LAST 1418 TO 1440:	543	7752
07/KEYUP	REF	1 LAST 1445 TO 1459:	73	7825
07/R52	REF	1 LAST 763 TO 766:	63	7888
07/SXTMK	REF	1 LAST 241 TO 249:	288	8176
10/CONIC	REF	1 LAST 1302 TO 1303:	8	8184
10/CSI	REF	1 LAST 680 TO 681:	60	8244
10/DSPLA	REF	3 LAST 1487 TO 1487:	9	8886
10/GEOM	REF	1 LAST 301 TO 303:	35	8921
10/KALC	REF	1 LAST 422 TO 422:	11	8932
10/PHASE	REF	2 LAST 1408 TO 1410:	66	9006
10/SXT	REF	2 LAST 176 TO 177:	28	9050

ROUTINE:	COUNT	DATA FOR ROUTINE'S LAST REACH:			TOTAL:	CUMUL
10/S62.3	REF	1 LAST	821 TO	826:	33	33 9083
10/T4RPT	REF	2 LAST	177 TO	178:	76	116 9199
11/CONIC	REF	1 LAST	1305 TO	1313:	16	16 9215
11/INITV	REF	2 LAST	494 TO	495:	22	167 9382
11/INTIN	REF	1 LAST	1320 TO	1320:	7	7 9389
11/ORBIT	REF	3 LAST	1352 TO	1352:	22	803 10192
11/S52.2	REF	1 LAST	782 TO	783:	25	25 10217
12/CONIC	REF	4 LAST	1303 TO	1305:	43	955 11172
12/CSI	REF	1 LAST	673 TO	673:	23	23 11195
12/P07	REF	1 LAST	426 TO	426:	5	5 11200
12/P3136	REF	1 LAST	657 TO	661:	24	24 11224
12/P3373	REF	1 LAST	668 TO	668:	11	11 11235
13/INTIN	REF	3 LAST	1320 TO	1326:	204	466 11701
13/LT-LG	REF	1 LAST	1236 TO	1241:	129	129 11830
13/ORBIT	REF	1 LAST	1352 TO	1354:	42	42 11872
13/P07	REF	1 LAST	424 TO	426:	27	27 11899
13/P24	REF	1 LAST	565 TO	567:	57	57 11956
13/P7677	REF	1 LAST	513 TO	517:	115	115 12071
13/R41	REF	1 LAST	1328 TO	1330:	89	89 12160
13/S50	REF	1 LAST	766 TO	767:	70	70 12230
14/PICAP	REF	1 LAST	750 TO	754:	125	125 12355
14/PLNET	REF	1 LAST	786 TO	787:	57	57 12412
14/P5153	REF	2 LAST	776 TO	778:	4	109 12521
14/P52	REF	2 LAST	750 TO	750:	14	232 12753
14/R50	REF	2 LAST	787 TO	790:	25	68 12821
14/R51	REF	2 LAST	755 TO	757:	39	93 12914
14/R52	REF	1 LAST	757 TO	763:	263	263 13177
14/R53	REF	1 LAST	780 TO	782:	48	48 13225
14/R55	REF	1 LAST	755 TO	755:	22	22 13247
14/STARS	REF	1 LAST	640 TO	640:	2	2 13249
15/CDH	REF	1 LAST	687 TO	688:	11	11 13260
15/CONIC	REF	1 LAST	1288 TO	1289:	29	29 13289
15/CRS61	REF	1 LAST	602 TO	603:	40	40 13329
15/DAPEN	REF	3 LAST	1070 TO	1096:	653	719 14048
15/STARS	REF	1 LAST	1387 TO	1393:	223	223 14271
16/CSI	REF	1 LAST	677 TO	678:	43	43 14314
16/INITV	REF	1 LAST	493 TO	494:	10	10 14324
16/LT-LG	REF	1 LAST	1241 TO	1243:	30	30 14354
16/P37	REF	1 LAST	919 TO	920:	13	13 14367
16/ROLL	REF	1 LAST	987 TO	997:	276	276 14643

ROUTINE:	COUNT	DATA FOR ROUTINE'S LAST REACH:			TOTAL:	CUMUL
16/RSRT	REF	1 LAST	961 TO	965:	80	80 14723
16/R50	REF	1 LAST	769 TO	770:	22	22 14745
16/R51	REF	1 LAST	770 TO	773:	36	36 14781
16/R54	REF	1 LAST	768 TO	769:	41	41 14822
16/S40.1	REF	1 LAST	723 TO	724:	58	58 14880
16/S40.2	REF	1 LAST	724 TO	725:	15	15 14895
16/S40.8	REF	1 LAST	725 TO	729:	130	130 15025
16/S40.9	REF	1 LAST	729 TO	732:	92	92 15117
16/S50	REF	1 LAST	767 TO	768:	20	20 15137
16/TVCX	REF	1 LAST	951 TO	956:	115	115 15252
16/40.13	REF	1 LAST	732 TO	733:	55	55 15307
17/CONIC	REF	1 LAST	1289 TO	1291:	35	35 15342
17/DAPJS	REF	1 LAST	1038 TO	1060:	549	549 15891
17/EXTVB	REF	2 LAST	275 TO	275:	15	42 15933
17/INIT	REF	1 LAST	943 TO	951:	238	238 16171
17/R51	REF	1 LAST	778 TO	780:	27	27 16198
17/R56	REF	1 LAST	785 TO	786:	46	46 16244
17/T6RPT	REF	1 LAST	1060 TO	1063:	81	81 16325
17/40.13	REF	1 LAST	733 TO	733:	8	8 16333
20/DAPEN	REF	1 LAST	1066 TO	1070:	84	84 16417
20/DAPS	REF	1 LAST	965 TO	987:	496	496 16913
20/KALC	REF	2 LAST	423 TO	423:	7	86 16999
20/P15	REF	1 LAST	528 TO	530:	36	36 17035
20/P29	REF	1 LAST	460 TO	461:	63	63 17098
20/START	REF	1 LAST	223 TO	224:	52	52 17150
20/S40.6	REF	1 LAST	718 TO	720:	70	70 17220
20/S41.2	REF	1 LAST	720 TO	723:	87	87 17307
20/40.14	REF	1 LAST	733 TO	734:	26	26 17333
21/DAPAM	REF	2 LAST	1025 TO	1036:	285	319 17652
21/DAPMS	REF	1 LAST	997 TO	1000:	35	35 17687
21/DAPRC	REF	1 LAST	1000 TO	1024:	615	615 18302
21/P11	REF	1 LAST	550 TO	551:	26	26 18328
21/RCSUP	REF	1 LAST	734 TO	735:	22	22 18350
22/CSI	REF	2 LAST	685 TO	686:	8	106 18456
22/DAPEX	REF	1 LAST	1036 TO	1037:	33	33 18489
22/KALC	REF	6 LAST	423 TO	424:	7	634 19123
22/PERAP	REF	1 LAST	498 TO	504:	98	98 19221
22/P3136	REF	1 LAST	655 TO	657:	42	42 19263
22/RTB	REF	1 LAST	1501 TO	1501:	106	106 19369
23/CSI	REF	1 LAST	675 TO	677:	59	59 19428

ROUTINE:	COUNT	DATA FOR ROUTINE'S LAST REACH:			TOTAL:	CUMUL
23/GECM	REF	2 LAST 303 TO 308:	107	216	19644	
23/INCOR	REF	1 LAST 574 TO 577:	42	42	19686	
23/INFLT	REF	1 LAST 1354 TO 1364:	184	184	19870	
23/POWFL	REF	2 LAST 1370 TO 1374:	24	163	20033	
23/R22	REF	1 LAST 586 TO 587:	75	75	20108	
23/R30	REF	1 LAST 517 TO 524:	216	216	20324	
23/R63	REF	1 LAST 623 TO 626:	2	2	20326	
23/SR30S	REF	1 LAST 524 TO 527:	62	62	20388	
24/CSI	REF	1 LAST 679 TO 680:	57	57	20445	
24/P40	REF	4 LAST 713 TO 716:	42	440	20885	
24/P41	REF	1 LAST 737 TO 740:	63	63	20948	
24/P47	REF	1 LAST 740 TO 743:	55	55	21003	
24/RTB	REF	1 LAST 1501 TO 1501:	15	15	21018	
24/R22	REF	1 LAST 587 TO 588:	15	15	21033	
24/R36	REF	1 LAST 504 TO 507:	68	68	21101	
24/R40	REF	3 LAST 713 TO 713:	16	139	21240	
24/S40.1	REF	1 LAST 694 TO 696:	56	56	21296	
24/S40.2	REF	1 LAST 696 TO 698:	75	75	21371	
24/S40.8	REF	1 LAST 706 TO 706:	33	33	21404	
25/ENTRY	REF	2 LAST 861 TO 887:	841	1017	22421	
26/ENTRY	REF	2 LAST 887 TO 890:	109	150	22571	
26/EPHEM	REF	1 LAST 790 TO 792:	62	62	22633	
26/ICONS	REF	1 LAST 1205 TO 1206:	16	16	22649	
26/LUROT	REF	1 LAST 1243 TO 1252:	199	199	22848	
26/P05	REF	1 LAST 1443 TO 1445:	30	30	22878	
26/P06	REF	1 LAST 1442 TO 1443:	49	49	22927	
26/P11	REF	1 LAST 550 TO 550:	17	17	22944	
26/P30	REF	1 LAST 646 TO 647:	15	15	22959	
26/P61	REF	1 LAST 792 TO 795:	49	49	23008	
26/P62	REF	1 LAST 795 TO 798:	57	57	23065	
26/P63	REF	1 LAST 798 TO 800:	20	20	23085	
26/P64	REF	1 LAST 800 TO 801:	6	6	23091	
26/P65	REF	1 LAST 801 TO 803:	27	27	23118	
26/P66	REF	1 LAST 803 TO 804:	4	4	23122	
26/P67	REF	2 LAST 804 TO 807:	29	39	23161	
26/R52	REF	1 LAST 783 TO 785:	62	62	23223	
26/S61.1	REF	1 LAST 807 TO 812:	68	68	23291	
26/S61.2	REF	1 LAST 812 TO 819:	149	149	23440	
27/CDH	REF	1 LAST 688 TO 693:	94	94	23534	
27/CRS61	REF	1 LAST 607 TO 609:	30	30	23564	
27/INTIN	REF	1 LAST 1331 TO 1332:	47	47	23611	
27/MIDG	REF	1 LAST 495 TO 495:	12	12	23623	
27/MNKEY	REF	1 LAST 219 TO 221:	60	60	23683	
27/P27	REF	1 LAST 1496 TO 1501:	144	144	23827	
27/R22	REF	2 LAST 589 TO 592:	66	112	23939	
27/R60	REF	1 LAST 394 TO 398:	89	89	24028	
27/R62	REF	1 LAST 402 TO 403:	11	11	24039	
27/S41.1	REF	1 LAST 720 TO 720:	16	16	24055	
27/S61.2	REF	1 LAST 819 TO 820:	16	16	24071	
27/TFF	REF	1 LAST 1374 TO 1386:	252	252	24323	
27/VECPT	REF	2 LAST 400 TO 402:	13	130	24453	
30/P22	REF	3 LAST 619 TO 623:	181	804	25257	
30/P29	REF	2 LAST 461 TO 466:	25	107	25364	
30/P40	REF	1 LAST 716 TO 718:	79	79	25443	
30/R22	REF	1 LAST 583 TO 584:	25	25	25468	
31/CDH	REF	1 LAST 686 TO 687:	14	14	25482	
31/CSI	REF	1 LAST 681 TO 683:	41	41	25523	
31/INCOR	REF	1 LAST 1260 TO 1277:	51	51	25574	
31/P22	REF	1 LAST 618 TO 619:	31	31	25605	
31/P23	REF	1 LAST 628 TO 640:	569	569	26174	
31/P37	REF	1 LAST 922 TO 923:	49	49	26223	
31/R3134	REF	2 LAST 512 TO 513:	17	224	26447	
31/R63	REF	1 LAST 626 TO 628:	37	37	26484	
32/COMST	REF	1 LAST 431 TO 431:	15	15	26499	
32/P22	REF	1 LAST 623 TO 623:	8	8	26507	
32/P30	REF	2 LAST 649 TO 652:	49	163	26670	
32/P37	REF	3 LAST 923 TO 938:	443	835	27505	
33/COMST	REF	4 LAST 440 TO 443:	159	310	27815	
33/P01	REF	1 LAST 443 TO 445:	49	49	27864	
33/P02	REF	3 LAST 452 TO 452:	5	296	28160	
33/P03	REF	4 LAST 452 TO 452:	18	158	28318	
33/P11	REF	1 LAST 544 TO 545:	68	68	28386	
33/P15	REF	2 LAST 530 TO 532:	90	141	28527	
34/CRS61	REF	1 LAST 595 TO 600:	212	212	28739	
34/P11	REF	2 LAST 545 TO 550:	138	405	29144	
34/R22	REF	5 LAST 589 TO 589:	20	389	29533	
34/TFF	REF	1 LAST 1386 TO 1387:	12	12	29545	
35/CRS61	REF	3 LAST 605 TO 607:	96	171	29716	
35/CSI	REF	1 LAST 671 TO 672:	10	10	29726	
35/INTIN	REF	1 LAST 1326 TO 1328:	57	57	29783	

ROUTINE:	COUNT	DATA FOR ROUTINE'S LAST REACH:	TOTAL:	CUMUL
35/P30	REF	1 LAST 644 TO 646:	81	81 29864
35/P3474	REF	3 LAST 488 TO 490:	14	389 30253
35/P3575	REF	1 LAST 472 TO 478:	235	235 30488
35/P37	REF	2 LAST 939 TO 940:	14	70 30558
35/P40	REF	1 LAST 735 TO 737:	3	3 30561
36/INCOR	REF	2 LAST 1256 TO 1260:	188	326 30887
36/P15	REF	1 LAST 532 TO 536:	4	4 30891
36/P20	REF	1 LAST 552 TO 561:	304	304 31195
36/P3474	REF	1 LAST 478 TO 479:	10	10 31205
36/P37	REF	1 LAST 897 TO 906:	370	370 31575
37/CDH	REF	1 LAST 683 TO 684:	23	23 31598
37/CMBAT	REF	1 LAST 890 TO 897:	192	192 31790
37/CRS61	REF	2 LAST 603 TO 605:	45	74 31864
37/CSI	REF	1 LAST 670 TO 671:	17	17 31881
37/P21	REF	1 LAST 456 TO 458:	119	119 32000
37/R23	REF	1 LAST 569 TO 571:	40	40 32040
37/R57	REF	1 LAST 567 TO 569:	60	60 32100
37/R61	REF	1 LAST 571 TO 574:	58	58 32158
37/SERV	REF	2 LAST 832 TO 852:	252	381 32539
40/EXTVB	REF	1 LAST 640 TO 644:	95	95 32634
40/PIN	REF	10 LAST 392 TO 394:	51	926 33560
41/PIN	REF	7 LAST 379 TO 380:	56	878 34438
42/NOUNS	REF	1 LAST 282 TO 297:	561	561 34999
42/PIN	REF	2 LAST 362 TO 364:	83	229 35228
42/P27	REF	1 LAST 1493 TO 1496:	103	103 35331
42/R03	REF	1 LAST 265 TO 266:	46	46 35377
42/R05	REF	1 LAST 940 TO 943:	82	82 35459
43/EXTVB	REF	8 LAST 452 TO 456:	28	593 36052
43/FLAG	REF	1 LAST 278 TO 279:	13	13 36065
43/P27	REF	1 LAST 1492 TO 1493:	36	36 36101
43/R33	REF	1 LAST 258 TO 258:	24	24 36125
43/SELF	REF	1 LAST 1393 TO 1402:	312	312 36437

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

4000 TO 4377	PARAGRAPH # 010	ROPE MODULE 1, SIDE A, SENSE LINE SET 5	(WIRES 65- 80)
4400 TO 4777	PARAGRAPH # 011	ROPE MODULE 1, SIDE B, SENSE LINE SET 5	(WIRES 65- 80)
5000 TO 5377	PARAGRAPH # 012	ROPE MODULE 1, SIDE A, SENSE LINE SET 6	(WIRES 81- 96)
5400 TO 5777	PARAGRAPH # 013	ROPE MODULE 1, SIDE B, SENSE LINE SET 6	(WIRES 81- 96)
6000 TO 6377	PARAGRAPH # 014	ROPE MODULE 1, SIDE A, SENSE LINE SET 7	(WIRES 97-112)
6400 TO 6777	PARAGRAPH # 015	ROPE MODULE 1, SIDE B, SENSE LINE SET 7	(WIRES 97-112)
7000 TO 7377	PARAGRAPH # 016	ROPE MODULE 1, SIDE A, SENSE LINE SET 8	(WIRES 113-128)
7400 TO 7777	PARAGRAPH # 017	ROPE MODULE 1, SIDE B, SENSE LINE SET 8	(WIRES 113-128)
00,2000 TO 00,2377	PARAGRAPH # 020	ROPE MODULE 1, SIDE A, SENSE LINE SET 1	(WIRES 1- 16)
00,2400 TO 00,2777	PARAGRAPH # 021	ROPE MODULE 1, SIDE B, SENSE LINE SET 1	(WIRES 1- 16)
00,3000 TO 00,3377	PARAGRAPH # 022	ROPE MODULE 1, SIDE A, SENSE LINE SET 2	(WIRES 17- 32)
00,3400 TO 00,3777	PARAGRAPH # 023	ROPE MODULE 1, SIDE B, SENSE LINE SET 2	(WIRES 17- 32)
01,2000 TO 01,2377	PARAGRAPH # 024	ROPE MODULE 1, SIDE A, SENSE LINE SET 3	(WIRES 33- 48)
01,2400 TO 01,2777	PARAGRAPH # 025	ROPE MODULE 1, SIDE B, SENSE LINE SET 3	(WIRES 33- 48)
01,3000 TO 01,3377	PARAGRAPH # 026	ROPE MODULE 1, SIDE A, SENSE LINE SET 4	(WIRES 49- 64)
01,3400 TO 01,3777	PARAGRAPH # 027	ROPE MODULE 1, SIDE B, SENSE LINE SET 4	(WIRES 49- 64)
04,2000 TO 04,2377	PARAGRAPH # 040	ROPE MODULE 1, SIDE A, SENSE LINE SET 9	(WIRES 129-144)
04,2400 TO 04,2777	PARAGRAPH # 041	ROPE MODULE 1, SIDE B, SENSE LINE SET 9	(WIRES 129-144)
04,3000 TO 04,3377	PARAGRAPH # 042	ROPE MODULE 1, SIDE A, SENSE LINE SET 10	(WIRES 145-160)
04,3400 TO 04,3777	PARAGRAPH # 043	ROPE MODULE 1, SIDE B, SENSE LINE SET 10	(WIRES 145-160)
05,2000 TO 05,2377	PARAGRAPH # 044	ROPE MODULE 1, SIDE A, SENSE LINE SET 11	(WIRES 161-176)
05,2400 TO 05,2777	PARAGRAPH # 045	ROPE MODULE 1, SIDE B, SENSE LINE SET 11	(WIRES 161-176)
05,3000 TO 05,3377	PARAGRAPH # 046	ROPE MODULE 1, SIDE A, SENSE LINE SET 12	(WIRES 177-192)
05,3400 TO 05,3777	PARAGRAPH # 047	ROPE MODULE 1, SIDE B, SENSE LINE SET 12	(WIRES 177-192)
06,2000 TO 06,2377	PARAGRAPH # 050	ROPE MODULE 2, SIDE A, SENSE LINE SET 1	(WIRES 1- 16)
06,2400 TO 06,2777	PARAGRAPH # 051	ROPE MODULE 2, SIDE B, SENSE LINE SET 1	(WIRES 1- 16)
06,3000 TO 06,3377	PARAGRAPH # 052	ROPE MODULE 2, SIDE A, SENSE LINE SET 2	(WIRES 17- 32)
06,3400 TO 06,3777	PARAGRAPH # 053	ROPE MODULE 2, SIDE B, SENSE LINE SET 2	(WIRES 17- 32)
07,2000 TO 07,2377	PARAGRAPH # 054	ROPE MODULE 2, SIDE A, SENSE LINE SET 3	(WIRES 33- 48)
07,2400 TO 07,2777	PARAGRAPH # 055	ROPE MODULE 2, SIDE B, SENSE LINE SET 3	(WIRES 33- 48)
07,3000 TO 07,3377	PARAGRAPH # 056	ROPE MODULE 2, SIDE A, SENSE LINE SET 4	(WIRES 49- 64)
07,3400 TO 07,3777	PARAGRAPH # 057	ROPE MODULE 2, SIDE B, SENSE LINE SET 4	(WIRES 49- 64)
10,2000 TO 10,2377	PARAGRAPH # 060	ROPE MODULE 2, SIDE A, SENSE LINE SET 5	(WIRES 65- 80)
10,2400 TO 10,2777	PARAGRAPH # 061	ROPE MODULE 2, SIDE B, SENSE LINE SET 5	(WIRES 65- 80)
10,3000 TO 10,3377	PARAGRAPH # 062	ROPE MODULE 2, SIDE A, SENSE LINE SET 6	(WIRES 81- 96)
10,3400 TO 10,3777	PARAGRAPH # 063	ROPE MODULE 2, SIDE B, SENSE LINE SET 6	(WIRES 81- 96)
11,2000 TO 11,2377	PARAGRAPH # 064	ROPE MODULE 2, SIDE A, SENSE LINE SET 7	(WIRES 97-112)
11,2400 TO 11,2777	PARAGRAPH # 065	ROPE MODULE 2, SIDE B, SENSE LINE SET 7	(WIRES 97-112)
11,3000 TO 11,3377	PARAGRAPH # 066	ROPE MODULE 2, SIDE A, SENSE LINE SET 8	(WIRES 113-128)
11,3400 TO 11,3777	PARAGRAPH # 067	ROPE MODULE 2, SIDE B, SENSE LINE SET 8	(WIRES 113-128)
12,2000 TO 12,2377	PARAGRAPH # 070	ROPE MODULE 2, SIDE A, SENSE LINE SET 9	(WIRES 129-144)
12,2400 TO 12,2777	PARAGRAPH # 071	ROPE MODULE 2, SIDE B, SENSE LINE SET 9	(WIRES 129-144)
12,3000 TO 12,3377	PARAGRAPH # 072	ROPE MODULE 2, SIDE A, SENSE LINE SET 10	(WIRES 145-160)

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

12,3400	TO 12,3777	PARAGRAPH # 073	ROPE MODULE 2, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
13,2000	TO 13,2377	PARAGRAPH # 074	ROPE MODULE 2, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
13,2400	TO 13,2777	PARAGRAPH # 075	ROPE MODULE 2, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
13,3000	TO 13,3377	PARAGRAPH # 076	ROPE MODULE 2, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
13,3400	TO 13,3777	PARAGRAPH # 077	ROPE MODULE 2, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
14,2000	TO 14,2377	PARAGRAPH # 100	ROPE MODULE 3, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
14,2400	TO 14,2777	PARAGRAPH # 101	ROPE MODULE 3, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
14,3000	TO 14,3377	PARAGRAPH # 102	ROPE MODULE 3, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
14,3400	TO 14,3777	PARAGRAPH # 103	ROPE MODULE 3, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
15,2000	TO 15,2377	PARAGRAPH # 104	ROPE MODULE 3, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
15,2400	TO 15,2777	PARAGRAPH # 105	ROPE MODULE 3, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
15,3000	TO 15,3377	PARAGRAPH # 106	ROPE MODULE 3, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
15,3400	TO 15,3777	PARAGRAPH # 107	ROPE MODULE 3, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
16,2000	TO 16,2377	PARAGRAPH # 110	ROPE MODULE 3, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
16,2400	TO 16,2777	PARAGRAPH # 111	ROPE MODULE 3, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
16,3000	TO 16,3377	PARAGRAPH # 112	ROPE MODULE 3, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
16,3400	TO 16,3777	PARAGRAPH # 113	ROPE MODULE 3, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
17,2000	TO 17,2377	PARAGRAPH # 114	ROPE MODULE 3, SIDE A, SENSE LINE SET 7 (WIRES 97-112)
17,2400	TO 17,2777	PARAGRAPH # 115	ROPE MODULE 3, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
17,3000	TO 17,3377	PARAGRAPH # 116	ROPE MODULE 3, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
17,3400	TO 17,3777	PARAGRAPH # 117	ROPE MODULE 3, SIDE B, SENSE LINE SET 8 (WIRES 113-128)
20,2000	TO 20,2377	PARAGRAPH # 120	ROPE MODULE 3, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
20,2400	TO 20,2777	PARAGRAPH # 121	ROPE MODULE 3, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
20,3000	TO 20,3377	PARAGRAPH # 122	ROPE MODULE 3, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
20,3400	TO 20,3777	PARAGRAPH # 123	ROPE MODULE 3, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
21,2000	TO 21,2377	PARAGRAPH # 124	ROPE MODULE 3, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
21,2400	TO 21,2777	PARAGRAPH # 125	ROPE MODULE 3, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
21,3000	TO 21,3377	PARAGRAPH # 126	ROPE MODULE 3, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
21,3400	TO 21,3777	PARAGRAPH # 127	ROPE MODULE 3, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
22,2000	TO 22,2377	PARAGRAPH # 130	ROPE MODULE 4, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
22,2400	TO 22,2777	PARAGRAPH # 131	ROPE MODULE 4, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
22,3000	TO 22,3377	PARAGRAPH # 132	ROPE MODULE 4, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
22,3400	TO 22,3777	PARAGRAPH # 133	ROPE MODULE 4, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
23,2000	TO 23,2377	PARAGRAPH # 134	ROPE MODULE 4, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
23,2400	TO 23,2777	PARAGRAPH # 135	ROPE MODULE 4, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
23,3000	TO 23,3377	PARAGRAPH # 136	ROPE MODULE 4, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
23,3400	TO 23,3777	PARAGRAPH # 137	ROPE MODULE 4, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
24,2000	TO 24,2377	PARAGRAPH # 140	ROPE MODULE 4, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
24,2400	TO 24,2777	PARAGRAPH # 141	ROPE MODULE 4, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
24,3000	TO 24,3377	PARAGRAPH # 142	ROPE MODULE 4, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
24,3400	TO 24,3777	PARAGRAPH # 143	ROPE MODULE 4, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
25,2000	TO 25,2377	PARAGRAPH # 144	ROPE MODULE 4, SIDE A, SENSE LINE SET 7 (WIRES 97-112)
25,2400	TO 25,2777	PARAGRAPH # 145	ROPE MODULE 4, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
25,3000	TO 25,3377	PARAGRAPH # 146	ROPE MODULE 4, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
25,3400	TO 25,3777	PARAGRAPH # 147	ROPE MODULE 4, SIDE B, SENSE LINE SET 8 (WIRES 113-128)

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

26,2000	TO 26,2377	PARAGRAPH # 150	ROPE MODULE 4, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
26,2400	TO 26,2777	PARAGRAPH # 151	ROPE MODULE 4, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
26,3000	TO 26,3377	PARAGRAPH # 152	ROPE MODULE 4, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
26,3400	TO 26,3777	PARAGRAPH # 153	ROPE MODULE 4, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
27,2000	TO 27,2377	PARAGRAPH # 154	ROPE MODULE 4, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
27,2400	TO 27,2777	PARAGRAPH # 155	ROPE MODULE 4, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
27,3000	TO 27,3377	PARAGRAPH # 156	ROPE MODULE 4, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
27,3400	TO 27,3777	PARAGRAPH # 157	ROPE MODULE 4, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
30,2000	TO 30,2377	PARAGRAPH # 160	ROPE MODULE 5, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
30,2400	TO 30,2777	PARAGRAPH # 161	ROPE MODULE 5, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
30,3000	TO 30,3377	PARAGRAPH # 162	ROPE MODULE 5, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
30,3400	TO 30,3777	PARAGRAPH # 163	ROPE MODULE 5, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
31,2000	TO 31,2377	PARAGRAPH # 164	ROPE MODULE 5, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
31,2400	TO 31,2777	PARAGRAPH # 165	ROPE MODULE 5, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
31,3000	TO 31,3377	PARAGRAPH # 166	ROPE MODULE 5, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
31,3400	TO 31,3777	PARAGRAPH # 167	ROPE MODULE 5, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
32,2000	TO 32,2377	PARAGRAPH # 170	ROPE MODULE 5, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
32,2400	TO 32,2777	PARAGRAPH # 171	ROPE MODULE 5, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
32,3000	TO 32,3377	PARAGRAPH # 172	ROPE MODULE 5, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
32,3400	TO 32,3777	PARAGRAPH # 173	ROPE MODULE 5, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
33,2000	TO 33,2377	PARAGRAPH # 174	ROPE MODULE 5, SIDE A, SENSE LINE SET 7 (WIRES 97-112)
33,2400	TO 33,2777	PARAGRAPH # 175	ROPE MODULE 5, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
33,3000	TO 33,3377	PARAGRAPH # 176	ROPE MODULE 5, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
33,3400	TO 33,3777	PARAGRAPH # 177	ROPE MODULE 5, SIDE B, SENSE LINE SET 8 (WIRES 113-128)
34,2000	TO 34,2377	PARAGRAPH # 200	ROPE MODULE 5, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
34,2400	TO 34,2777	PARAGRAPH # 201	ROPE MODULE 5, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
34,3000	TO 34,3377	PARAGRAPH # 202	ROPE MODULE 5, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
34,3400	TO 34,3777	PARAGRAPH # 203	ROPE MODULE 5, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
35,2000	TO 35,2377	PARAGRAPH # 204	ROPE MODULE 5, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
35,2400	TO 35,2777	PARAGRAPH # 205	ROPE MODULE 5, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
35,3000	TO 35,3377	PARAGRAPH # 206	ROPE MODULE 5, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
35,3400	TO 35,3777	PARAGRAPH # 207	ROPE MODULE 5, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
36,2000	TO 36,2377	PARAGRAPH # 210	ROPE MODULE 6, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
36,2400	TO 36,2777	PARAGRAPH # 211	ROPE MODULE 6, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
36,3000	TO 36,3377	PARAGRAPH # 212	ROPE MODULE 6, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
36,3400	TO 36,3777	PARAGRAPH # 213	ROPE MODULE 6, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
37,2000	TO 37,2377	PARAGRAPH # 214	ROPE MODULE 6, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
37,2400	TO 37,2777	PARAGRAPH # 215	ROPE MODULE 6, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
37,3000	TO 37,3377	PARAGRAPH # 216	ROPE MODULE 6, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
37,3400	TO 37,3777	PARAGRAPH # 217	ROPE MODULE 6, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
40,2000	TO 40,2377	PARAGRAPH # 220	ROPE MODULE 6, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
40,2400	TO 40,2777	PARAGRAPH # 221	ROPE MODULE 6, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
40,3000	TO 40,3377	PARAGRAPH # 222	ROPE MODULE 6, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
40,3400	TO 40,3777	PARAGRAPH # 223	ROPE MODULE 6, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
41,2000	TO 41,2377	PARAGRAPH # 224	ROPE MODULE 6, SIDE A, SENSE LINE SET 7 (WIRES 97-112)

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

41,2400	TO 41,2777	PARAGRAPH # 225	ROPE MODULE 6, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
41,3000	TO 41,3377	PARAGRAPH # 226	ROPE MODULE 6, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
41,3400	TO 41,3777	PARAGRAPH # 227	ROPE MODULE 6, SIDE B, SENSE LINE SET 8 (WIRES 113-128)
42,2000	TO 42,2377	PARAGRAPH # 230	ROPE MODULE 6, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
42,2400	TO 42,2777	PARAGRAPH # 231	ROPE MODULE 6, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
42,3000	TO 42,3377	PARAGRAPH # 232	ROPE MODULE 6, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
42,3400	TO 42,3777	PARAGRAPH # 233	ROPE MODULE 6, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
43,2000	TO 43,2377	PARAGRAPH # 234	ROPE MODULE 6, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
43,2400	TO 43,2777	PARAGRAPH # 235	ROPE MODULE 6, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
43,3000	TO 43,3377	PARAGRAPH # 236	ROPE MODULE 6, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
43,3400	TO 43,3777	PARAGRAPH # 237	ROPE MODULE 6, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

OCTAL LISTING FOR PARAGRAPH # 010, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

4000	00004 0	34051 1	56006 1	12563 1	52011 0	00006 1	30111 0	52006 0
4010	52011 0	40030 0	65011 1	14056 1	52011 0	35254 1	56006 1	13362 1
4020	52011 0	34054 1	56006 1	12000 1	52011 0	34052 1	56006 1	13666 0
4030	52011 0	34052 1	56006 1	12105 0	52011 0	34052 1	56006 1	13710 0
4040	52011 0	34051 1	56006 1	14621 1	52011 0	34053 0	56006 1	12536 1
4050	50017 1	C: 12063 1	C: 16067 1	C: 56067 0	C: 14062 0	C: 04060 0	00006 1	65327 1
4060	00006 1	30113 1	52006 0	C: 04025 1	C: 10003 0	C: 14031 0	C: 20033 0	C: 24017 1
4070	C: 30036 1	C: 34034 1	C: 40023 1	C: 44035 1	C: 50037 0	C: 54000 0	C: 60000 1	44761 1
4100	00006 1	03012 1	00002 0	05561 0	C: 00236 0	05402 1	C: 05024 1	C: 13000 0
4110	04655 0	C: 10000 0	34762 0	70106 1	00006 1	16711 1	05402 1	C: 05024 1
4120	C: 13000 0	34754 0	56004 0	01012 0	C: 00024 1	C: 00031 0	00004 0	54001 1
4130	50002 0	30000 1	24002 0	60000 1	54061 1	10001 1	14145 1	14145 1
4140	24000 1	54001 1	40025 1	50061 0	55255 0	40001 1	50061 0	53154 1
4150	15642 0	34171 1	71225 1	00006 1	14156 0	04157 0	31223 0	54023 1
4160	30023 0	04636 0	C: 62336 0	34772 1	55216 1	31225 0	04264 0	04170 0
4170	05205 0	C: 37600 0	C: 00034 0	04362 1	41244 0	55216 1	04636 0	C: 62336 0
4200	04655 0	C: 62000 0	22007 0	54123 0	23242 1	22002 0	04226 0	23242 1
4210	23225 0	04235 1	34223 0	56006 1	00006 1	04007 1	55243 1	34223 0
4220	00006 1	01007 1	03513 0	C: 62102 0	53243 1	05214 0	34753 1	71224 0
4230	61215 0	10000 0	00001 0	24001 0	00002 0	34752 0	55224 0	00002 0
4240	11245 1	04245 0	11246 1	04245 0	00002 0	05726 1	C: 21206 0	34223 0
4250	00006 1	01007 1	34260 1	55216 1	55204 1	04261 0	04655 0	C: 61307 1
4260	C: 00042 1	44351 0	55202 1	00002 0	74774 0	54123 0	22002 0	04226 0
4270	10123 0	14273 1	00001 0	34304 1	56006 1	00006 1	04007 1	52131 0
4300	34223 0	00006 1	01007 1	03351 0	C: 60102 1	55222 0	54003 0	74350 1
4310	65024 1	54145 0	00002 0	31222 1	14306 1	54003 0	74350 1	65024 1
4320	00002 0	C: 00016 0	C: 00011 1	C: 00004 0	54020 1	40020 1	40020 1	40020 1
4330	40020 1	56020 0	00002 0	54022 0	40022 0	40022 0	40022 0	40022 0
4340	56022 1	00002 0	C: 00037 0	C: 01740 0	C: 76000 0	05135 0	C: 30000 1	C: 03777 0
4350	C: 00377 1	C: 00023 0	C: 00021 1	C: 00025 0	C: 00026 0	C: 00012 1	34764 0	14363 1
4360	34763 1	14363 1	34762 0	00006 1	05011 1	00002 0	00006 1	30025 0
4370	52014 0	00002 0	00006 1	30156 0	20156 1	60154 1	26154 0	54007 1

OCTAL LISTING FOR PARAGRAPH # 011, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

4400	00002 0	54162 0	00002 0	54135 1	10000 0	30135 0	17257 1	14405 0
4410	44772 0	54154 0	54155 1	54156 1	00002 0	44766 0	14420 1	44763 0
4420	00006 1	03011 1	00002 0	50000 1	34063 0	74342 1	54124 1	31202 0
4430	54143 0	00002 0	56002 0	54144 1	44753 0	00004 0	71224 0	55224 0
4440	11246 1	04443 0	04446 0	34772 1	57246 0	05167 1	00003 1	44764 1
4450	00006 1	03011 1	34772 1	55215 1	00144 0	56002 0	54144 1	11246 1
4460	04462 0	04446 0	14452 1	34772 1	55575 0	55576 0	55525 0	55526 0
4470	55564 0	44752 1	71501 0	55501 0	34772 1	55577 1	55600 1	55601 0
4500	55602 0	55527 1	55530 1	55531 0	55532 0	55565 1	55566 1	00002 0
4510	00004 0	00006 1	00004 0	54001 1	00006 1	06004 0	00006 1	14523 0
4520	00006 1	00004 0	54001 1	44750 0	60001 0	00006 1	14511 1	00006 1
4530	00003 1	00002 0	C: 01445 0	C: 01467 0	C: 01472 1	C: 01521 0	C: 04055 0	C: 01006 0
4540	C: 02000 0	C: 42066 1	34754 0	56004 0	54071 0	13251 0	00006 1	34552 1
4550	15214 1	C: 02641 0	C: 66107 1	00006 1	23760 1	05561 0	C: 00050 1	04606 0
4560	34754 0	55424 0	34756 1	54003 0	01760 1	00006 1	23760 1	05547 1
4570	C: 00050 1	01760 1	00006 1	23760 1	05547 1	C: 00031 0	05547 1	C: 00027 1
4600	05561 0	C: 00244 0	01760 1	C: 01413 0	C: 01415 0	C: 01513 1	35046 0	56003 1
4610	00002 0	35045 0	56003 1	00002 0	C: 00000 1	C: 00027 1	C: 77750 0	C: 00000 1
4620	C: 01224 1	54016 1	00006 1	22012 1	34762 0	00006 1	02013 1	10000 0
4630	00334 0	04542 0	34762 0	00006 1	05013 0	00334 0	52134 0	50002 0
4640	30000 1	24002 0	54001 1	22004 0	75041 0	56002 0	52134 0	50002 0
4650	02000 0	56134 1	56004 0	56134 1	00133 0	56002 0	50001 1	30000 1
4660	54004 1	75041 0	56002 0	50002 0	12000 1	35041 1	70133 1	60134 1
4670	00002 0	54135 1	56004 0	00006 1	04007 1	56135 0	75041 0	56001 0
4700	00004 0	00006 1	01007 1	50001 0	32000 0	56135 0	00006 1	01007 1
4710	00003 1	54004 1	30135 0	00002 0	52073 1	50002 0	30001 1	24002 0
4720	54001 1	22004 0	75041 0	56002 0	52073 1	50002 0	02000 0	56073 0
4730	56004 0	56073 0	00072 1	54164 0	34761 0	54023 1	30006 1	54165 1
4740	50002 0	30000 1	54004 1	75041 0	56002 0	56164 1	14663 1	C: 37777 1
4750	C: 37777 1	C: 57777 1	C: 40000 0	C: 20000 0	C: 10000 0	C: 04000 0	C: 02000 0	C: 01000 0
4760	C: 00400 0	C: 00200 0	C: 00100 0	C: 00040 0	C: 00020 0	C: 00010 0	C: 00004 0	C: 00002 0
4770	C: 00001 0	C: 77777 0	C: 00000 1	C: 00005 1	C: 00007 0	C: 00013 0	C: 00015 0	C: 00017 1

OCTAL LISTING FOR PARAGRAPH # 012, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

5000	C: 00022 1	C: 00030 1	C: 00032 0	C: 00041 1	C: 00050 1	C: 00054 0	C: 00055 1	C: 00056 1
5010	C: 00060 1	C: 00062 0	C: 00075 0	C: 00110 1	C: 00120 1	C: 00140 1	C: 00144 0	C: 00310 0
5020	C: 00620 0	C: 00777 0	C: 01124 1	C: 01211 1	C: 01400 1	C: 01426 0	C: 01441 1	C: 01442 1
5030	C: 01461 0	C: 01422 1	C: 01451 0	C: 01474 1	C: 01475 0	C: 01530 0	C: 01531 1	C: 01532 1
5040	C: 01535 0	C: 01777 1	C: 02177 1	C: 02400 1	C: 02600 0	C: 03000 1	C: 03400 0	C: 05000 1
5050	C: 06000 1	C: 07000 0	C: 13000 0	C: 14000 1	C: 15000 0	C: 16000 0	C: 17770 1	C: 21000 1
5060	64753 1	54742 1	15064 1	40742 1	60000 1	54742 1	15077 0	56742 0
5070	50742 0	64751 0	40000 0	60742 0	54742 1	15077 0	15115 0	00006 1
5100	70742 1	54743 0	00006 1	75022 0	67672 0	00006 1	70743 0	67653 0
5110	00006 1	70742 1	20001 1	54742 1	00002 0	50000 1	44751 1	00002 0
5120	34346 1	00004 0	65213 1	54063 0	00006 1	50002 0	30001 0	52066 0
5130	34756 1	56004 0	54061 1	12620 0	34753 1	00004 0	54063 0	00006 1
5140	50002 0	30001 0	52066 0	34756 1	56004 0	12576 0	56002 0	67701 0
5150	56002 0	15142 1	22002 0	34756 1	56006 1	12677 1	40164 0	54001 1
5160	34756 1	54006 0	12676 0	54164 0	34756 1	54004 1	12767 1	00004 0
5170	54065 0	44767 1	26002 1	34756 1	56004 0	13014 0	00004 0	54063 0
5200	34756 1	56006 1	54165 1	30002 0	13063 0	34756 1	54004 1	13074 0
5210	30061 0	54004 1	16710 0	C: 00110 1	56001 0	00006 1	01007 1	54006 0
5220	00001 0	C: 77677 1	34770 0	00004 0	54001 1	34750 1	26002 1	30006 1
5230	00006 1	04007 1	56001 0	00004 0	00006 1	65247 0	56002 0	54061 1
5240	00006 1	50061 0	30001 0	54063 0	35254 1	56006 1	13213 0	05726 1
5250	C: 21204 1	52062 1	64767 0	52006 0	C: 02063 0	50002 0	30000 1	24002 0
5260	00006 1	65247 0	56002 0	54063 0	30006 1	00006 1	04007 1	54001 1
5270	35273 1	54061 1	15244 1	15312 0	C: 72501 0	C: 73714 1	30076 0	74752 1
5300	00006 1	15314 0	11335 1	17703 0	15307 1	17703 0	17703 0	37657 1
5310	05121 0	C: 03561 0	C: 14063 1	05314 1	11137 1	35254 1	54006 0	13367 1
5320	30016 0	00006 1	01007 1	00006 1	22012 1	30016 0	56006 1	52011 0
5330	00003 1	50017 1	53305 1	00006 1	50002 0	30001 0	53301 0	00006 1
5340	35343 0	52006 0	C: 03425 1	C: 02063 0	50002 0	30000 1	24002 0	55214 0
5350	35353 1	22006 1	14660 1	C: 20463 1	50002 0	40000 0	61214 1	00006 1
5360	16710 0	16706 1	00004 0	50002 0	30000 1	24002 0	54072 0	74774 0
5370	60000 1	54071 0	30072 1	75056 0	00006 1	74755 0	56072 1	74752 1

OCTAL LISTING FOR PARAGRAPH # 013, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
5400    54066 0   15405 1   00004 0   34770 0     54066 0     50002 0     30000 1   24002 0
5410    54065 0   00006 1   35415 1   52006 0   C: 02473 0   C: 20063 0   22073 0   22006 1
5420    22073 0   75053 0   10000 0   15464 0     30062 0     74762 1     10000 0   15451 0
5430    50061 0   31256 1   54070 1   30062 0     74761 1     10000 0     15455 1   30002 0

5440    54063 0   30006 1   00006 1   04007 1     54064 1     35450 0     22073 0   52006 0
5450  C: 02561 1   50002 0   30000 1   24002 0     15432 0     00006 1     50002 0   30001 0
5460    52064 1   34767 0   26002 1   15445 0     74755 0     10000 0     15451 0   15430 1
5470    22706 0   22006 1   50000 1   30001 0     22006 1     22706 0     13542 0   22706 0

5500    22006 1   22706 0   00006 1   50000 1     30001 0     22706 0     22006 1   22706 0
5510    13650 0   34772 1   54032 1   54033 0     54034 1     00002 0     54162 0   40160 1
5520    70162 0   50161 1   26160 1   00002 0     05527 1     04655 0   C: 21643 0   34772 1
5530    55247 0   44770 1   70100 1   54100 1     00002 0     56001 0     35545 0   15542 0

5540    56001 0   35546 0   24002 0   22155 0     14642 1   C: 20732 0   C: 20735 1   30002 0
5550    05565 1   40000 0   00006 1   04001 1     50061 0     54074 0     22063 1   00003 1
5560    00001 0   30002 0   05565 1   70001 1     15554 1     64770 0     00004 0   54063 0
5570    34777 1   54061 1   50063 1   27777 0     54001 1     34772 1     00006 1   10061 1

5600    52062 1   50061 0   30074 1   54001 1     50062 0     44752 1     00002 0   00004 0
5610    54061 1   50002 0   60000 1   50000 1     30000 1     54001 1     30061 0   50002 0
5620    60001 0   50000 1   22000 1   10061 1     15610 1     16710 0     44764 1   71247 0
5630    55247 0   05205 0   00004 0   47670 0     71241 0     64752 0     55241 0   41337 0

5640    74762 1   27337 0   00003 1   00002 0     00004 0     41241 0     77670 0   27241 0
5650    15642 0   10000 0   24002 0   00002 0     54001 1     30374 1     74346 0   10000 0
5660    15667 1   00006 1   00031 0   70001 1     00006 1     16711 1     16706 1   30374 1
5670    15663 0   00004 0   30002 0   55363 1     50002 0     30000 1     54001 1   30006 1

5700    00006 1   04007 1   55364 0   30002 0     54061 1     10375 1     15712 1   30001 0
5710    54375 1   15716 0   10376 1   15716 0     30001 0     54376 1     22377 1   41241 0
5720    77716 1   27241 0   56061 0   00003 1     50000 1     00001 0     00004 0   30002 0
5730    55363 1   04636 0 C: 40000 0   51363 0     30000 1     05676 0   C: 77770 1   34763 1

5740    70103 1   10000 0   07717 1   44753 0     71247 0     10000 0     17717 0   05561 0
5750  C: 00067 0   05561 0 C: 00236 0   05561 0   C: 00230 0   05561 0   C: 00176 1   05561 0
5760  C: 00010 0   05561 0 C: 00031 0   05561 0   C: 00054 0   04636 0   C: 12536 1   07720 0
5770    00004 0   54001 1   30002 0   55363 1     05677 1   C: 00014 1     01363 0   CKSM 05072 1
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OCTAL LISTING FOR PARAGRAPH # 014, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

6000	30007 0	00006 1	01006 0	00006 1	01005 0	00002 0	00003 1	00006 1
6010	22164 1	30006 1	54165 1	74752 1	54115 0	54023 1	16037 1	22006 1
6020	16011 0	00006 1	50116 1	30001 0	52155 1	34772 1	54156 1	54163 1
6030	30165 0	54006 0	10023 1	16046 1	10067 1	15156 1	24164 1	50164 1
6040	30000 1	10000 0	16331 1	C: 00177 0	54023 1	76043 1	54020 1	10020 1
6050	16216 0	16712 1	74770 1	10000 0	16115 0	50164 1	40001 1	10000 0
6060	16164 0	C: 77773 1	24164 1	54116 0	66220 1	10000 0	67676 1	16074 0
6070	30120 1	26116 0	50020 0	76242 1	00006 1	66105 0	75041 0	65041 1
6100	56116 1	60115 1	54004 1	50020 0	76242 1	74350 1	65024 1	56116 1
6110	54003 0	50020 0	76242 1	37666 0	54020 1	30120 1	54130 1	24164 1
6120	50164 1	40000 0	10000 0	24130 0	16125 0	54116 0	77675 0	00006 1
6130	16133 1	30115 1	26116 0	50130 0	40046 1	26116 0	77677 1	00006 1
6140	16153 1	77675 0	00006 1	16155 1	30116 1	54004 1	75041 0	64756 1
6150	54116 0	50020 0	36242 0	30120 1	16161 0	35024 1	56116 1	54003 0
6160	74350 1	26116 0	50020 0	36242 0	34351 1	70020 1	66171 0	10000 0
6170	16202 0	C: 77767 1	66061 0	10000 0	50000 1	46213 0	16204 0	50163 0
6200	46211 1	16204 0	50163 0	46213 0	26166 1	54116 0	50020 0	76242 1
6210	C: 00002 0	C: 00006 1	C: 00006 1	C: 00002 0	C: 00003 1	C: 00006 1	10021 1	16232 0
6220	C: 77722 0	24164 1	50164 1	30000 1	54117 1	35042 1	54004 1	70020 1
6230	50000 1	16303 0	54004 1	10020 1	50000 1	12000 1	10163 1	12017 1
6240	12017 1	12121 0	C: 00122 0	16454 0	17040 0	17611 1	17335 1	16652 1
6250	16437 0	16021 0	17560 1	16450 1	16567 1	16472 1	17270 1	16526 1
6260	16575 1	17273 1	17552 0	17530 1	17533 1	17537 0	17555 1	16720 0
6270	16716 0	17005 1	17265 0	17414 0	17361 0	16754 0	17031 0	16744 1
6300	16300 0	17526 0	17547 1	12341 1	12346 0	12351 0	12355 1	12361 0
6310	12367 0	12403 0	12412 0	12375 0	12406 0	12464 1	12471 0	12444 0
6320	12504 0	12513 0	12454 1	30165 0	54004 1	24164 1	50164 1	40000 0
6330	67702 0	54116 0	74347 1	56116 1	77656 1	00006 1	74764 1	50000 1
6340	16341 0	06371 1	16030 0	06363 1	16030 0	06366 1	16030 0	06371 1
6350	16427 1	06371 1	16113 0	06371 1	16432 0	06371 1	16435 1	06371 1
6360	35002 0	54020 1	16221 1	50120 1	40046 1	16370 1	50120 1	40047 0
6370	26116 0	40116 0	65006 1	10000 0	30120 1	16402 0	35024 1	56116 1

OCTAL LISTING FOR PARAGRAPH # 015, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

6400	54003 0	74350 1	26116 0	00006 1	30155 0	50116 1	52001 1	10163 1
6410	16423 0	00002 0	00006 1	30160 0	50116 1	52003 0	00006 1	30162 1
6420	50116 1	52005 0	00002 0	30156 0	50116 1	54002 1	00002 0	37665 0
6430	54020 1	16055 0	34752 0	54020 1	16055 0	36056 1	16114 1	50116 1
6440	30002 0	54156 1	00006 1	50116 1	30001 0	52155 1	34770 0	16027 0
6450	22007 0	50116 1	30000 1	16024 0	00006 1	50116 1	30001 0	52155 1
6460	00006 1	50116 1	30003 1	52160 1	00006 1	50116 1	30005 1	52162 0
6470	44770 1	16027 0	00006 1	50116 1	30001 0	52155 1	50166 0	52001 1
6500	50163 0	36213 1	26166 1	10163 1	16521 0	16517 0	54163 1	54156 1
6510	52160 1	50166 0	51775 0	52162 0	50166 0	51777 1	16030 0	54156 1
6520	16030 0	54163 1	56156 0	50166 0	53777 0	16030 0	00006 1	50116 1
6530	30001 0	52155 1	50166 0	52001 1	50163 0	36213 1	26166 1	10163 1
6540	16557 1	16460 1	00006 1	50116 1	30003 1	52160 1	50166 0	51775 0
6550	00006 1	50116 1	30005 1	52162 0	50166 0	51777 1	16030 0	00006 1
6560	50116 1	30003 1	52160 1	30156 0	50166 0	53777 0	16464 0	24164 1
6570	50164 1	30000 1	50116 1	54000 0	16030 0	24164 1	50164 1	30000 1
6600	50116 1	60000 1	54004 1	75041 0	50000 1	32000 0	54117 1	30165 0
6610	74344 1	64344 0	60164 1	50120 1	54052 1	30117 0	77675 0	00006 1
6620	16631 1	30165 0	54006 0	30117 0	54004 1	75041 0	64756 1	54164 0
6630	16011 0	30117 0	66220 1	10000 0	30117 0	16644 0	30120 1	60117 0
6640	50000 1	30000 1	54117 1	16616 1	54003 0	74350 1	50000 1	31400 1
6650	54117 1	16616 1	50164 1	30001 0	50116 1	60000 1	54004 1	75041 0
6660	50000 1	32000 0	54117 1	16616 1	30165 0	54004 1	50164 1	30001 0
6670	54117 1	16616 1	10154 0	00002 0	16676 1	16710 0	10155 1	00002 0
6700	16702 0	16710 0	10156 1	00002 0	16706 1	16710 0	50002 0	00001 0
6710	50002 0	00002 0	30165 0	54006 0	50164 1	00001 0	34752 0	16721 1
6720	34346 1	26116 0	00006 1	50116 1	00003 1	20160 1	00006 1	16731 0
6730	06763 0	00006 1	50116 1	00005 1	20162 0	00006 1	16740 0	06760 0
6740	00006 1	50116 1	00001 0	16747 1	00006 1	50116 1	30001 0	20155 1
6750	00006 1	16030 0	06766 0	16030 0	00006 1	50116 1	40001 1	16747 1
6760	54001 1	34773 0	16765 1	54001 1	36214 0	56001 0	50000 1	44751 1
6770	54130 1	00006 1	24000 1	50001 0	26155 1	54007 1	34772 1	60130 0

OCTAL LISTING FOR PARAGRAPH # 016, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

7000	50001 0	26154 0	54007 1	00002 0	17121 0	00006 1	50116 1	30003 1
7010	52160 1	00006 1	40001 1	20160 1	00006 1	17017 1	06763 0	00006 1
7020	50116 1	30005 1	52162 0	00006 1	40001 1	20162 0	00006 1	17031 0
7030	06760 0	00006 1	50116 1	30001 0	52155 1	00006 1	40001 1	16747 1
7040	00006 1	50116 1	30002 0	20156 1	50116 1	60000 1	60154 1	54154 0
7050	16030 0	16752 0	50002 0	30000 1	24002 0	54116 0	50116 1	30001 0
7060	54156 1	34772 1	56155 0	54135 1	00006 1	70156 1	56156 0	00006 1
7070	70154 0	20156 1	50116 1	30000 1	56135 0	00006 1	70135 1	2 156 1
7100	56154 1	00006 1	70135 1	20155 1	00002 0	34772 1	54163 1	56156 0
7110	60000 1	54001 1	00002 0	60155 0	54155 1	00002 0	60154 1	54154 0
7120	00002 0	54121 1	00002 0	34767 0	54136 1	00006 1	22137 1	07056 0
7130	52160 1	52155 1	52131 0	30156 0	54132 0	30136 0	26116 0	07056 0
7140	52156 1	20132 0	60154 1	60130 0	54130 1	17147 0	54121 1	52162 0
7150	52155 1	30136 0	26116 0	07056 0	52132 0	20156 1	60154 1	60130 0
7160	54154 0	00137 1	06766 0	00137 1	00006 1	22141 0	54117 1	22140 1
7170	17201 1	50002 0	30000 1	54140 0	60000 1	60002 0	54117 1	64773 0
7200	54141 1	36242 0	54116 0	00006 1	50117 0	30004 0	52155 1	52123 0
7210	17214 0	54140 0	44767 1	26117 1	07056 0	00006 1	50117 0	30002 0
7220	20155 1	10140 0	17211 0	00141 0	34772 1	54156 1	22002 0	6672 1
7230	17234 1	17254 1	44750 0	17235 0	34750 1	54002 1	00006 1	24000 1
7240	60156 0	54156 1	34772 1	60002 0	60155 0	54155 1	34772 1	60002 0
7250	60154 1	54154 0	54155 1	00001 0	54156 1	17251 1	54135 1	00006 1
7260	70156 1	54156 1	34772 1	56155 0	17075 0	07123 0	34772 1	16027 0
7270	34767 0	54140 0	17276 1	44355 1	54140 0	36211 0	54136 1	07466 1
7300	07125 0	00006 1	30123 1	52155 1	52134 0	00006 1	30125 1	52160 1
7310	00006 1	30127 0	52162 0	30140 1	26116 0	07125 0	52123 0	52155 1
7320	52125 0	52160 1	52127 1	52162 0	30140 1	26116 0	07125 0	52134 0
7330	52155 1	52162 0	52125 0	52160 1	16030 0	10163 1	17364 0	17364 0
7340	07056 0	07107 0	52160 1	52155 1	52160 1	07056 0	07107 0	52162 0
7350	52155 1	52162 0	07056 0	07107 0	52155 1	52162 0	52160 1	52155 1
7360	16030 0	07123 0	44766 0	26116 0	00006 1	30155 0	52160 1	07056 0
7370	07107 0	34767 0	26116 0	00006 1	30160 0	52155 1	52162 0	07056 0

OCTAL LISTING FOR PARAGRAPH # 017, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

7400	07107 0	34767 0	26116 0	52160 1	52155 1	52160 1	07056 0	07107 0
7410	52155 1	52162 0	52155 1	16470 0	00006 1	30162 1	52155 1	52123 0
7420	07056 0	00006 1	40160 1	52155 1	52125 0	07056 0	34767 0	26116 0
7430	00006 1	40162 0	52155 1	52162 0	07056 0	00006 1	30123 1	52155 1
7440	52127 1	07056 0	34767 0	26116 0	00006 1	40123 0	52155 1	20162 0
7450	00006 1	17453 0	06760 0	07056 0	52125 0	52160 1	52155 1	20160 1
7460	00006 1	17463 0	06763 0	07056 0	52127 1	16747 1	00006 1	30155 0
7470	52123 0	00006 1	30160 0	52125 0	00006 1	30162 1	52127 1	00002 0
7500	10000 0	17505 1	00002 0	17515 0	00002 0	56001 0	64753 1	64753 1
7510	54000 0	17513 0	24001 0	56001 0	00002 0	56001 0	64752 0	67702 0
7520	54000 0	17523 0	24001 0	56001 0	40000 0	00002 0	07056 0	16030 0
7530	07056 0	07106 1	16030 0	00006 1	50116 1	30001 0	17543 0	00006 1
7540	50116 1	30001 0	52155 1	52131 0	34772 1	54004 1	12353 1	30116 1
7550	54166 1	16032 1	34772 1	54004 1	12172 0	36043 0	54004 1	12214 0
7560	10163 1	17572 1	17572 1	00006 1	50116 1	30001 0	52131 0	34772 1
7570	54004 1	12653 1	00006 1	50116 1	30003 1	52160 1	00006 1	50116 1
7600	30005 1	52162 0	44770 1	54163 1	00006 1	50116 1	30001 0	52155 1
7610	17566 1	50116 1	10000 0	16030 0	17616 0	17624 1	50116 1	10001 1
7620	16030 0	16030 0	17624 1	16030 0	00006 1	40155 1	52155 1	10163 1
7630	17641 1	17641 1	00006 1	40160 1	52160 1	00006 1	40162 0	52162 0
7640	16030 0	40156 1	54156 1	16030 0	C: 22000 1	C: 24000 1	C: 24100 0	C: 25000 0
7650	C: 26000 0	C: 27000 1	C: 31000 0	C: 31103 1	C: 32000 0	C: 33000 1	C: 34000 0	C: 35000 1
7660	C: 37000 0	C: 37766 1	C: 37774 1	C: 37776 0	C: 40010 1	C: 40014 0	C: 40015 1	C: 40040 1
7670	C: 40200 1	C: 47777 0	C: 65552 0	C: 70000 0	C: 73777 1	C: 74000 1	C: 74056 1	C: 77700 0
7700	C: 77774 0	C: 77775 1	C: 77776 1	05255 0	C: 00764 1	05276 1	00004 0	30002 0
7710	55363 1	04636 0	C: 40000 0	51363 0	30000 1	05676 0	C: 40400 1	00004 0
7720	34767 0	60005 1	54017 0	50017 1	04655 0	C: 12712 0	C: 07726 0	C: 07727 1
7730	CKSM 41360 1	@	@	@	@	@	@	@
7740	@	@	@	@	@	@	@	@
7750	@	@	@	@	@	@	@	@
7760	@	@	@	@	@	@	@	@
7770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 020, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2000	13206 1	13525 1	13514 0	13605 0	13607 1	13173 0	12116 1	17624 1
00,2010	13231 0	13022 0	13175 0	13244 1	16323 1	13273 0	13246 0	36211 0
00,2020	70020 1	54021 0	10020 1	12101 1	C: 00024 1	50021 1	34753 1	54135 1
00,2030	10020 1	02050 0	16027 0	30135 0	00006 1	70156 1	54156 1	30135 0
00,2040	00006 1	70154 0	52155 1	30135 0	00006 1	70001 1	2 156 1	16030 0
00,2050	30156 0	00006 1	70135 1	56155 0	00006 1	70135 1	56155 0	60001 0
00,2060	60000 1	54156 1	12064 0	26155 1	34772 1	54156 1	56154 1	00006 1
00,2070	70135 1	20155 1	00002 0	30135 0	00006 1	70155 1	54155 1	56001 0
00,2100	12060 1	30021 1	54135 1	00006 1	30156 0	20156 1	6 154 1	60154 1
00,2110	54154 0	12113 1	54121 1	10135 1	12102 1	10020 1	07105 1	16030 0
00,2120	16030 0	34774 1	70020 1	54135 1	10020 1	12145 1	C: 00176 1	30135 0
00,2130	34753 1	54135 1	02073 1	52155 1	52160 1	52155 1	02073 1	52155 1
00,2140	52162 0	52155 1	02073 1	17354 0	54135 1	00006 1	30155 0	20155 1
00,2150	00006 1	12153 0	06766 0	00006 1	30160 0	20160 1	00006 1	12161 1
00,2160	06763 0	00006 1	30162 1	20162 0	00006 1	12167 1	06760 0	10135 1
00,2170	12144 0	16030 0	54135 1	06672 1	12176 1	12212 0	07226 0	30154 1
00,2200	12207 1	24135 0	00006 1	30156 0	20156 1	60154 1	26154 0	60000 1
00,2210	54000 0	12201 1	40135 1	16572 0	70116 0	10000 0	12224 0	34757 0
00,2220	70116 0	10000 0	07105 1	16030 0	54135 1	34761 0	00006 1	70116 0
00,2230	76214 1	50000 1	12233 0	12332 0	12342 1	12336 1	10163 1	12277 0
00,2240	12277 0	30135 0	63726 1	00006 1	62127 1	67702 0	54135 1	34772 1
00,2250	54001 1	56154 1	56155 0	02272 1	20155 1	56157 1	56160 0	02272 1
00,2260	20160 1	56161 1	56162 1	02272 1	20162 0	10135 1	54135 1	12242 0
00,2270	C: 04604 1	16030 0	60000 1	54156 1	34772 1	56001 0	00002 0	30135 0
00,2300	63726 1	00006 1	62322 0	67702 0	54135 1	34772 1	56154 1	56155 0
00,2310	54156 1	10135 1	54135 1	02300 0	C: 22650 1	34757 0	70116 0	10000 0
00,2320	07105 1	16030 0	50135 0	34753 1	54135 1	34757 0	70116 0	10000 0
00,2330	12031 0	12033 1	40135 1	62126 0	54135 1	12236 0	42126 1	60135 0
00,2340	40000 0	54135 1	10163 1	12346 0	12346 0	12145 1	40116 0	00006 1
00,2350	74763 0	54020 1	12103 0	44770 1	54136 1	54137 0	54140 0	10130 1
00,2360	12515 0	12363 1	12530 1	07225 0	10154 0	12413 1	12370 0	12412 0
00,2370	56131 1	56130 0	56155 0	56154 1	10130 1	12421 0	12400 0	12415 1

OCTAL LISTING FOR PARAGRAPH # 021, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2400	40154 0	00006 1	62404 0	24136 0	34750 1	54154 0	02627 0	34770 0
00,2410	54121 1	06030 1	24136 0	40131 0	12401 1	00006 1	40131 0	52131 0
00,2420	24136 0	10154 0	12436 0	12425 1	12432 1	10155 1	12436 0	16030 0
00,2430	12432 1	16030 0	00006 1	40155 1	52155 1	24136 0	40154 0	67702 0
00,2440	60130 0	10000 0	12504 0	C: 60001 0	12445 1	34753 1	60000 1	60155 0
00,2450	54155 1	34772 1	64750 1	26154 0	34753 1	60000 1	60131 1	54131 0
00,2460	34772 1	64750 1	26130 1	40154 0	60130 0	10000 0	12504 0	C: 00133 0
00,2470	12404 1	54140 0	40155 1	60131 1	00006 1	62404 0	12504 0	00006 1
00,2500	24137 1	00006 1	30131 1	20131 0	30130 0	60000 1	54000 0	12477 0
00,2510	52155 1	50137 1	02564 1	54156 1	16030 0	10000 0	12421 0	40131 0
00,2520	00006 1	62421 1	34753 1	60000 1	26131 0	34772 1	54130 1	12363 1
00,2530	10000 0	12415 1	30131 1	00006 1	62415 0	44753 0	12523 0	22021 1
00,2540	00006 1	74753 0	56001 0	60021 1	56001 0	12570 0	20001 1	20001 1
00,2550	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1
00,2560	20001 1	20001 1	20001 1	52155 1	10140 0	C: 06552 0	12641 1	52155 1
00,2570	00006 1	10130 1	52155 1	40154 0	00006 1	70131 0	60155 0	54000 0
00,2600	12605 1	00006 1	60130 0	24154 1	12607 0	00006 1	62617 0	00006 1
00,2610	60130 0	00006 1	12615 0	00006 1	62623 1	24154 1	12624 1	00006 1
00,2620	12627 1	00006 1	26154 0	60130 0	22007 0	00006 1	10130 1	54155 1
00,2630	10136 1	00002 0	00002 0	00002 0	00006 1	40155 1	52155 1	34772 1
00,2640	00002 0	40154 0	60130 0	00006 1	12646 0	12567 0	34750 1	54154 0
00,2650	40131 0	60155 0	12623 0	44770 1	54137 0	54127 1	03007 0	52131 0
00,2660	07500 0	52131 0	10130 1	12720 1	12666 1	12714 0	56131 1	56130 0
00,2670	56155 0	56154 1	00006 1	12675 0	12404 1	56160 0	56157 1	00006 1
00,2700	12702 1	12404 1	56162 1	56161 1	00006 1	12707 1	12404 1	10130 1
00,2710	12720 1	12404 1	12714 0	12404 1	00006 1	40131 0	52131 0	24127 0
00,2720	00006 1	30131 1	52134 0	12731 1	00006 1	24137 1	00006 1	30131 1
00,2730	20131 0	30130 0	60000 1	54000 0	12724 0	02747 1	52160 1	52155 1
00,2740	52160 1	02747 1	52162 0	52155 1	52162 0	02747 1	17354 0	30127 0
00,2750	54136 1	10154 0	12766 0	12755 0	12762 1	10155 1	12766 0	00002 0
00,2760	12762 1	00002 0	00006 1	40155 1	52155 1	24136 0	44770 1	54140 0
00,2770	40154 0	60133 0	10000 0	13003 0	12776 1	12404 1	54140 0	40155 1

OCTAL LISTING FOR PARAGRAPH # 022, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3000	60134 1	00006 1	62404 0	52155 1	52137 1	12564 0	C: 32506 0	56002 0
00,3010	52155 1	07500 0	52155 1	52160 1	07500 0	52160 1	52162 0	07500 0
00,3020	52162 0	00000 1	03007 0	07466 1	34772 1	56121 0	54141 1	03316 0
00,3030	30141 0	56121 0	00006 1	13035 0	12404 1	00006 1	30155 0	50120 1
00,3040	52043 1	03342 1	10154 0	13050 0	54001 1	50120 1	52045 1	12404 1
00,3050	44321 1	60135 0	10000 0	40000 0	13132 0	13064 1	44776 1	54135 1
00,3060	30154 1	54001 1	34772 1	13111 1	10135 1	13073 1	42024 1	54135 1
00,3070	00006 1	30155 0	13111 1	40000 0	54135 1	40000 0	50000 1	34753 1
00,3100	54130 1	00006 1	70155 1	56130 0	00006 1	70154 0	56001 0	60130 0
00,3110	56001 0	50120 1	52045 1	44770 1	54140 0	52123 0	52155 1	52131 0
00,3120	03150 0	52125 0	52155 1	52160 1	03150 0	52127 1	52155 1	52162 0
00,3130	03150 0	17354 0	54135 1	34772 1	56123 1	56122 0	56125 1	56124 0
00,3140	56127 0	56126 1	40135 1	50000 1	34753 1	00006 1	70154 0	13061 1
00,3150	10154 0	13167 0	13154 0	13161 0	10155 1	13167 0	00002 0	13161 0
00,3160	00002 0	44772 0	54136 1	00006 1	40155 1	50135 0	12563 1	54136 1
00,3170	52155 1	50135 0	12563 1	03277 0	16030 0	10163 1	13225 0	13225 0
00,3200	03316 0	22163 0	00006 1	30155 0	50120 1	52043 1	03342 1	10135 1
00,3210	13212 1	16030 0	63726 1	00006 1	63220 1	22007 0	22116 1	12303 1
00,3220	50135 0	34752 0	54135 1	34772 1	12036 1	06672 1	16030 0	16030 0
00,3230	17624 1	44766 0	26166 1	00006 1	50000 1	30003 1	52160 1	00006 1
00,3240	50166 0	30001 0	52162 0	16470 0	03316 0	17266 0	00006 1	30155 0
00,3250	50166 0	52001 1	50163 0	36213 1	26166 1	10163 1	13271 1	16030 0
00,3260	00006 1	30160 0	50166 0	51775 0	00006 1	30162 1	50166 0	51777 1
00,3270	16030 0	30156 0	16523 1	50120 1	30052 0	54117 1	16621 0	30155 0
00,3300	00006 1	70000 0	54156 1	34772 1	56155 0	00006 1	70154 0	20001 1
00,3310	20156 1	56154 1	00006 1	70000 0	20155 1	00002 0	00006 1	22137 1
00,3320	03277 0	52160 1	52155 1	52131 0	30156 0	54132 0	03277 0	52156 1
00,3330	20132 0	60154 1	60130 0	54130 1	13336 0	54121 1	52162 0	52155 1
00,3340	03277 0	17154 1	34772 1	54135 1	10154 0	13403 1	13350 0	13372 0
00,3350	56156 0	56155 0	54154 0	34774 1	54135 1	10154 0	13403 1	13361 1
00,3360	13375 1	56155 0	54154 0	34774 1	26135 1	10154 0	13403 1	00002 0
00,3370	13375 1	13450 1	10000 0	13401 0	10155 1	34772 1	13450 1	13401 0

OCTAL LISTING FOR PARAGRAPH # 023, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3400	13450 1	05726 1	C: 21302 0	62443 0	00006 1	63453 0	52155 1	22021 1
00,3410	00006 1	74753 0	52155 1	56021 1	26155 1	32314 0	00006 1	70154 0
00,3420	62565 0	54130 1	30154 1	00006 1	74753 0	00006 1	10130 1	26130 1
00,3430	00006 1	74753 0	52155 1	00006 1	10130 1	54131 0	34772 1	56001 0
00,3440	00006 1	10130 1	54001 1	30131 1	20155 1	00006 1	13452 0	34750 1
00,3450	54154 0	54155 1	00002 0	64754 0	00006 1	63477 0	52155 1	22021 1
00,3460	00006 1	74753 0	52155 1	56021 1	26155 1	33006 1	00006 1	70154 0
00,3470	62270 0	13421 1	00006 1	30156 0	20156 1	60154 1	26154 0	24135 0
00,3500	00006 1	30156 0	20156 1	60154 1	26154 0	60000 1	54022 0	10022 0
00,3510	10022 0	13472 1	13415 0	13465 1	06672 1	13520 1	13523 1	13523 1
00,3520	00006 1	40155 1	52155 1	34754 0	26154 0	52155 1	20001 1	54000 0
00,3530	13533 0	00006 1	40001 1	52155 1	30154 1	60000 1	54001 1	13550 0
00,3540	50000 1	34752 0	60000 1	00006 1	60154 1	54154 0	40155 1	54155 1
00,3550	00006 1	30155 0	52134 0	03277 0	07171 1	C: 00003 1	C: 14441 0	C: 37325 1
00,3560	C: 53250 0	C: 60764 1	C: 12146 1	C: 21276 1	C: 75466 1	C: 71471 0	C: 00236 0	C: 32757 0
00,3570	32467 0	07055 0	00006 1	30156 0	20156 1	60154 1	26154 0	00006 1
00,3600	30156 0	20156 1	60154 1	26154 0	16030 0	33626 0	13610 1	33710 1
00,3610	54136 1	06672 1	13622 0	13724 1	00006 1	40155 1	52155 1	33727 0
00,3620	56136 0	54137 0	44753 0	60154 1	10000 0	13716 0	13704 0	13637 1
00,3630	10155 1	34772 1	13634 1	13637 1	54155 1	54154 0	00136 0	00006 1
00,3640	40155 1	64753 1	52155 1	52134 0	03342 1	10135 1	13711 1	52155 1
00,3650	52134 0	52155 1	07171 1	C: 00006 1	C: 13240 0	C: 23630 0	C: 74721 0	C: 47775 1
00,3660	C: 02440 0	C: 20237 0	C: 75067 1	C: 70742 1	C: 03436 0	C: 26756 1	C: 74037 0	C: 57640 1
00,3670	C: 03046 0	C: 07143 0	C: 76654 1	C: 42244 0	32467 0	07055 0	00136 0	00006 1
00,3700	40155 1	64753 1	52155 1	00137 1	00006 1	40155 1	64754 0	52155 1
00,3710	16030 0	50000 1	34753 1	54135 1	02073 1	13647 0	00006 1	13634 1
00,3720	05671 1	C: 01301 1	34772 1	13634 1	34754 0	13635 0	C: 77763 0	13677 0
00,3730	35016 0	00004 0	54002 1	36214 0	54070 1	50000 1	31000 0	00006 1
00,3740	13745 0	10070 1	13734 0	07706 1	C: 31104 0	33765 0	54061 1	30004 0
00,3750	60070 0	54001 1	33766 0	15243 0	04665 0	50070 0	55000 1	05163 0
00,3760	34772 1	50006 1	57000 0	05167 1	05314 1	C: 03752 1	C: 03760 0	C: 03767 1
00,3770	C: 03770 1	CKSM 45537 1	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 024, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2000	00044 1	00010 0	00044 1	00027 1	00044 1	00054 0	00074 1	00120 1
01,2010	00226 1	00244 0	00311 1	00321 1	C: 00170 1	C: 75141 1	C: 45711 1	C: 10000 0
01,2020	C: 02502 1	C: 34066 0	C: 10000 0	C: 02170 0	C: 56066 1	C: 10000 0	C: 02157 0	C: 74066 1
01,2030	C: 10000 0	C: 02374 0	C: 74066 1	C: 02730 1	C: 75075 1	C: 26063 0	C: 05000 1	C: 02711 1
01,2040	C: 26063 0	C: 10000 0	C: 02625 1	C: 70067 1	C: 14000 1	C: 03532 0	C: 62067 1	C: 10000 0
01,2050	C: 02516 1	C: 56067 0	C: 77777 0	C: 75456 1	C: 37710 0	C: 01750 1	C: 75446 0	C: 37710 0
01,2060	C: 20000 0	C: 02534 1	C: 34067 1	C: 76347 0	C: 74754 1	C: 27710 1	C: 22000 1	C: 02115 0
01,2070	C: 70065 0	C: 22000 1	C: 02250 1	C: 70063 0	C: 22000 1	C: 02024 0	C: 70063 0	C: 01672 0
01,2100	C: 75466 1	C: 40067 1	C: 77777 0	C: 75152 0	C: 27710 1	C: 47777 0	C: 03730 0	C: 50067 0
01,2110	C: 77777 0	C: 75152 0	C: 27710 1	C: 05664 0	C: 74160 0	C: 27711 0	C: 77777 0	C: 75152 0
01,2120	C: 27710 1	C: 04700 1	C: 75143 0	C: 27710 1	C: 00050 1	C: 75053 0	C: 27711 0	C: 00240 1
01,2130	C: 75022 0	C: 27711 0	C: 00764 1	C: 75126 0	C: 27711 0	C: 77777 0	C: 75126 0	C: 27711 0
01,2140	C: 47777 0	C: 03411 0	C: 50066 1	C: 16000 0	C: 02000 0	C: 66065 1	C: 16000 0	C: 03132 1
01,2150	C: 66105 0	C: 01672 0	C: 75212 1	C: 50067 0	C: 12000 1	C: 02523 1	C: 50067 0	C: 24000 1
01,2160	C: 02002 1	C: 30060 1	C: 77777 0	C: 75113 0	C: 27711 0	C: 13000 0	C: 02622 0	C: 30065 1
01,2170	C: 04064 1	C: 75402 0	C: 23711 1	C: 65777 0	C: 03174 0	C: 50066 1	C: 00764 1	C: 75175 0
01,2200	C: 27710 1	C: 17000 1	C: 02511 0	C: 54066 0	C: 76003 0	C: 75210 0	C: 23711 1	C: 13000 0
01,2210	C: 02604 1	C: 54066 0	C: 17000 1	C: 03013 0	C: 52066 0	C: 77777 0	C: 75462 0	C: 07711 1
01,2220	C: 47777 0	C: 03322 1	C: 50066 1	C: 64777 1	C: 02456 1	C: 54067 1	C: 76105 1	C: 74101 1
01,2230	C: 27710 1	C: 76317 0	C: 74140 1	C: 11710 1	C: 32000 0	C: 03154 1	C: 76067 1	C: 00310 0
01,2240	C: 74555 1	C: 01711 1	C: 20000 0	C: 03010 0	C: 76067 1	C: 00310 0	C: 74555 1	C: 01711 1
01,2250	C: 00310 0	C: 74555 1	C: 01711 1	C: 77777 0	C: 75120 0	C: 01711 1	C: 20000 0	C: 02232 0
01,2260	C: 66065 1	C: 77777 0	C: 75421 1	C: 11712 0	C: 20000 0	C: 02303 0	C: 66065 1	C: 20000 0
01,2270	C: 03100 0	C: 66065 1	C: 77777 0	C: 75170 0	C: 01710 0	C: 22000 1	C: 02412 1	C: 66065 1
01,2300	C: 77777 0	C: 75376 1	C: 11712 0	C: 20000 0	C: 03111 0	C: 66065 1	C: 20000 0	C: 03057 0
01,2310	C: 66065 1	C: 77777 0	C: 75037 1	C: 01711 1	C: 20000 0	C: 03134 1	C: 66065 1	C: 77777 0
01,2320	C: 75422 1	C: 37711 1	C: 00144 0	C: 74552 0	C: 27710 1	C: 00144 0	C: 74552 0	C: 27710 1
01,2330	C: 30000 1	C: 03575 0	C: 56063 1	C: 50777 0	C: 03365 1	C: 50066 1	C: 76052 1	C: 75714 1
01,2340	C: 45711 1	02436 1	30117 0	50130 0	54046 1	16030 0	02436 1	40117 1
01,2350	02343 1	02424 1	50117 0	30000 1	12343 0	02424 1	50117 0	40000 0
01,2360	12343 0	02424 1	50130 0	30046 0	50117 0	54000 0	16030 0	02424 1
01,2370	50117 0	30000 1	50130 0	56046 0	12364 0	02424 1	50117 0	30000 1

OCTAL LISTING FOR PARAGRAPH # 025, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2400	50130 0	26046 1	16030 0	02436 1	30117 0	12400 0	02424 1	50117 0
01,2410	40000 0	12400 0	02436 1	50130 0	40050 0	50130 0	60046 0	00006 1
01,2420	66030 1	50130 0	56046 0	16615 1	40117 1	65006 1	10000 0	30120 1
01,2430	12435 0	35024 1	56117 0	54003 0	74350 1	26117 1	30120 1	54130 1
01,2440	10020 1	24130 0	00002 0	00002 0	10020 1	30117 0	04641 0	10154 0
01,2450	16030 0	16615 1	16030 0	16615 1	10121 1	12457 1	16030 0	54121 1
01,2460	10020 1	12445 1	C: 00360 1	16615 1	10020 1	06672 1	16030 0	16615 1
01,2470	16030 0	10020 1	12500 1	C: 12000 1	06672 1	16030 0	16030 0	16615 1
01,2500	06672 1	16615 1	16615 1	16030 0	10020 1	16607 1	12507 0	02424 1
01,2510	50120 1	30052 0	12364 0	34777 1	70117 1	50000 1	34752 0	54131 0
01,2520	34762 0	00006 1	70117 1	54130 1	00004 0	50000 1	30074 1	54002 1
01,2530	34756 1	00006 1	70117 1	73024 0	50000 1	12536 1	30131 1	00006 1
01,2540	04002 1	12550 1	30131 1	00006 1	06002 0	12550 1	40131 0	70002 1
01,2550	50130 0	54074 0	00003 1	34754 0	00006 1	70117 1	73024 0	50000 1
01,2560	12561 0	40002 1	70131 0	10000 0	12574 1	16664 1	12574 1	12570 0
01,2570	12571 1	30002 0	12562 0	12574 1	24164 1	16030 0	54061 1	10400 1
01,2600	12613 0	10454 0	12613 0	10530 0	12613 0	10604 1	12613 0	10660 0
01,2610	12613 0	07706 1	C: 31201 0	64767 0	22007 0	50000 1	21777 0	26063 0
01,2620	34772 1	54064 1	32627 0	54062 1	50064 0	10167 0	12667 0	C: 00006 1
01,2630	12667 0	30063 1	50064 0	54167 0	75021 0	50064 0	54166 1	10064 1
01,2640	12654 0	54121 1	30166 0	54120 0	10067 1	12654 0	12647 1	12650 1
01,2650	54067 1	52066 0	52165 1	15210 0	52066 0	50064 0	52165 1	50067 0
01,2660	40167 0	60063 1	00006 1	65210 1	30064 0	54067 1	15210 0	33024 1
01,2670	26064 1	10062 1	12623 0	07706 1	C: 31202 0	22164 1	30165 0	00004 0
01,2700	00006 1	04007 1	56001 0	50067 0	52165 1	52165 1	30165 0	00006 1
01,2710	01007 1	52155 1	50067 0	52155 1	52155 1	52157 0	50067 0	52157 0
01,2720	52157 0	52161 0	50067 0	52161 0	52161 0	52163 1	50067 0	52163 1
01,2730	52163 1	34772 1	56121 0	00006 1	12737 1	40166 1	54166 1	52167 0
01,2740	50067 0	52167 0	52167 0	35021 1	70167 0	54120 0	10166 1	34772 1
01,2750	12755 0	40166 1	54166 1	34770 0	56121 0	54067 1	00003 1	52165 1
01,2760	00006 1	62763 1	52006 0	40000 0	64770 0	54164 0	16017 0	00004 0
01,2770	40167 0	54167 0	36043 0	70006 0	00006 1	04007 1	54165 1	44772 0

OCTAL LISTING FOR PARAGRAPH # 026, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3000	54131 0	13111 1	00004 0	10067 1	13007 1	00003 1	13201 0	34767 0
01,3010	00006 1	05011 1	52165 1	12703 0	54061 1	34772 1	54064 1	32627 0
01,3020	54062 1	50064 0	10167 0	13026 1	C: 00014 1	13035 0	33024 1	26064 1
01,3030	10062 1	13020 1	44770 1	54064 1	15210 0	40065 0	50064 0	60164 1
01,3040	00006 1	13043 1	13026 1	50064 0	40167 0	54063 0	50064 0	54167 0
01,3050	44344 1	70065 0	64756 1	56065 1	74344 1	50064 0	60165 0	54066 0
01,3060	10064 1	12654 0	12644 1	54164 0	34772 1	54130 1	35021 1	70167 0
01,3070	60063 1	54167 0	40000 0	13000 0	00004 0	44772 0	54131 0	56167 1
01,3100	75021 0	54001 1	45213 0	60001 0	00006 1	63111 0	10001 1	50000 1
01,3110	54000 0	10203 1	03156 0	C: 66102 1	13115 0	10217 1	03156 0	C: 40201 0
01,3120	13121 1	10233 1	03156 0	C: 67610 1	13125 0	10247 1	03156 0	C: 03724 0
01,3130	13131 0	10263 1	03156 0	C: 03502 0	13135 1	10277 1	03156 0	C: 05332 0
01,3140	13141 1	10131 0	53301 0	05214 0	13146 0	13171 1	10130 1	13151 0
01,3150	12755 0	50000 1	27777 0	63123 1	54067 1	12675 0	54132 0	60131 1
01,3160	10000 0	40132 0	13165 1	13164 0	16710 0	54131 0	30002 0	54130 1
01,3170	16710 0	44772 0	54067 1	00003 1	44767 1	00006 1	03011 1	10067 1
01,3200	13002 1	34767 0	13207 0	31361 1	54001 1	33113 1	15215 0	00006 1
01,3210	05011 1	52165 1	15214 1	54062 1	40026 1	64761 0	10000 0	66056 1
01,3220	40000 0	63117 0	60002 0	10000 0	61400 1	13267 0	13227 1	40002 1
01,3230	64753 1	64753 1	56026 0	64752 0	60002 0	00006 1	22007 0	57400 1
01,3240	57401 0	57402 0	57403 1	57404 0	57405 1	57406 1	57407 0	30063 1
01,3250	50002 0	13252 0	53411 0	53413 1	53415 1	53417 0	53421 0	53423 1
01,3260	53425 1	53427 0	53431 1	65274 0	00006 1	15251 0	13342 0	10000 0
01,3270	61401 0	13275 0	64770 0	03347 1	C: 00001 0	10000 0	61402 0	13303 0
01,3300	64770 0	03347 1	C: 00002 0	10000 0	61403 1	13311 0	64770 0	03347 1
01,3310	C: 00003 1	10000 0	61404 0	13317 0	64770 0	03347 1	C: 00004 0	10000 0
01,3320	61405 1	13325 1	64770 0	03347 1	C: 00005 1	10000 0	61406 1	13333 0
01,3330	64770 0	03347 1	C: 00006 1	10000 0	61407 0	13341 0	64770 0	03347 1
01,3340	C: 00007 0	10000 0	07706 1	C: 31203 1	64770 0	03347 1	C: 00010 0	54064 1
01,3350	50002 0	30000 1	54002 1	34770 0	60064 0	50002 0	27377 1	40064 1
01,3360	50002 0	13237 0	00006 1	04007 1	54016 1	00006 1	22012 1	34751 0
01,3370	57407 0	57406 1	57405 1	57404 0	57403 1	57402 0	57401 0	57400 1

OCTAL LISTING FOR PARAGRAPH # 027, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3400	64750 1	26026 1	55137 1	44772 0	55137 1	00006 1	45275 0	53431 1
01,3410	53427 0	53425 1	53423 1	53421 0	53417 0	53415 1	53413 1	53411 0
01,3420	56001 0	00006 1	01007 1	56001 0	52006 0	23435 1	34767 0	26002 1
01,3430	55434 1	11304 0	13440 0	13435 1	15247 1	31305 0	00006 1	65247 0
01,3440	00006 1	43452 0	21305 1	11305 1	13462 0	13446 0	13447 1	11304 0
01,3450	13462 0	C: 00000 1	C: 20000 0	34753 1	27305 1	05223 1	C: 03142 0	35313 0
01,3460	53435 0	52006 0	34753 1	05233 0	C: 03440 1	C: 02063 0	13457 0	30161 1
01,3470	60000 1	54155 1	33127 0	54157 0	33526 0	54707 0	30154 1	75024 0
01,3500	10000 0	13512 0	10154 0	10000 0	13612 0	35053 1	05135 0	C: 03263 0
01,3510	C: 20063 0	03526 0	75024 0	10000 0	13563 0	00006 1	50155 0	31437 0
01,3520	52706 1	30154 1	74774 0	67701 0	10000 0	13675 1	04651 1	13531 1
01,3530	13576 1	33463 0	54704 0	50155 0	31260 1	10000 0	24000 1	13542 0
01,3540	15470 0	13561 1	40000 0	54001 1	50155 0	41257 1	00006 1	60025 0
01,3550	10000 0	40000 0	67663 0	64770 0	60001 0	10000 0	34772 1	13561 1
01,3560	13561 1	64770 0	00704 1	33526 0	54157 0	33133 0	54707 0	30154 1
01,3570	76043 1	54154 0	00006 1	50155 0	31437 0	52706 1	50155 0	31260 1
01,3600	54704 0	00006 1	63606 1	33506 1	56704 1	00704 1	35310 0	56704 1
01,3610	40000 0	00704 1	54020 1	10020 1	13615 1	13713 0	33526 0	54707 0
01,3620	30154 1	54021 0	60021 1	50155 0	62001 1	54156 1	00006 1	50156 0
01,3630	32002 1	22706 0	10000 0	24000 1	13707 0	24000 1	54705 1	33463 0
01,3640	54704 0	30706 0	74757 1	10000 0	13702 0	50156 0	32000 0	15477 1
01,3650	53305 1	00006 1	40025 1	21305 1	00006 1	31303 0	21305 1	11304 0
01,3660	13670 1	13663 0	13556 0	11305 1	13670 1	13666 0	13556 0	13561 1
01,3670	33137 1	54704 0	00006 1	31305 0	00704 1	33463 0	54704 0	50155 0
01,3700	41260 0	15477 1	40706 1	54706 1	50156 0	32000 0	13535 0	56705 0
01,3710	50156 0	32000 0	13600 0	30157 1	54707 0	50155 0	32000 0	60154 1
01,3720	60154 1	60154 1	54156 1	13626 1	36214 0	26156 1	33526 0	54707 0
01,3730	13626 1	34754 0	70077 0	10000 0	03745 1	31333 0	74760 0	00006 1
01,3740	13742 1	44765 0	63750 0	05770 1	04103 1	05547 1	C: 00007 0	14651 0
01,3750	C: 00220 1	C: 03751 1	C: 03752 1	CKSM 67773 0	@	@	@	@
01,3760	@	@	@	@	@	@	@	@
01,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 040, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2000	02767 0	05531 0	04112 1	32006 0	05535 1	02003 0	C: 11343 0	55200 0
04,2010	05561 0	C: 00236 0	05561 0	C: 00226 1	05561 0	C: 00215 1	04606 0	37702 0
04,2020	55722 0	40077 0	74754 1	10000 0	12044 1	31200 1	62031 1	10000 0
04,2030	12375 0	C: 77660 1	12035 1	31200 1	12410 1	31200 1	62406 1	00006 1
04,2040	62044 0	63770 1	00006 1	62407 0	34346 1	54365 0	34772 1	54740 0
04,2050	54741 1	54735 1	54736 1	05561 0	C: 00210 1	31333 0	74763 0	10000 0
04,2060	12125 1	34762 0	70101 0	10000 0	12071 1	40102 0	74076 0	00006 1
04,2070	62116 0	04611 0	04636 0	C: 51045 1	04714 1	C: 13313 1	33054 0	04714 1
04,2100	C: 42043 0	04714 1	C: 51161 0	34772 1	55200 0	00003 1	34773 0	04636 0
04,2110	C: 01731 0	34772 1	00006 1	01005 0	00006 1	01006 0	31200 1	00006 1
04,2120	12151 1	40076 1	74770 1	10000 0	12132 1	05671 1	C: 01520 1	04432 0
04,2130	04655 0	C: 21275 1	33173 1	54155 1	50155 0	33124 0	76043 1	40000 0
04,2140	61200 1	10000 0	10155 1	12133 0	12375 0	30155 0	55177 0	05547 1
04,2150	C: 00055 1	40103 1	74763 0	10000 0	12162 1	00004 0	44770 1	70075 1
04,2160	54075 1	15205 1	33053 1	54373 1	05402 1	C: 00014 1	06006 1	I: 77624 1
04,2170	C: 27516 0	I: 77776 1	45024 0	00006 1	03011 1	33046 0	00006 1	03012 1
04,2200	43047 0	00006 1	03013 0	02767 0	05527 1	34772 1	54304 1	05561 0
04,2210	C: 00020 0	04415 0	05561 0	C: 00037 0	11200 0	12352 0	04432 0	35047 1
04,2220	55262 1	00004 0	44770 1	70076 1	54076 1	34773 0	54001 1	40000 0
04,2230	53160 0	34761 0	64762 0	40000 0	70074 0	54074 0	44760 0	70104 0
04,2240	54104 0	34772 1	54332 1	34764 0	64757 0	64762 0	40000 0	55275 1
04,2250	70075 1	54075 1	44767 1	70104 0	54104 0	04714 1	C: 12550 1	11200 0
04,2260	12270 1	04714 1	C: 12542 1	03002 0	31200 1	55214 0	04655 0	C: 13015 1
04,2270	41200 0	64124 1	00006 1	12275 1	12311 1	41200 0	61214 1	00006 1
04,2300	12321 1	30104 1	74760 0	10000 0	12333 1	30074 1	74762 1	10000 0
04,2310	12340 0	30104 1	74760 0	10000 0	12325 0	34762 0	70074 0	10000 0
04,2320	12330 1	00006 1	34772 1	53156 0	03002 0	00006 1	34772 1	53160 0
04,2330	33052 0	54373 1	12266 0	34773 0	54001 1	40000 0	53160 0	12343 0
04,2340	40075 1	74762 1	26075 1	40075 1	74764 1	26075 1	00006 1	34772 1
04,2350	53164 1	12264 1	34762 0	70074 0	10000 0	12364 0	34760 1	70104 0
04,2360	10000 0	12364 0	05561 0	C: 00007 0	51177 1	33124 0	54022 0	40022 0
04,2370	40022 0	56022 1	74774 0	00004 0	12242 0	04362 1	12127 0	C: 00051 0

OCTAL LISTING FOR PARAGRAPH # 041, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2400	C: 00114 0	C: 00064 0	C: 00044 1	C: 00043 0	C: 00117 0	C: 00126 1	C: 77741 0	62405 1
04,2410	55113 1	34760 1	70104 0	00006 1	12421 0	05561 0	C: 00031 0	05561 0
04,2420	C: 00176 1	40074 0	74762 1	00006 1	12431 1	05547 1	C: 00236 0	34124 1
04,2430	02507 1	31113 0	55200 0	02044 0	30002 0	55012 1	45011 0	61200 1
04,2440	05347 1	04432 0	34777 1	04636 0	C: 21067 0	14103 0	02452 0	05561 0
04,2450	C: 00236 0	01012 0	30107 1	74761 1	10000 0	12470 1	05547 1	C: 00254 1
04,2460	22007 0	40106 1	74756 0	00006 1	12467 1	00006 1	33760 0	53353 1
04,2470	40101 0	74770 1	00006 1	12500 1	05547 1	C: 00240 1	05547 1	C: 00241 0
04,2500	05547 1	C: 00215 1	05561 0	C: 00244 0	05547 1	C: 00236 0	01012 0	00006 1
04,2510	23356 0	55200 0	05402 1	C: 04024 0	31356 0	55012 1	02044 0	00006 1
04,2520	23356 0	06006 1	I: 51575 1	C: 03405 0	I: 51025 1	C: 10536 0	C: 10532 1	I: 77776 1
04,2530	32377 0	02511 0	I: 77776 1	35004 0	02511 0	C: 00002 0	C: 27311 1	02434 0
04,2540	34342 0	02507 1	02517 0	02724 1	12546 0	02434 0	05561 0	C: 00256 0
04,2550	34763 1	02507 1	02517 0	02724 1	35046 0	54003 0	31765 1	67701 0
04,2560	55414 0	05402 1	C: 04024 0	31414 1	55765 0	67701 0	40000 0	00006 1
04,2570	62572 0	12607 0	05547 1	C: 00256 0	06006 1	I: 77745 1	C: 02351 1	C: 02463 1
04,2600	I: 77776 1	31765 1	67701 0	00006 1	62540 1	02546 1	02434 0	32402 0
04,2610	02507 1	06006 1	I: 51575 1	C: 03405 0	I: 77454 1	C: 10642 0	32401 0	02507 1
04,2620	40106 1	74770 1	00006 1	12637 0	02517 0	02724 1	05547 1	C: 00226 1
04,2630	34124 1	02507 1	05561 0	C: 00226 1	32401 0	02507 1	02647 0	32377 0
04,2640	02507 1	02644 0	I: 77414 0	C: 05065 1	02724 1	02647 0	02434 0	35003 1
04,2650	02507 1	02517 0	05547 1	C: 00050 1	02724 1	12657 0	02434 0	34260 1
04,2660	02507 1	02517 0	02724 1	12665 1	02434 0	32403 1	02507 1	02517 0
04,2670	02724 1	32403 1	02507 1	02517 0	02724 1	32404 0	02432 0	05547 1
04,2700	C: 00226 1	05547 1	C: 00031 0	34772 1	54001 1	53740 1	32715 0	55012 1
04,2710	12452 1	32714 1	55012 1	05205 0	C: 02716 0	C: 02711 1	35047 1	05135 0
04,2720	C: 02564 1	C: 66104 1	04655 0	C: 74207 1	00006 1	23356 0	35051 0	05135 0
04,2730	C: 02000 0	C: 56067 0	05205 0	I: 77776 1	32400 1	02511 0	00004 0	35052 0
04,2740	55266 0	54063 0	51177 1	33124 0	55264 1	00006 1	74761 1	74774 0
04,2750	54001 1	51177 1	33055 1	55265 0	74344 1	26001 1	31265 1	75041 0
04,2760	64756 1	05146 1	31264 0	76043 1	05347 1	04432 0	05205 0	00004 0
04,2770	34775 0	54154 0	50154 1	43032 1	50154 1	70074 0	50154 1	54074 0

OCTAL LISTING FOR PARAGRAPH # 042, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3000	10154 0	12771 0	00006 1	22155 0	00004 0	34764 0	70075 1	10000 0
04,3010	13024 0	04611 0	04463 1	30105 0	74755 0	10000 0	13022 0	04636 0
04,3020	C: 51203 1	13024 0	04636 0	C: 51217 1	00003 1	37702 0	55323 0	00155 0
04,3030	03002 0	06030 1	C: 00001 0	C: 00040 0	C: 06400 0	C: 20400 1	C: 00000 1	C: 05100 0
04,3040	C: 10000 0	C: 16000 0	C: 00000 1	C: 42000 1	C: 00000 1	C: 00000 1	C: 44571 1	C: 00600 1
04,3050	C: 00300 1	C: 01120 0	C: 10741 1	C: 10171 1	C: 37312 0	C: 10606 0	C: 10664 1	C: 10656 0
04,3060	C: 10646 1	C: 10545 1	C: 10537 1	C: 10677 0	C: 26071 0	C: 26071 0	C: 72212 0	C: 72002 0
04,3070	C: 11575 0	C: 11405 0	C: 54321 0	C: 54234 0	C: 30002 0	C: 31414 1	C: 30002 0	C: 31414 1
04,3100	C: 51662 1	C: 51563 0	C: 50214 0	C: 74476 1	C: 45334 1	C: 72206 0	C: 72000 1	C: 11573 0
04,3110	C: 11403 0	C: 11303 1	C: 73433 1	C: 60000 1	C: 26254 0	C: 62444 1	C: 60153 0	C: 76000 0
04,3120	C: 74016 0	C: 67455 1	C: 55654 0	C: 66001 0	C: 21526 0	C: 21525 0	C: 21524 1	C: 21523 0
04,3130	C: 21522 1	C: 21521 1	C: 21717 0	C: 21715 1	C: 21714 0	C: 21113 1	C: 21112 0	C: 21111 0
04,3140	C: 21110 1	C: 11476 1	C: 31475 0	C: 01266 1	C: 01265 1	C: 01264 0	C: 01263 1	C: 31657 1
04,3150	C: 31451 0	C: 31450 1	C: 21645 0	C: 21044 1	C: 21043 0	C: 21042 1	C: 21041 1	C: 21040 0
04,3160	C: 21037 0	C: 21636 1	C: 21635 1	C: 41230 0	C: 21627 1	C: 41626 0	C: 21025 0	C: 21424 0
04,3170	C: 31617 0	C: 01006 0	C: 01201 0	C: 00046 0	C: 00465 0	C: 32324 0	C: 00333 1	C: 01733 1
04,3200	I: 53575 0	C: 03570 0	I: 77676 0	C: 00023 0	I: 53435 0	C: 03576 0	C: 00015 0	I: 53435 0
04,3210	C: 00023 0	C: 24007 0	C: 00001 0	I: 76521 0	C: 00007 0	C: 03405 0	I: 77616 0	I: 77160 0
04,3220	C: 00002 0	C: 00000 1	I: 77614 1	C: 04343 1	C: 11230 0	I: 77160 0	C: 00012 1	C: 00002 0
04,3230	I: 66143 1	C: 22305 1	C: 03745 1	C: 23752 0	C: 22277 0	I: 54214 1	C: 04343 1	C: 11241 0
04,3240	C: 20607 1	C: 03750 0	I: 43134 0	C: 03746 1	C: 01271 1	I: 52014 0	C: 05316 0	C: 45343 1
04,3250	C: 73027 0	34765 1	00006 1	02013 1	00006 1	13276 0	13257 0	00006 1
04,3260	00004 0	61063 0	64753 1	64753 1	56001 0	33301 0	61064 1	00006 1
04,3270	60001 0	00006 1	63276 1	63302 0	00006 1	63256 0	30071 1	22002 0
04,3300	52005 0	C: 00440 1	C: 77754 1	04553 0	04572 0	06006 1	I: 45014 0	C: 05671 1
04,3310	C: 11546 0	I: 74014 1	C: 04343 1	C: 11315 0	C: 00012 1	I: 51575 1	C: 01555 0	I: 62606 0
04,3320	C: 22301 0	C: 27746 1	C: 01563 0	I: 57236 1	C: 03746 1	I: 52405 1	I: 74421 0	C: 33416 1
04,3330	I: 41471 0	I: 55366 1	C: 33430 0	I: 65205 0	C: 03752 1	I: 65301 0	C: 00047 1	I: 56257 1
04,3340	C: 20172 1	I: 77621 1	C: 02463 1	C: 03413 1	I: 77776 1	35026 0	05535 1	06006 1
04,3350	I: 77624 1	C: 11217 0	I: 71214 0	C: 05470 1	C: 02463 1	I: 77624 1	C: 11441 0	I: 77775 1
04,3360	C: 11762 1	C: 17405 0	C: 02633 0	I: 57215 0	C: 02370 1	C: 11376 0	I: 45061 1	C: 20206 1
04,3370	C: 24005 1	I: 77624 1	C: 73027 0	I: 77650 1	C: 11352 0	C: 56574 1	C: 47556 1	C: 13434 0

OCTAL LISTING FOR PARAGRAPH # 043, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
04,3400   C: 16163 1   C: 22407 1   C: 36673 0     04553 0     03424 0     04565 0     03424 0   I: 77734 1
04,3410   C: 03664 0   I: 77740 1   C: 03664 0   I: 77533 1   C: 13270 0     30154 1     05770 1     35023 0
04,3420     04636 0   C: 20743 0     04103 1     03417 0     04572 0     06006 1   I: 45014 0   C: 05710 1
04,3430   C: 11306 1   C: 11546 0   I: 71214 0   C: 05671 1   C: 02463 1   C: 37413 0   C: 11217 0   I: 77745 1

04,3440   C: 03413 1   I: 77624 1   C: 76560 0   I: 77201 1   C: 00001 0   C: 03512 1   I: 65315 0   C: 03756 0
04,3450   C: 02463 1   I: 65325 0   C: 03663 1   C: 33430 0   I: 41512 1   I: 77624 1   C: 72740 1   I: 77624 1
04,3460   C: 45314 0   I: 77624 1   C: 15672 0   I: 43214 1   C: 05610 0   C: 11357 0   C: 26731 0   C: 03656 1
04,3470   I: 43014 0   C: 01311 0   C: 11474 0   C: 00470 1   I: 77745 1   C: 02547 0   C: 02547 0   I: 51025 1

04,3500   C: 13267 0   C: 11476 1   I: 77745 1   C: 03656 1   C: 03656 1   I: 51025 1   C: 13267 0   C: 11504 0
04,3510   I: 77414 0   C: 05310 0   C: 11516 0     34605 0     05535 1     06006 1   I: 77624 1   C: 76537 1
04,3520   I: 77775 1   C: 02453 1   C: 36541 1   C: 32050 0   I: 64375 1   C: 03667 0   C: 00001 0   I: 77772 0
04,3530   C: 03540 0   I: 77414 0   C: 05310 0   C: 11537 0     33545 0     05535 1     06006 1   I: 77745 1

04,3540   C: 03663 1   C: 36465 0   C: 73027 0   I: 77650 1   C: 11437 1   C: 01522 0   I: 71220 1   C: 02551 1
04,3550   C: 11400 0   C: 17754 1   C: 11402 1   C: 03744 0   I: 67214 1   C: 05711 0   C: 11561 0   C: 33433 0
04,3560   C: 03766 0   I: 77776 1     34603 0     05535 1     34533 0     05535 1     34532 1     05535 1
04,3570     06006 1   I: 77650 1   C: 02551 1     04553 0     03576 0     04565 0     04572 0     34604 1

04,3600     05535 1     06006 1   I: 77745 1   C: 02465 1   C: 17663 1   C: 02461 0   C: 37413 0   C: 11217 0
04,3610   I: 45145 0   C: 03413 1   C: 76560 0   I: 77624 1   C: 56674 1   C: 02445 0   I: 77201 1   C: 00001 0
04,3620   C: 03546 0   I: 45115 0   C: 02453 1   C: 63615 0   I: 77624 1   C: 45304 1   I: 77201 1   C: 00001 0
04,3630   C: 02617 0   I: 45115 0   C: 02625 1   C: 63615 0   I: 77624 1   C: 45314 0   I: 43145 0   C: 11762 1

04,3640   C: 03461 1   C: 36355 1   C: 72251 1   I: 77454 1   C: 24035 1     05671 1   C: 00611 1     35023 0
04,3650     04636 0   C: 20743 0     04103 1     03655 1     03576 0     06006 1   I: 77745 1   C: 11762 1
04,3660   C: 36355 1   C: 24035 1   I: 51025 1   C: 13267 0   C: 11662 0   I: 77615 0   C: 13267 0   C: 16547 0
04,3670   C: 03663 1   I: 41425 1   C: 02465 1   I: 45246 0   C: 13267 0   I: 43244 1   C: 11673 0   C: 13267 0

04,3700   I: 45565 0   C: 74121 0   I: 77414 0   C: 05310 0   C: 11710 1     34605 0     05535 1     06006 1
04,3710   I: 77624 1   C: 76537 1   I: 77624 1   C: 73027 0   I: 77650 1   C: 11610 0   I: 77624 1   C: 47432 1
04,3720   I: 75160 1   C: 02713 0   C: 01733 1   I: 45014 0   C: 01662 1   C: 34730 1   I: 77414 0   C: 01462 0
04,3730     04103 1   I: 77620 0   C: 03373 0   I: 43205 1   C: 11752 1   C: 03733 0   C: 37606 0   C: 46223 0

04,3740   I: 77624 1   C: 11744 0   I: 77650 1   C: 03373 0   I: 50375 0   C: 03542 1   C: 03474 0   I: 65512 1
04,3750   I: 77616 0   C: 00052 0   C: 05716 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 20000 0
04,3760   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 77777 0
04,3770   C: 77771 0   C: 77763 0   C: 37777 1   C: 37777 1   C: 37777 1   C: 37777 1   C: 03776 1   CKSM 40022 0
```

OCTAL LISTING FOR PARAGRAPH # 044, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2000	C: 77340 0	C: 32043 1	C: 24337 0	C: 32052 1	C: 14337 0	C: 32057 1	C: 03412 0	C: 03422 0
05,2010	C: 13414 1	C: 03427 0	C: 01104 0	C: 11314 1	C: 03023 0	C: 03223 1	C: 03702 1	C: 12444 0
05,2020	C: 25733 1	C: 32061 1	C: 00024 1	C: 32063 0	C: 24337 0	C: 32052 1	C: 14337 0	C: 32057 1
05,2030	C: 32075 1	C: 03743 1	C: 03753 0	C: 00007 0	C: 00106 0	C: 01021 0	C: 03223 1	C: 01337 1
05,2040	C: 32101 0	C: 13720 0	C: 64111 1	C: 76746 0	C: 01033 0	C: 01035 0	C: 01037 1	C: 01041 0
05,2050	C: 01043 1	C: 76750 1	C: 77743 1	C: 03133 0	C: 03135 0	C: 03137 1	C: 77745 1	C: 07076 1
05,2060	C: 70605 0	C: 20074 0	C: 52551 1	C: 76056 0	C: 01723 0	C: 01725 0	C: 01727 1	C: 01731 0
05,2070	C: 01642 0	C: 76060 0	C: 00775 1	C: 01516 1	C: 07172 1	C: 01432 0	C: 34076 1	C: 04374 0
05,2100	C: 73741 1	C: 03072 1	C: 03065 1	C: 07167 0	C: 13125 0	C: 05306 1	C: 01333 0	C: 34011 0
05,2110	C: 34013 1	C: 34030 0	C: 43745 0	C: 32043 1	C: 24337 0	C: 32052 1	C: 14337 0	C: 32057 1
05,2120	C: 03412 0	C: 00302 0	C: 17674 1	C: 17460 0	C: 06342 1	C: 03023 0	C: 13720 0	C: 25733 1
05,2130	C: 32061 1	C: 00024 1	C: 32063 0	C: 24337 0	C: 32052 1	C: 14337 0	C: 32072 0	C: 12757 1
05,2140	C: 00106 0	C: 01021 0	C: 02633 0	C: 01337 1	C: 32101 0	C: 52551 1	C: 32043 1	C: 24337 0
05,2150	C: 32052 1	C: 14337 0	C: 32057 1	C: 03412 0	C: 03422 0	C: 13414 1	C: 01007 1	C: 17674 1
05,2160	C: 00771 0	C: 03662 0	C: 03424 0	C: 02636 0	C: 06460 0	C: 03655 1	C: 13404 0	C: 06311 1
05,2170	C: 32061 1	C: 00024 1	C: 32063 0	C: 24337 0	C: 32052 1	C: 14337 0	C: 32072 0	C: 02632 1
05,2200	C: 03753 0	C: 00007 0	C: 13645 1	C: 01337 1	C: 32101 0	C: 02315 1	C: 07400 1	C: 07756 1
05,2210	C: 77671 1	C: 32043 1	C: 24337 0	C: 32052 1	C: 14337 0	C: 32057 1	C: 07300 0	C: 03635 1
05,2220	C: 24304 0	C: 14320 0	C: 04300 0	C: 03313 0	C: 13675 1	C: 07400 1	C: 03265 0	C: 32061 1
05,2230	C: 00024 1	C: 32260 1	C: 24337 0	C: 32052 1	C: 14337 0	C: 00775 1	C: 01516 1	C: 13167 0
05,2240	C: 07300 0	C: 24304 0	C: 14320 0	C: 03072 1	C: 03065 1	C: 03314 1	C: 01337 1	C: 13125 0
05,2250	C: 05306 1	C: 01333 0	C: 32107 0	C: 01432 0	C: 34076 1	C: 04374 0	C: 00106 0	C: 74017 1
05,2260	C: 76463 1	C: 01316 1	C: 01320 1	C: 03726 1	C: 03724 0	C: 03756 0	C: 76673 1	C: 32043 1
05,2270	C: 24337 0	C: 32052 1	C: 14337 0	C: 32057 1	C: 32340 1	C: 24337 0	C: 32347 0	C: 24337 0
05,2300	C: 32356 0	C: 10337 1	C: 03751 1	C: 00007 0	C: 00007 0	C: 00007 0	C: 32061 1	C: 00024 1
05,2310	C: 32335 0	C: 04337 1	C: 00007 0	C: 00007 0	C: 00007 0	C: 00007 0	C: 32052 1	C: 14337 0
05,2320	C: 32072 0	C: 03747 0	C: 00106 0	C: 12025 0	C: 00007 0	C: 01337 1	C: 32101 0	C: 00007 0
05,2330	C: 00007 0	C: 00007 0	C: 00007 0	C: 00007 0	C: 77770 1	C: 77027 1	C: 00752 1	C: 77031 0
05,2340	C: 74236 0	C: 03543 0	C: 03545 0	C: 03547 1	C: 03551 0	C: 03553 1	C: 74240 1	C: 74220 1
05,2350	C: 03561 0	C: 03563 1	C: 03565 1	C: 03567 0	C: 03571 1	C: 74222 0	C: 74202 1	C: 03577 1
05,2360	C: 03601 0	C: 74204 1	C: 02113 0	C: 02211 1	C: 02146 0	C: 02001 1	C: 02267 0	00004 0
05,2370	03046 0	12376 0	34753 1	05135 0	C: 77777 0	C: 77777 0	31241 1	75004 1

OCTAL LISTING FOR PARAGRAPH # 045, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2400	64752 0	55241 0	34772 1	55365 1	54375 1	54376 1	54377 0	55306 1
05,2410	00006 1	01077 0	44664 0	55322 1	34772 1	55360 1	55362 0	55501 0
05,2420	00006 1	01005 0	00006 1	01006 0	00006 1	01011 0	00006 1	01012 0
05,2430	00006 1	01013 1	00006 1	01014 0	55331 0	54332 1	54370 1	55275 1
05,2440	54772 1	54771 1	55247 0	54735 1	54736 1	54740 0	54741 1	41241 0
05,2450	75004 1	10000 0	02456 1	35004 0	00006 1	05012 1	02536 0	44772 0
05,2460	55214 0	34346 1	54365 0	33247 0	55333 1	37702 0	55323 0	33251 1
05,2470	55337 0	35055 1	55334 0	00006 1	33231 1	52113 0	33252 1	54074 0
05,2500	30075 0	74755 0	63253 0	54075 1	33254 1	54076 1	30077 1	74754 1
05,2510	63255 0	54077 0	00006 1	33257 1	52101 0	00006 1	33261 1	52103 1
05,2520	30104 1	72562 0	63262 1	54104 0	33263 0	54105 1	34756 1	70106 1
05,2530	63264 1	54106 1	33265 0	54107 0	04655 0	C: 03173 1	00004 0	00006 1
05,2540	34772 1	53160 0	00006 1	34772 1	53164 1	00006 1	34772 1	53156 0
05,2550	00006 1	34772 1	53162 1	00006 1	34772 1	53166 0	00006 1	34772 1
05,2560	53170 1	00002 0	C: 06200 0	25306 0	22002 0	00006 1	04007 1	53433 0
05,2570	04636 0	C: 40000 0	34752 0	00006 1	03033 1	00006 1	12604 0	34753 1
05,2600	00006 1	02033 0	00006 1	13044 0	03023 0	34344 0	71360 1	00006 1
05,2610	12612 1	13044 0	41360 1	00006 1	12631 0	61377 0	00006 1	12621 1
05,2620	13044 0	31374 0	54003 0	00006 1	31376 1	51377 0	52001 1	34772 1
05,2630	55360 1	03046 0	30102 1	74076 0	00006 1	74766 0	76211 1	00006 1
05,2640	50000 1	33231 1	52113 0	44753 0	70106 1	54106 1	31337 1	75001 1
05,2650	64762 0	55337 0	34763 1	71334 0	65055 1	55334 0	34772 1	54740 0
05,2660	54741 1	33250 0	71241 0	64752 0	57241 1	74765 0	00006 1	12676 0
05,2670	04714 1	C: 17070 0	36211 0	05233 0	C: 03064 0	C: 16063 0	33240 1	71333 1
05,2700	67660 0	55333 1	40101 0	74762 1	10000 0	12730 0	34754 0	00006 1
05,2710	05011 1	12730 0	00004 0	03023 0	03054 0	44753 0	70106 1	54106 1
05,2720	40102 0	74076 0	00006 1	62730 1	35011 1	05233 0	C: 03037 0	C: 34066 0
05,2730	30102 1	74076 0	00006 1	62744 1	34764 0	70075 1	10000 0	12744 0
05,2740	04611 0	04463 1	35024 1	54003 0	34773 0	54161 0	60000 1	00006 1
05,2750	50000 1	31156 1	00006 1	06001 0	10000 0	13012 0	13012 0	13012 0
05,2760	10161 0	12745 1	54162 0	05350 1	00004 0	34773 0	54161 0	60000 1
05,2770	50000 1	11156 0	12774 0	13001 1	54154 0	24154 1	24162 1	04636 0

OCTAL LISTING FOR PARAGRAPH # 046, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3000	C: 03467 1	10161 0	12766 0	10162 0	12534 0	34752 0	71214 0	00006 1
05,3010	14103 0	12534 0	05671 1	C: 01107 0	12414 0	00004 0	03054 0	44753 0
05,3020	70106 1	54106 1	12744 0	34762 0	00006 1	02016 1	00006 1	13043 1
05,3030	34342 0	00006 1	02016 1	63246 1	00006 1	13044 0	00006 1	00015 0
05,3040	63246 1	00006 1	13044 0	00002 0	03046 0	12414 0	33241 0	54334 1
05,3050	37662 1	54030 0	64770 0	54027 0	33244 0	00006 1	03011 1	34750 1
05,3060	54026 1	33245 1	00006 1	03013 0	34753 1	64755 1	64757 0	40000 0
05,3070	70076 1	64757 0	54076 1	44765 0	70075 1	54075 1	44765 0	70074 0
05,3100	54074 0	35024 1	54003 0	34751 0	55407 1	55406 0	55405 0	55404 1
05,3110	55403 0	55402 1	55401 1	55400 0	45274 1	55410 1	55412 0	55414 0
05,3120	55416 1	55420 1	55422 0	55424 0	55426 1	55430 0	45275 0	55411 0
05,3130	55413 1	55415 1	55417 0	55421 0	55423 1	55425 1	55427 0	55431 1
05,3140	44772 0	54167 0	54203 1	54217 1	54233 1	54247 1	54263 1	54277 1
05,3150	55322 1	54067 1	33243 1	54400 1	65005 1	54454 0	65005 1	54530 0
05,3160	65005 1	54604 1	65005 1	54660 0	34355 0	54154 0	44755 0	50154 1
05,3170	55226 1	10154 0	13165 1	55000 1	55001 0	55002 0	55003 1	54045 1
05,3200	55201 1	55245 1	55216 1	55220 1	55215 1	55223 1	55224 0	55204 1
05,3210	55205 0	55246 1	55335 1	55324 1	54100 1	54301 1	55247 0	34775 0
05,3220	55221 0	33242 0	55361 0	44351 0	55202 1	00002 0	30001 0	15326 1
05,3230	C: 03226 1	C: 12066 1	C: 02123 0	C: 42066 1	C: 03222 0	C: 34066 0	C: 02000 0	C: 54066 0
05,3240	C: 00435 0	C: 03446 1	C: 03270 1	C: 00400 0	C: 77603 1	C: 74777 0	C: 77755 0	C: 37411 1
05,3250	C: 00450 0	C: 00130 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00200 0
05,3260	C: 00004 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00025 0	C: 37100 1
05,3270	C: 00600 1	C: 00601 0	C: 00602 0	C: 00603 1	C: 00604 0	C: 00605 1	C: 00606 1	C: 00003 1
05,3300	C: 34661 1	C: 00606 1	C: 04467 0	C: 00601 0	C: 33216 1	C: 00000 1	C: 01177 1	C: 77754 1
05,3310	C: 57611 0	C: 00116 1	C: 00730 0	34322 0	55506 1	31465 1	74754 1	00006 1
05,3320	13324 0	51506 0	33410 1	13334 1	31472 1	60000 1	00006 1	51506 0
05,3330	73432 0	20001 1	51506 0	63420 1	51506 0	55511 1	11506 1	13314 0
05,3340	11465 0	13347 0	13347 0	53522 1	21513 0	33445 1	27520 0	34767 0
05,3350	55506 1	55507 0	31473 0	63444 0	60000 1	55510 0	00006 1	63362 0
05,3360	37701 0	55506 1	51506 0	31516 1	00006 1	71510 0	60000 1	51507 1
05,3370	61511 0	51507 1	55467 1	11507 0	13404 0	31465 1	74753 0	10000 0

OCTAL LISTING FOR PARAGRAPH # 047, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3400	31472 1	61473 0	55475 1	00002 0	55507 0	00006 1	27506 1	13362 1
05,3410	C: 00616 0	C: 02526 1	C: 02352 1	C: 01471 1	C: 00634 0	C: 00612 1	C: 03706 0	C: 04425 0
05,3420	C: 00644 1	C: 03710 1	C: 04246 0	C: 02011 0	C: 77501 0	C: 00612 1	C: 04656 0	C: 10372 0
05,3430	C: 77126 1	C: 76261 0	C: 00767 1	C: 15624 0	C: 03054 0	C: 04532 1	C: 10433 1	C: 00000 1
05,3440	C: 22070 0	C: 03204 1	C: 77266 0	C: 02476 0	C: 70364 1	C: 75420 0	37702 0	54336 0
05,3450	54335 0	33574 1	54334 1	13467 0	10335 0	03607 0	C: 77753 0	13460 1
05,3460	10336 0	13622 0	C: 74001 0	30333 1	00006 1	63467 1	13474 1	50332 0
05,3470	32362 1	54333 0	40332 1	13711 1	50333 1	30000 1	10000 0	24333 1
05,3500	13504 1	56333 1	40000 0	56333 1	24000 1	54335 0	63456 0	10000 0
05,3510	13514 0	C: 47777 0	13514 0	03536 1	30335 1	63511 1	00006 1	63607 0
05,3520	67674 0	00006 1	63545 0	00006 1	50335 1	44000 1	54001 1	00006 1
05,3530	50335 1	43777 1	54335 0	37702 0	56335 1	13635 0	00006 1	22070 0
05,3540	04542 0	44762 1	00006 1	03013 0	00070 0	50335 1	00000 1	10000 0
05,3550	30335 1	13621 0	56335 1	54336 0	34772 1	56335 1	54003 0	74350 1
05,3560	00006 1	50000 1	31402 0	50335 1	52340 1	24335 1	24335 1	24336 1
05,3570	50336 1	00000 1	10000 0	13556 0	C: 03454 1	54336 0	37702 0	54335 0
05,3600	56336 1	54003 0	74350 1	00006 1	50000 1	31402 0	13635 0	30335 1
05,3610	54003 0	74350 1	54001 1	33462 1	26335 0	00006 1	50001 0	31401 0
05,3620	13635 0	54336 0	50336 1	00000 1	10000 0	24336 1	13632 1	54336 0
05,3630	37702 0	56336 1	24000 1	54335 0	13515 1	00006 1	01034 1	30001 0
05,3640	00006 1	01035 0	15323 1	34772 1	54335 0	03706 0	33655 1	54334 1
05,3650	30025 0	56001 0	30335 1	13635 0	C: 03656 1	C: 03670 0	34767 0	26335 0
05,3660	74350 1	10000 0	13672 0	30335 1	74754 1	00006 1	13645 1	13446 0
05,3670	33654 0	54334 1	30335 1	54003 0	74350 1	54002 1	34771 1	54001 1
05,3700	50002 0	71401 1	56001 0	50002 0	71400 0	13635 0	00006 1	22334 0
05,3710	35041 1	54061 1	03536 1	32000 0	56001 0	30061 0	13635 0	I: 77656 1
05,3720	C: 16714 1	C: 00045 0	C: 26722 1	I: 77656 1	C: 02724 1	I: 72441 0	C: 02714 1	I: 77725 1
05,3730	C: 00045 0	C: 24041 1	C: 02724 1	I: 76435 1	C: 02714 1	I: 75214 1	C: 03705 0	C: 13751 0
05,3740	C: 02675 1	I: 40056 0	C: 13747 1	C: 16676 1	C: 00045 0	I: 43565 0	C: 02675 1	I: 52162 0
05,3750	C: 13743 0	I: 75246 0	C: 02675 1	I: 77616 0	C: 00000 1	C: 00003 1	I: 77414 0	C: 04674 0
05,3760	24773 1	05671 1	C: 01703 1	06006 1	I: 77745 1	C: 13771 1	C: 03466 0	I: 77616 0
05,3770	C: 00000 1	C: 02342 0	C: 00000 1	C: 01060 0	C: 03774 0	C: 03775 1	CKSM 66070 0	@

OCTAL LISTING FOR PARAGRAPH # 050, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2000	54016 1	00006 1	22012 1	11322 1	12010 0	12007 0	12132 1	36214 0
06,2010	54070 1	55322 1	11241 0	02063 0	02063 0	57241 1	74347 1	55241 0
06,2020	64076 1	00006 1	01010 1	02072 0	55221 0	44772 0	54073 1	57201 0
06,2030	64771 1	55201 1	51201 0	11226 1	11201 1	12030 1	12047 1	C: 22400 0
06,2040	10073 1	C: 37764 0	55221 0	00002 0	54073 1	34355 0	12031 0	64770 0
06,2050	51201 0	55226 1	74347 1	54073 1	34344 0	51201 0	74063 1	60073 0
06,2060	00006 1	01010 1	16706 1	30101 1	74752 1	00006 1	12126 1	11221 0
06,2070	02024 0	12126 1	42037 0	27322 1	37663 0	54027 0	31334 1	00006 1
06,2100	06032 0	74753 0	00006 1	12116 1	23334 1	00006 1	06001 0	55334 0
06,2110	74753 0	10000 0	12116 1	05120 1	C: 03311 1	C: 60102 1	50070 0	12120 1
06,2120	12124 0	13001 1	12124 0	12167 1	04714 1	C: 20000 0	00006 1	01010 1
06,2130	32041 0	12075 0	34753 1	71322 1	00006 1	12163 0	11221 0	02024 0
06,2140	12150 0	44753 0	27322 1	37663 0	54027 0	34760 1	27322 1	05323 0
06,2150	00006 1	01010 1	37663 0	26027 0	34760 1	27322 1	11322 1	05323 0
06,2160	C: 37737 0	02152 0	05323 0	00006 1	01010 1	34753 1	12142 0	31333 0
06,2170	00006 1	06030 1	72764 1	00006 1	12224 0	54070 1	23333 0	00006 1
06,2200	06001 0	55333 1	44770 1	56070 0	00006 1	62517 0	12210 1	64770 0
06,2210	24070 0	60000 1	54000 0	12210 1	56071 1	50070 0	34753 1	71333 1
06,2220	50070 0	02760 1	10071 0	12207 1	41333 1	74762 1	10000 0	12366 1
06,2230	34761 0	71333 1	10000 0	12237 1	34761 0	27333 1	12366 1	34761 0
06,2240	64762 0	40000 0	71333 1	55333 1	74753 0	10000 0	12342 1	41333 1
06,2250	74760 0	10000 0	12255 0	05671 1	C: 00213 1	02740 0	33670 0	05233 0
06,2260	C: 02265 1	C: 14063 1	12366 1	33670 0	05260 0	44767 1	71333 1	57333 0
06,2270	74767 1	00006 1	12305 1	34753 1	71333 1	00006 1	12263 0	40074 0
06,2300	74761 1	10000 0	15314 0	04655 0	C: 17625 0	34752 0	00006 1	05012 1
06,2310	04714 1	C: 17207 1	05511 1	45071 1	00006 1	05012 1	35025 0	05260 0
06,2320	34763 1	64765 1	64766 1	40000 0	71333 1	55333 1	44763 0	71334 0
06,2330	55334 0	02706 1	44752 1	00006 1	03012 1	35020 0	05233 0	C: 03175 1
06,2340	C: 16063 0	15314 0	34765 1	00006 1	02012 0	10000 0	12366 1	34761 0
06,2350	70074 0	10000 0	12366 1	02751 0	04714 1	C: 17207 1	34764 0	00006 1
06,2360	05012 1	05511 1	34763 1	05223 1	C: 02312 0	12366 1	31334 1	75055 0
06,2370	54001 1	35055 1	00006 1	03033 1	00006 1	06001 0	00006 1	12426 1

OCTAL LISTING FOR PARAGRAPH # 051, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2400	54070 1	23334 1	00006 1	06001 0	55334 0	34772 1	56070 0	60000 1
06,2410	12413 1	64770 0	24070 0	60000 1	54000 0	12412 0	56071 1	50070 0
06,2420	34754 0	71334 0	50070 0	02766 1	10071 0	12411 0	10034 1	12433 0
06,2430	12471 0	12433 0	12471 0	62516 1	00006 1	62470 0	63557 0	00006 1
06,2440	62466 1	34765 1	00006 1	02012 0	10000 0	12466 0	35045 0	54003 0
06,2450	41465 0	74346 0	10000 0	12460 0	34770 0	70075 1	10000 0	12466 0
06,2460	04714 1	C: 17070 0	36211 0	05233 0	C: 03064 0	C: 16063 0	34763 1	12471 0
06,2470	34772 1	61241 1	74763 0	00006 1	15323 1	71241 0	10000 0	12513 0
06,2500	34763 1	71333 1	10000 0	15323 1	41241 0	74763 0	64752 0	57241 1
06,2510	72160 0	27241 0	15323 1	02771 1	15323 1	12504 0	C: 63434 1	74750 0
06,2520	54071 0	31333 0	74752 1	00006 1	12531 0	34765 1	00006 1	05011 1
06,2530	12222 0	02771 1	12222 0	44765 0	00006 1	03011 1	12222 0	34767 0
06,2540	71333 1	10000 0	12222 0	34753 1	71333 1	00006 1	12562 0	34752 0
06,2550	00006 1	02012 0	00006 1	12555 1	12222 0	34767 0	27333 1	05671 1
06,2560	C: 00207 1	12222 0	41333 1	74762 1	27333 1	12222 0	10000 0	12354 0
06,2570	35021 1	00006 1	03014 1	42774 0	00006 1	03012 1	44762 1	70101 0
06,2600	54101 0	44754 1	00006 1	03011 1	02746 0	04714 1	C: 17121 0	44772 0
06,2610	54050 0	54051 1	54052 1	54047 0	42777 0	00006 1	03014 1	12222 0
06,2620	00006 1	12646 0	41334 0	74763 0	27334 0	04714 1	C: 17121 0	44760 0
06,2630	70104 0	54104 0	34762 0	64761 0	40000 0	70074 0	56074 1	40000 0
06,2640	74761 1	10000 0	12222 0	05671 1	C: 00214 0	12222 0	34767 0	71333 1
06,2650	10000 0	12222 0	12562 0	10000 0	34757 0	57333 0	73000 0	27333 1
06,2660	02706 1	41333 1	74770 1	10000 0	12424 0	31333 0	72776 1	10000 0
06,2670	12424 0	05671 1	C: 00212 0	12424 0	10000 0	12424 0	05671 1	C: 01105 1
06,2700	12424 0	10000 0	12424 0	05671 1	C: 01106 1	12424 0	34776 0	71333 1
06,2710	00006 1	74757 1	31333 0	00006 1	04001 1	40000 0	75054 1	10000 0
06,2720	12731 1	34770 0	71334 0	10000 0	00002 0	44770 1	00006 1	03011 1
06,2730	00002 0	00006 1	22066 1	05770 1	34770 0	00006 1	05011 1	00066 1
06,2740	47667 0	00006 1	03012 1	35001 0	00006 1	05012 1	41241 0	77664 0
06,2750	27241 0	41333 1	75012 0	27333 1	41334 0	74763 0	27334 0	00002 0
06,2760	12537 0	12706 0	12706 0	12566 1	C: 76400 1	12620 0	12653 1	12674 1
06,2770	12701 1	41334 0	74770 1	15651 1	C: 00272 0	C: 00300 1	C: 01720 0	C: 00740 1

OCTAL LISTING FOR PARAGRAPH # 052, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3000	C: 76777 1	31337 1	00006 1	06030 1	74762 1	54070 1	10000 0	03221 0
06,3010	11323 0	13015 1	13015 1	03256 0	15323 1	31337 1	00006 1	06033 1
06,3020	75001 1	26070 1	23337 1	00006 1	06001 0	55337 0	30374 1	75001 1
06,3030	00006 1	13037 1	54001 1	45001 1	71337 0	60001 0	55337 0	41337 0
06,3040	75001 1	00006 1	13047 0	74764 1	10000 0	03047 1	37702 0	55354 0
06,3050	11330 1	03143 1	03115 1	11354 0	03132 1	03071 1	03101 1	03124 0
06,3060	11332 0	03123 1	34770 0	00006 1	05012 1	34124 1	05223 1	C: 03171 0
06,3070	03124 0	03101 1	03154 1	05671 1	C: 00116 1	34775 0	55331 0	03104 1
06,3100	03154 1	34766 1	71337 0	15651 1	34766 1	64767 0	40000 0	71337 0
06,3110	55337 0	44770 1	00006 1	03012 1	00002 0	11354 0	03137 1	03127 0
06,3120	11331 0	03150 0	03146 1	55332 0	31354 1	55330 1	05323 0	11331 0
06,3130	55331 0	03124 0	03101 1	03142 0	05671 1	C: 00116 1	03104 1	34772 1
06,3140	55331 0	55332 0	03154 1	11354 0	03124 0	03154 1	34763 1	55332 0
06,3150	03213 1	04077 0	03257 1	03124 0	11323 0	03161 1	03161 1	03160 0
06,3160	03124 0	34772 1	54740 0	54741 1	03257 1	36211 0	05223 1	C: 03263 0
06,3170	03124 0	34772 1	54036 0	55327 1	43671 0	54035 0	44770 1	00006 1
06,3200	03012 1	34124 1	05260 0	41337 0	74757 1	27337 0	46211 1	71337 0
06,3210	55337 0	03221 0	05314 1	34772 1	55331 0	41337 0	76211 1	27337 0
06,3220	00002 0	34762 0	00006 1	02030 0	10000 0	13247 1	34767 0	71337 0
06,3230	10000 0	00002 0	34761 0	61241 1	74761 1	00006 1	16711 1	54001 1
06,3240	31241 1	00006 1	06001 0	74750 0	64752 0	55241 0	00002 0	34770 0
06,3250	71334 0	10000 0	00002 0	34761 0	71241 0	13235 1	24002 0	44767 1
06,3260	00006 1	03012 1	00002 0	31354 1	00006 1	13267 0	13272 1	34761 0
06,3270	00006 1	05012 1	34767 0	00006 1	05012 1	05314 1	33535 1	56003 1
06,3300	54163 1	11477 0	13305 0	13305 0	13422 1	00004 0	34766 1	77702 1
06,3310	54132 0	50132 1	31453 1	00006 1	50132 1	71314 1	54002 1	30001 0
06,3320	00006 1	74763 0	50132 1	55315 0	30002 0	00006 1	74763 0	50132 1
06,3330	21315 0	50132 1	41452 1	00006 1	71277 0	00006 1	74766 0	50132 1
06,3340	21315 0	10132 0	13307 1	00003 1	55477 0	54130 1	00006 1	41315 0
06,3350	52155 1	31463 1	03425 1	00006 1	41317 1	52155 1	41466 0	03425 1
06,3360	41460 0	03454 1	00006 1	41317 1	52155 1	31464 0	03425 1	00006 1
06,3370	41321 1	52155 1	41467 1	03425 1	41461 1	03454 1	00006 1	41317 1

OCTAL LISTING FOR PARAGRAPH # 053, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
06,3400    52155 1   31470 0   03425 1   00006 1   41321 1   52155 1   31465 1   03425 1
06,3410    31462 0   03454 1   11477 0   13415 0   13422 1   35057 0   05121 0 C: 03507 0
06,3420 C: 14063 1   00003 1   30163 0   54003 0   14651 0   56154 1   00006 1   70154 0
06,3430    52123 0   30155 0   00006 1   70154 0   54001 1   34772 1   20123 0   30122 0

06,3440    00006 1   74755 0   50130 0   21472 0   30123 1   00006 1   74755 0   54001 1
06,3450    34772 1   50130 0   21472 0   00002 0   00006 1   22131 1   00006 1   71277 0
06,3460    22155 0   00006 1   74765 0   50130 0   21472 0   30155 0   00006 1   74765 0
06,3470    54001 1   34772 1   50130 0   21472 0   34767 0   60130 0   56130 0   50000 1

06,3500    11471 0   13503 0   00131 1   77702 1   10000 0   55477 0   00131 1   31335 0
06,3510    00006 1   13513 1   15205 1   34766 1   54130 1   50130 0   31472 1   00006 1
06,3520    74761 1   50130 0   55472 0   34772 1   50130 0   57471 1   00006 1   74761 1
06,3530    50130 0   21472 0   10130 1   67702 0   13514 0 C: 01471 1   33535 1   04636 0

06,3540 C: 17244 0   04636 0 C: 17644 1   13544 0   34766 1   54130 1   50130 0   31472 1
06,3550    00006 1   74761 1   50130 0   23472 1   10130 1   67702 0   13545 1 C: 75252 0
06,3560    15205 1   11477 0   13565 0   13565 0   15205 1   00004 0   30076 0   74752 1
06,3570    00006 1   15205 1   30025 0   57277 1   00003 1   40000 0   61277 1   10000 0

06,3600    64770 0   13606 0   13604 1   15205 1   40000 0   64750 1   00006 1   74757 1
06,3610    52123 0   00006 1   30123 1   52155 1   34772 1   55477 0   54130 1   41460 0
06,3620    03636 1   00006 1   40123 0   52155 1   31461 0   03636 1   00006 1   40123 0
06,3630    52155 1   41462 1   03636 1   11477 0   13513 1   15205 1   56002 0   54131 0

06,3640    30002 0   00006 1   70154 0   50130 0   21472 0   30002 0   00006 1   70155 1
06,3650    54001 1   34772 1   50130 0   21472 0   13474 1   04636 0 C: 17214 0   11477 0
06,3660    13663 0   13663 0   15205 1   37652 1   57277 1   40000 0   61105 1   13577 0
06,3670 C: 21450 0 C: 16037 1 I: 43014 0 C: 05660 1 C: 05461 1 I: 43014 0 C: 05662 0 C: 05463 0

06,3700 I: 77745 1 C: 11762 1 C: 03764 1 C: 03665 1 I: 77201 1 C: 00001 0 C: 02541 0 I: 41446 1
06,3710 I: 70501 1 C: 00050 1 I: 51515 1 C: 03554 0 I: 55301 0 C: 00047 1 I: 53664 0 C: 00046 0
06,3720 C: 57175 0 I: 41215 1 C: 33412 0 I: 65301 0 C: 00047 1 C: 03750 0 I: 56342 1 I: 75457 0
06,3730 C: 20172 1 I: 53515 0 C: 02541 0 I: 47315 0 C: 02611 0 I: 77656 1 I: 72441 0 C: 03504 0

06,3740 I: 45421 1 C: 60315 0 C: 13300 0 C: 03464 1 I: 43345 1 C: 03764 1 C: 33432 1 C: 03764 1
06,3750 I: 77025 0 C: 33417 0 C: 00006 1 I: 52044 0 C: 63566 1 C: 24050 1 I: 77620 0 C: 02356 0
06,3760 I: 57575 1 C: 02601 1 C: 15756 1 C: 02603 0 C: 03407 1 I: 51414 1 C: 05356 1 C: 45550 0
06,3770 I: 51025 1 C: 13306 0 C: 45550 0 I: 77775 1 C: 11762 1 C: 37405 1 C: 45550 0 CKSM 04275 0
```

OCTAL LISTING FOR PARAGRAPH # 054, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
07,2000   02062 1   05354 0   C: 00030 1   12005 1   12010 0   05354 0   C: 00026 0   12015 0
07,2010   34772 1   55747 0   55753 0      34773 0   12016 0   34770 0   54301 1      4665 0
07,2020   55336 1   04636 0   C: 20575 1   32061 1   04636 0   C: 20604 1   12031 0   12042 1
07,2030   12052 0   05527 1   02073 1      05354 0   C: 00003 1   12037 0   02040 1   04103 1

07,2040   04655 0   C: 67370 1   37645 1   05121 0   C: 05524 1   C: 04067 1   35052 0   05176 1
07,2050   31336 0   04660 0      10301 1   12021 1   34321 0      55250 0      32060 0   12024 1
07,2060   C: 14431 1   C: 14600 1   36211 0   71247 0   10000 0   12071 1   34767 0   27247 0
07,2070   00002 0   07706 1   C: 31211 1   00004 0   37702 0   55323 0   34772 1   54301 1

07,2100   44765 0   70075 1   54075 1   00003 1   00002 0   54016 1   30035 1   54361 1
07,2110   30036 1   54357 1   30033 1   54356 0   30034 0   54360 0   30032 0   54362 1
07,2120   00006 1   30025 0   52355 0   00006 1   30355 1   52014 0   56002 0   54012 0
07,2130   34763 1   00006 1   02016 1   10000 0   02154 0   34762 0   00006 1   02016 1

07,2140   10000 0   02344 0   34342 0   00006 1   02016 1   00006 1   12151 1   04655 0
07,2150   C: 17675 0   05671 1   C: 00113 1   05323 0   11341 1   12160 0   12160 0   34772 1
07,2160   64770 0   05233 0   C: 02165 1   C: 16067 1   15323 1   34753 1   70105 1   10000 0
07,2170   12204 1   31341 0   00006 1   62204 0   44770 1   54353 0   30362 0   02325 1

07,2200   30356 1   02325 1   30360 1   02325 1   34753 1   70076 1   10000 0   12314 1
07,2210   34755 1   70101 0   10000 0   12304 0   10301 1   12221 0   05671 1   C: 00114 0
07,2220   05314 1   54301 1   05547 1   C: 00032 0   05354 0   C: 00030 1   12235 0   24301 0
07,2230   05547 1   C: 00061 0   05547 1   C: 00052 0   12240 1   05354 0   C: 00026 0   12314 1

07,2240   25747 1   00006 1   30355 1   51753 1   53540 0   00006 1   30357 0   51753 1
07,2250   53542 1   00006 1   30361 0   51753 1   53544 1   30362 0   51753 1   55545 0
07,2260   05354 0   C: 00030 1   12273 1   44172 0   61753 1   00006 1   12270 1   12273 1
07,2270   34772 1   55753 0   12275 1   34774 1   27753 0   10301 1   15314 0   37644 0

07,2300   05135 0   C: 02052 1   C: 16067 1   15314 0   36211 0   05607 0   C: 00354 0   C: 01674 0
07,2310   35047 1   05121 0   C: 02230 1   C: 76067 1   36211 0   05607 0   C: 00354 0   C: 01722 1
07,2320   34753 1   70076 1   10000 0   15314 0   12275 1   24353 1   00006 1   50353 1
07,2330   20032 1   10000 0   12336 1   00002 0   12336 1   00002 0   67701 0   00006 1

07,2340   62335 0   05671 1   C: 00121 0   15314 0   34753 1   70076 1   00006 1   12367 0
07,2350   31722 1   00006 1   12355 1   00006 1   62360 0   37702 0   55722 0   05323 0
07,2360   34762 0   70105 1   00006 1   15323 1   05547 1   C: 00231 1   05323 0   34765 1
07,2370   70075 1   10000 0   02376 1   05671 1   C: 00110 1   05323 0   05561 0   C: 00032 0
```

OCTAL LISTING FOR PARAGRAPH # 055, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2400	05354 0	C: 00030 1	12422 0	05561 0	C: 00052 0	11753 0	12411 0	34172 1
07,2410	12413 1	44774 0	61753 1	54070 1	00006 1	50070 0	41540 0	50070 0
07,2420	53540 0	12433 0	24301 0	05354 0	C: 00026 0	12433 0	44770 1	27747 0
07,2430	44774 0	27753 0	12413 1	37644 0	05135 0	C: 02023 1	C: 16067 1	15323 1
07,2440	I: 74345 0	I: 76455 1	C: 00023 0	I: 50206 0	C: 03540 0	I: 41552 0	I: 72316 0	C: 00155 0
07,2450	I: 50315 0	C: 03540 0	C: 03540 0	I: 57551 1	C: 00155 0	I: 50315 0	C: 03554 0	C: 03554 0
07,2460	I: 76371 0	I: 71244 0	C: 16500 0	C: 03764 1	I: 77025 0	C: 33432 1	C: 00001 0	I: 77654 0
07,2470	C: 11407 1	I: 70545 1	C: 03464 1	C: 03464 1	I: 77621 1	C: 03470 1	C: 37462 0	C: 15744 1
07,2500	I: 41566 1	I: 45276 0	C: 00007 0	C: 14013 0	I: 45425 0	C: 77762 1	I: 77646 0	C: 14017 1
07,2510	C: 00013 0	I: 45246 0	C: 00017 1	I: 71240 1	C: 50123 1	C: 00015 0	C: 34013 1	C: 50123 1
07,2520	I: 41406 0	I: 74241 0	C: 02611 0	C: 02611 0	I: 51352 1	I: 63256 0	I: 74246 1	I: 43572 0
07,2530	I: 45345 1	C: 02347 0	C: 00364 0	I: 77634 0	C: 45636 0	I: 77612 1	C: 14772 0	C: 02347 0
07,2540	C: 00364 0	I: 77545 0	C: 01771 1	30772 0	56771 0	22007 0	30155 0	00006 1
07,2550	10771 1	56001 0	31773 0	00006 1	21313 0	00006 1	70001 1	55657 0
07,2560	22007 0	30154 1	00006 1	10771 1	56001 0	30330 1	00006 1	21312 1
07,2570	00006 1	70001 1	55656 1	34770 0	54772 1	50772 0	31656 0	00006 1
07,2600	62610 1	62626 1	00006 1	62617 0	42626 0	50772 0	55656 1	12617 1
07,2610	40000 0	62626 1	00006 1	62617 0	32626 1	50772 0	55656 1	10772 1
07,2620	12574 1	06006 1	I: 77745 1	C: 02657 1	C: 34736 1	C: 31161 0	C: 77177 0	00004 0
07,2630	41241 0	75004 1	10000 0	12637 0	05671 1	C: 00206 0	13622 0	03616 0
07,2640	41334 0	74763 0	27334 0	40000 0	74764 1	27334 0	41333 1	74765 0
07,2650	27333 1	40000 0	74766 0	27333 1	45004 1	00006 1	03012 1	03207 1
07,2660	34764 0	00006 1	05012 1	05511 1	34763 1	05223 1	C: 02677 0	41333 1
07,2670	74760 0	10000 0	12675 0	05671 1	C: 00210 1	00003 1	14651 0	03606 1
07,2700	05511 1	44764 1	00006 1	03012 1	35025 0	05260 0	03606 1	34765 1
07,2710	64766 1	40000 0	71333 1	55333 1	34763 1	64764 0	40000 0	71334 0
07,2720	55334 0	04714 1	C: 14706 0	13563 0	00004 0	03616 0	03070 0	36211 0
07,2730	05233 0	C: 02734 0	C: 16063 0	12675 0	03606 1	34763 1	00006 1	05012 1
07,2740	34767 0	55474 0	51474 1	31307 1	00006 1	51474 1	20032 1	00006 1
07,2750	74754 1	56001 0	60000 1	54061 1	12756 0	26001 1	51474 1	23471 1
07,2760	11474 0	02741 1	34767 0	05260 0	03606 1	54061 1	34767 0	55474 0
07,2770	51474 1	11471 0	02776 0	03005 1	03043 0	03005 1	63663 1	00006 1

OCTAL LISTING FOR PARAGRAPH # 056, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3000	63053 1	51474 1	55471 0	43664 1	24061 0	64771 1	51474 1	54050 0
07,3010	11474 0	02767 0	10061 1	13057 1	05255 0	C: 00226 1	34767 0	54061 1
07,3020	50000 1	30032 0	00006 1	50061 0	21307 0	10000 0	13034 1	13031 1
07,3030	13034 1	10061 1	13017 0	13563 0	63042 1	00006 1	63031 0	05671 1
07,3040	C: 00211 0	13625 1	C: 77511 1	63663 1	00006 1	63053 1	40000 0	51474 1
07,3050	55471 0	33664 0	03004 0	34772 1	51474 1	57471 1	03004 0	37673 1
07,3060	00006 1	05014 1	33665 1	12763 0	34763 1	00006 1	05012 1	05314 1
07,3070	34765 1	00006 1	02012 0	10000 0	00002 0	44763 0	00006 1	03012 1
07,3100	44757 1	00006 1	03014 1	44772 0	54047 0	34765 1	00006 1	05012 1
07,3110	41241 0	77664 0	27241 0	41334 0	74763 0	27334 0	41333 1	74765 0
07,3120	27333 1	44764 1	70075 1	54075 1	44752 1	70076 1	54076 1	44754 1
07,3130	70077 0	54077 0	00002 0	00004 0	03616 0	45001 1	00006 1	03012 1
07,3140	44763 0	71334 0	55334 0	03207 1	34757 0	05223 1	C: 03155 0	35017 1
07,3150	05223 1	C: 03153 0	12675 0	03606 1	13563 0	03613 0	15314 0	34765 1
07,3160	00006 1	02012 0	10000 0	15314 0	41333 1	74754 1	27333 1	44765 0
07,3170	71333 1	55333 1	04714 1	C: 14706 0	15314 0	03613 0	15314 0	41333 1
07,3200	74757 1	27333 1	41334 0	74754 1	27334 0	44764 1	13170 0	47664 0
07,3210	71241 0	64752 0	55241 0	00002 0	44772 0	54037 1	54040 1	54041 0
07,3220	03613 0	14651 0	00004 0	44770 1	71333 1	55333 1	04714 1	C: 14706 0
07,3230	12675 0	00004 0	41333 1	74770 1	27333 1	74757 1	10000 0	12675 0
07,3240	05671 1	C: 00212 0	00004 0	13226 0	54161 0	03616 0	11324 1	03307 0
07,3250	34763 1	00006 1	05014 1	34766 1	05233 0	C: 03324 1	C: 16063 0	30161 1
07,3260	56003 1	56161 1	55324 1	74350 1	54061 1	34767 0	54157 0	60000 1
07,3270	60061 0	54160 1	00006 1	50000 1	31401 0	52155 1	07224 1	52155 1
07,3300	50160 0	53401 1	10157 0	13266 1	30161 1	54003 0	12675 0	00006 1
07,3310	30134 1	52155 1	33323 0	15163 1	11324 1	13312 0	00006 1	30155 0
07,3320	52134 0	34770 0	13254 0	C: 17314 1	43560 0	00006 1	03014 1	03575 0
07,3330	31324 0	00006 1	74765 0	50000 1	13335 0	03352 0	C: 00202 1	03352 0
07,3340	C: 00302 0	03350 1	C: 00100 0	34772 1	55324 1	33323 0	05167 1	13153 1
07,3350	44766 0	27324 1	50002 0	30000 1	54064 1	74774 0	64754 0	27324 1
07,3360	54003 0	74350 1	54061 1	44774 0	70064 1	54064 1	00006 1	50061 0
07,3370	31401 0	52071 0	10070 1	13406 1	13376 1	13541 0	10071 0	13403 1

OCTAL LISTING FOR PARAGRAPH # 057, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3400	13330 0	13536 0	13330 0	63437 1	00006 1	63330 1	00006 1	33562 0
07,3410	20071 0	30064 0	00006 1	05014 1	36043 0	70071 0	56071 1	00006 1
07,3420	74761 1	54062 1	30070 0	00006 1	74760 0	54070 1	30001 0	00006 1
07,3430	74753 0	26062 1	00006 1	30071 1	67702 0	10000 0	13503 0	C: 77601 0
07,3440	13444 1	34753 1	26062 1	34772 1	50061 0	53401 1	30062 0	54047 0
07,3450	03570 0	30047 1	00006 1	74757 1	66214 0	05223 1	C: 03467 1	03463 0
07,3460	15314 0	34767 0	54047 0	34757 0	00006 1	05014 1	00002 0	44760 0
07,3470	00006 1	03014 1	03461 1	34770 0	05223 1	C: 03324 1	34760 1	00006 1
07,3500	05014 1	03461 1	15314 0	50061 0	53401 1	34753 1	60062 0	54047 0
07,3510	00006 1	74757 1	67700 1	05223 1	C: 03516 0	13457 0	03570 0	31324 0
07,3520	54003 0	74350 1	54061 1	50061 0	11400 0	13531 1	34753 1	26047 0
07,3530	13450 1	50061 0	55400 0	34753 1	26047 0	13510 1	63437 1	00006 1
07,3540	63330 1	00006 1	43562 1	20071 0	30064 0	64760 1	00006 1	05014 1
07,3550	40070 1	54070 1	40071 0	76043 1	40000 0	56071 1	40000 0	13417 1
07,3560	C: 01700 1	C: 00000 1	C: 00034 0	00006 1	00011 1	74770 1	67702 0	13626 1
07,3570	34765 1	00006 1	02012 0	10000 0	13601 1	41333 1	74763 0	10000 0
07,3600	00002 0	34772 1	55324 1	33323 0	05167 1	13625 1	34763 1	71333 1
07,3610	10000 0	13625 1	00002 0	41333 1	74763 0	15651 1	41333 1	74763 0
07,3620	10000 0	00002 0	44772 0	55335 1	12675 0	44772 0	54072 0	11335 1
07,3630	13632 1	13641 0	34772 1	57335 0	05167 1	40072 0	50064 0	26164 0
07,3640	15314 0	30072 1	55335 1	15314 0	11335 1	13661 1	13656 0	13652 1
07,3650	55335 1	12675 0	10000 0	13661 1	24133 0	13650 0	04665 0	55335 1
07,3660	15163 1	05726 1	C: 21210 1	C: 77500 1	C: 77477 0	C: 00074 1	54016 1	56002 0
07,3670	54012 0	04366 0	34342 0	00006 1	02015 1	54073 1	40101 0	74752 1
07,3700	26101 0	05120 1	C: 02000 0	C: 60102 1	30073 0	50064 0	54154 0	05323 0
07,3710	54016 1	56002 0	54012 0	04366 0	34772 1	56045 0	54073 1	30075 0
07,3720	74755 0	10000 0	13726 0	30073 0	27116 1	25117 1	34766 1	00006 1
07,3730	05011 1	34342 0	70073 1	56073 0	00006 1	74757 1	55137 1	74342 1
07,3740	63774 0	03771 0	34757 0	00006 1	71137 1	74342 1	40000 0	03771 0
07,3750	45000 0	60073 0	00006 1	13761 0	34765 1	70103 1	10000 0	05323 0
07,3760	03701 1	44765 0	70103 1	54103 1	03701 1	40103 1	74765 0	26103 1
07,3770	05323 0	60073 0	10000 0	03765 0	C: 77740 1	03765 0	00002 0	CKSM 65667 0

OCTAL LISTING FOR PARAGRAPH # 060, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2000	30036 1	54001 1	10000 0	67673 1	12006 1	12003 1	00006 1	62016 1
10,2010	31327 0	00006 1	12014 1	12020 0	56001 0	12017 1	34772 1	55327 1
10,2020	11323 0	02025 1	02025 1	04077 0	05323 0	31354 1	00006 1	12226 1
10,2030	00006 1	65323 0	34757 0	71337 0	10000 0	02040 1	05671 1	C: 00120 1
10,2040	34767 0	00006 1	02012 0	00006 1	12204 1	34770 0	55323 0	51323 1
10,2050	31312 0	00006 1	51323 1	20035 0	00006 1	74754 1	56001 0	60000 1
10,2060	54061 1	12063 1	26001 1	51323 1	23325 1	11323 0	12140 1	54061 1
10,2070	10036 0	64751 0	12074 1	12071 1	00006 1	62124 1	31327 0	00006 1
10,2100	12124 0	74752 1	54001 1	31326 1	74752 1	00006 1	06001 0	10000 0
10,2110	12124 0	11313 0	64751 0	12115 1	12112 0	00006 1	62120 0	12124 0
10,2120	41326 0	55326 0	34772 1	54736 1	31354 1	00006 1	12212 0	04077 0
10,2130	34770 0	55323 0	50000 1	11325 0	02153 1	02160 1	02170 0	02160 1
10,2140	55323 0	40035 0	61312 0	54002 1	02047 0	10000 0	34750 1	02151 0
10,2150	44750 0	54001 1	02063 0	62211 1	00006 1	62175 0	42210 1	24061 0
10,2160	64771 1	51323 1	54053 0	11323 0	02131 0	10061 1	12200 0	05323 0
10,2170	62211 1	00006 1	62175 0	32210 0	12157 1	51323 1	57325 1	12157 1
10,2200	35050 1	00006 1	05014 1	05323 0	34767 0	00006 1	05012 1	05323 0
10,2210	C: 77654 0	C: 77655 1	40741 1	60736 0	64771 1	54001 1	40740 0	60735 0
10,2220	64771 1	52054 1	00006 1	30736 0	52741 1	02200 1	34761 0	00006 1
10,2230	02012 0	00006 1	12234 1	02032 1	34761 0	00006 1	05012 1	05323 0
10,2240	I: 43414 1	C: 04756 1	C: 20243 0	I: 53775 1	C: 01521 0	C: 57605 0	I: 53655 1	C: 01535 0
10,2250	C: 57576 1	C: 25030 0	C: 01527 0	I: 53257 1	C: 57602 1	C: 01543 1	I: 77657 0	C: 57576 1
10,2260	C: 15036 0	C: 01517 0	C: 01044 0	I: 77616 0	I: 53775 1	C: 01521 0	C: 57605 0	I: 53655 1
10,2270	C: 01535 0	C: 57576 1	C: 25720 0	C: 01527 0	I: 53257 1	C: 57602 1	C: 01543 1	I: 77657 0
10,2300	C: 57576 1	C: 01726 0	I: 77616 0	04474 1	04714 1	C: 45165 1	31307 1	55646 0
10,2310	04463 1	35053 1	05135 0	C: 02141 1	C: 56066 1	05314 1	I: 43025 1	C: 03464 1
10,2320	C: 05661 0	C: 37462 0	C: 15744 1	I: 43014 0	C: 05702 1	C: 20347 0	C: 05703 0	C: 20347 0
10,2330	I: 75345 1	C: 13310 1	C: 00005 1	I: 77765 0	C: 03466 0	C: 03464 1	I: 43276 0	C: 03462 1
10,2340	C: 17462 1	C: 00001 0	I: 43014 0	C: 05463 0	C: 05462 1	C: 37466 1	C: 24050 1	I: 60345 0
10,2350	C: 00005 1	C: 00050 1	I: 54065 0	C: 00001 0	C: 00047 1	I: 77657 0	C: 20601 1	C: 17464 1
10,2360	C: 00001 0	C: 03466 0	I: 51545 1	C: 03464 1	I: 45206 1	C: 13306 0	I: 71240 1	C: 20404 0
10,2370	I: 50025 0	C: 13312 0	C: 20377 0	I: 75345 1	C: 13312 0	C: 03464 1	C: 03464 1	I: 45345 1

OCTAL LISTING FOR PARAGRAPH # 061, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2400	C: 03462 1	C: 03464 1	C: 37462 0	C: 15744 1	I: 77145 1	C: 03460 0	C: 00002 0	I: 52150 1
10,2410	C: 03745 1	C: 63535 1	I: 67201 0	C: 00001 0	C: 03012 1	I: 41542 1	I: 65346 0	I: 65356 1
10,2420	C: 03316 0	I: 74346 0	C: 03550 1	I: 73525 1	C: 03316 0	I: 53361 0	C: 03556 1	I: 77772 0
10,2430	C: 02722 1	I: 76435 1	C: 03542 1	I: 65361 0	I: 53361 0	C: 03542 1	I: 77772 0	C: 2714 1
10,2440	I: 76435 1	C: 02722 1	C: 26730 1	C: 01734 0	C: 26672 0	C: 01742 1	C: 26700 1	C: 01750 1
10,2450	C: 02706 1	I: 77650 1	C: 47344 1	I: 75345 1	C: 11760 0	C: 00031 0	C: 14031 0	C: 11762 1
10,2460	I: 77614 1	C: 04032 1	C: 25663 0	00004 0	52071 0	05120 1	C: 03377 1	C: 60102 1
10,2470	52071 0	00003 1	52006 0	22073 0	30065 1	74774 0	60000 1	54061 1
10,2500	30065 1	75056 0	00006 1	74755 0	54062 1	30065 1	74076 0	56065 1
10,2510	75053 0	10000 0	15416 0	30062 0	50061 0	55154 1	10066 0	12533 1
10,2520	12521 1	40072 0	22072 1	50071 1	53154 1	10066 0	12527 1	12533 1
10,2530	40025 1	50071 1	55255 0	10065 0	12547 1	12552 0	40025 1	50061 0
10,2540	55255 0	30065 1	62545 1	10000 0	12545 0	C: 17777 0	12552 0	00006 1
10,2550	30025 0	53303 1	40062 1	50061 0	55153 0	30002 0	22073 0	00003 1
10,2560	52006 0	22073 0	30062 0	50061 0	55154 1	30070 0	50061 0	55256 0
10,2570	00006 1	30064 0	50061 0	53435 0	12516 0	34772 1	54155 1	37664 1
10,2600	12745 1	54155 1	33733 0	12745 1	54155 1	33723 1	12745 1	54155 1
10,2610	37664 1	13103 1	54155 1	33754 1	12745 1	34770 0	03172 0	30100 0
10,2620	73734 0	10000 0	12670 0	30100 0	74760 0	00006 1	12630 1	15205 1
10,2630	44773 1	70100 1	64770 0	54100 1	22007 0	41274 0	74761 1	10000 0
10,2640	12645 0	30367 0	74171 0	54001 1	12651 0	41274 0	74764 1	10000 0
10,2650	12653 1	40367 1	54367 1	34770 0	54164 0	13316 1	30165 0	54156 1
10,2660	50164 1	33740 1	54162 0	50164 1	31273 0	54160 1	54003 0	00002 0
10,2670	30100 0	77646 0	10000 0	13676 1	34766 1	03755 0	13000 0	30367 0
10,2700	74171 0	13350 0	54155 1	34772 1	12745 1	54155 1	34763 1	12745 1
10,2710	54155 1	34772 1	54160 1	34772 1	13105 1	34772 1	54155 1	33722 0
10,2720	12745 1	54155 1	34753 1	12745 1	54155 1	34753 1	12712 0	54155 1
10,2730	33750 0	12745 1	05547 1	C: 00111 0	12744 0	05547 1	C: 00111 0	34765 1
10,2740	54160 1	34772 1	13105 1	54155 1	34765 1	54160 1	03157 1	13012 0
10,2750	54155 1	35013 0	13103 1	54155 1	35013 0	12745 1	34772 1	54164 0
10,2760	03623 0	12766 0	30100 0	73747 1	10000 0	13041 0	30100 0	77716 1
10,2770	00006 1	12774 0	34772 1	13226 0	30100 0	73745 0	00006 1	13002 1

OCTAL LISTING FOR PARAGRAPH # 062, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3000	34770 0	13226 0	03171 0	03431 1	05167 1	03445 1	30025 0	55005 1
10,3010	34772 1	13062 1	30167 1	77660 1	54163 1	37655 0	05176 1	30116 0
10,3020	73735 1	10000 0	12756 0	13025 1	12615 0	34767 0	54164 0	03623 0
10,3030	13043 1	41275 1	74765 0	10000 0	13043 1	30100 0	73727 1	00006 1
10,3040	13043 1	05726 1	C: 21502 0	03173 1	30163 0	00006 1	04007 1	54365 0
10,3050	30100 0	73730 1	10000 0	13210 0	13056 0	13210 0	03431 1	05167 1
10,3060	03445 1	34767 0	54164 0	13315 1	54155 1	37667 1	12745 1	55250 0
10,3070	33720 1	54155 1	33717 0	12745 1	54775 0	34537 1	54155 1	35775 1
10,3100	12745 1	54155 1	34765 1	54160 1	36214 0	00004 0	54072 0	30167 1
10,3110	77660 1	54063 0	30160 0	74765 0	10000 0	13123 0	30063 1	05121 0
10,3120	C: 03012 1	C: 20067 1	13131 0	30006 1	00006 1	04007 1	54001 1	33744 0
10,3130	05146 1	03157 1	00006 1	30156 0	50064 0	52156 1	00006 1	30160 0
10,3140	50064 0	52160 1	30064 0	54161 0	03164 1	00003 1	14660 1	55250 0
10,3150	33720 1	54155 1	33717 0	13103 1	54155 1	35001 0	13103 1	00004 0
10,3160	45046 1	70160 1	60003 1	54160 1	22002 0	04665 0	54157 0	60072 1
10,3170	00001 0	34772 1	54164 0	30160 0	50164 1	55273 1	75004 1	00006 1
10,3200	13204 0	30157 1	50164 1	54371 0	30155 0	50164 1	54366 0	13454 0
10,3210	50164 1	33740 1	75045 1	03755 0	44770 1	60164 1	54154 0	50154 1
10,3220	33725 1	05167 1	03445 1	50154 1	33725 1	15163 1	54154 0	03431 1
10,3230	05167 1	30154 1	50064 0	54154 0	33752 1	03446 1	50154 1	33741 0
10,3240	73743 0	03762 1	50154 1	34764 0	03755 0	30100 0	74766 0	10000 0
10,3250	02630 0	13002 1	34772 1	54160 1	50160 0	33736 0	03762 1	50160 0
10,3260	33725 1	05167 1	13555 0	31275 0	54003 0	30365 1	00006 1	01007 1
10,3270	77660 1	05176 1	46214 1	60373 0	14660 1	00003 1	31276 0	54156 1
10,3300	30100 0	77673 0	10000 0	13306 0	13713 0	12630 1	05547 1	C: 00105 0
10,3310	34753 1	70100 1	10000 0	13010 1	13061 1	22007 0	02660 0	30160 0
10,3320	74774 0	26001 1	44754 1	50164 1	71273 1	50164 1	55273 1	74761 1
10,3330	10000 0	35044 1	54141 1	30156 0	54165 1	55276 1	50164 1	10366 0
10,3340	13347 0	13455 1	40367 1	54367 1	76043 1	63731 1	60141 0	64770 0
10,3350	04203 1	13467 0	04417 1	02656 0	33732 1	03762 1	30160 0	04264 0
10,3360	13315 1	34764 0	70160 1	10000 0	13407 0	34765 1	70160 1	10000 0
10,3370	13504 1	40160 1	74763 0	10000 0	13401 0	50164 1	30371 1	54157 0

OCTAL LISTING FOR PARAGRAPH # 063, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3400	13602 1	50164 1	30366 1	76043 1	00006 1	13504 1	15205 1	30160 0
10,3410	74754 1	10000 0	13365 0	34754 0	50164 1	27273 1	22007 0	00006 1
10,3420	62677 0	74755 0	00006 1	13427 1	40777 1	63746 1	13350 0	33721 0
10,3430	13350 0	44764 1	00006 1	03011 1	30100 0	73732 0	10000 0	34770 0
10,3440	54001 1	34772 1	50001 0	57245 0	00002 0	34170 0	56064 0	00006 1
10,3450	63454 1	56064 0	50064 0	54164 0	15642 0	37654 1	05135 0	C: 04247 1
10,3460	C: 04060 0	13505 0	30100 0	77667 0	00006 1	13041 0	15205 1	11245 1
10,3470	15205 1	13473 0	15205 1	30162 1	73732 0	03755 0	04240 0	04356 0
10,3500	50164 1	33724 0	55246 1	05163 0	04360 0	30164 1	54157 0	30162 1
10,3510	77675 0	03755 0	11245 1	13462 0	13516 1	13462 0	04240 0	33557 0
10,3520	55245 1	05163 0	44354 0	60154 1	00006 1	26000 0	00006 1	13703 1
10,3530	30100 0	74076 0	10000 0	13536 0	13651 1	13640 1	30366 1	00006 1
10,3540	13651 1	40025 1	61005 0	10000 0	40000 0	67663 0	64770 0	63774 0
10,3550	00006 1	63010 0	13651 1	34770 0	13253 1	11217 0	15205 1	C: 21522 1
10,3560	13561 1	30100 0	74767 1	60157 1	66061 0	00006 1	13607 1	31217 1
10,3570	64767 0	50157 1	60371 1	54157 0	30162 1	73751 0	03762 1	46214 1

10,3600	04202 0	13602 1	30163 0	77660 1	05176 1	30157 1	14660 1	05561 0
10,3610	C: 00111 0	31217 1	64770 0	10000 0	37700 1	13571 0	13621 0	44770 1
10,3620	13571 0	33753 0	13573 1	40160 1	74753 0	10000 0	16706 1	40157 0
10,3630	50164 1	60371 1	00006 1	13635 0	00002 0	11215 1	05205 0	00002 0
10,3640	34766 1	03762 1	13555 0	34770 0	55217 0	30100 0	74346 0	10000 0
10,3650	13306 0	30100 0	73736 1	10000 0	13252 0	30100 0	73737 0	10000 0
10,3660	13553 0	34765 1	64763 1	71275 1	10000 0	13555 0	30370 0	00006 1
10,3670	13555 0	35054 0	05121 0	C: 03061 0	C: 20060 0	13555 0	30100 0	73736 1
10,3700	10000 0	15205 1	13210 0	50157 1	30366 1	76043 1	40000 0	60155 0
10,3710	00006 1	13530 0	13275 0	46214 1	04202 0	15205 1	15205 1	C: 00036 1
10,3720	C: 00231 1	C: 14400 0	C: 20010 1	C: 40036 0	C: 21006 1	C: 20630 0	C: 21061 0	C: 11210 1
10,3730	C: 66521 1	C: 01177 1	C: 00700 0	C: 40030 0	C: 34300 0	C: 40100 1	C: 02020 1	C: 01010 1
10,3740	C: 20144 1	C: 42424 0	C: 11254 1	C: 74700 0	C: 03012 1	C: 10200 1	C: 30200 0	C: 20100 1
10,3750	C: 24030 1	C: 74040 0	C: 03217 0	C: 55772 0	C: 40210 0	54001 1	40100 1	70001 1
10,3760	26100 1	00002 0	40000 0	70100 1	54100 1	00002 0	00004 0	54001 1
10,3770	30133 0	55363 1	30134 1	05700 0	C: 77467 1	35023 0	12750 0	CKSM 52742 1

OCTAL LISTING FOR PARAGRAPH # 064, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2000	I: 77614 1	C: 00475 1	I: 44175 1	C: 03415 1	C: 01023 1	C: 03604 0	I: 46135 1	C: 03747 0
11,2010	C: 22022 1	I: 72575 0	C: 03570 0	C: 27570 0	C: 03576 0	I: 77752 1	C: 27576 0	C: 03604 0
11,2020	I: 77752 1	C: 03604 0	I: 71331 0	C: 03505 1	C: 77776 1	I: 70546 1	C: 17630 1	I: 67154 0
11,2030	C: 00154 1	C: 02703 1	I: 77775 1	C: 03570 0	C: 26657 1	C: 03604 0	C: 16665 0	C: 03423 1
11,2040	C: 02673 1	I: 77201 1	C: 00001 0	C: 03570 0	I: 41456 0	I: 53435 0	C: 03576 0	C: 26676 1
11,2050	C: 03604 0	I: 50256 0	I: 43015 1	C: 03630 1	C: 03665 1	C: 03630 1	I: 43044 0	C: 22101 1
11,2060	C: 03465 0	I: 41575 0	C: 02665 0	I: 63246 1	I: 46206 1	C: 02676 1	I: 51352 1	I: 74256 0
11,2070	I: 77772 0	C: 02665 0	I: 67351 1	C: 11762 1	C: 03505 1	I: 77244 0	C: 22101 1	C: 02665 0
11,2100	C: 03604 0	I: 63345 0	C: 27740 1	C: 02665 0	I: 63256 0	C: 02657 1	I: 41456 0	I: 57435 1
11,2110	C: 00003 1	I: 77606 1	I: 71350 1	C: 03745 1	C: 00023 0	I: 62040 1	C: 22120 1	C: 77767 1
11,2120	I: 67310 1	C: 00012 1	C: 00047 1	I: 77230 0	C: 22126 1	I: 41476 1	I: 77775 1	I: 50235 0
11,2130	I: 71244 0	C: 22133 0	I: 41476 1	I: 67154 0	C: 00000 1	C: 02674 0	I: 45150 1	C: 03745 1
11,2140	C: 25255 1	I: 77214 0	C: 00675 0	C: 02746 0	C: 17612 1	C: 02704 0	I: 45030 0	C: 34003 0
11,2150	C: 27516 0	I: 43135 1	C: 03747 0	C: 00263 0	I: 43030 0	C: 22157 1	C: 00063 1	I: 77775 1
11,2160	C: 03570 0	C: 02657 1	C: 25535 0	C: 03612 1	C: 15543 1	C: 03503 1	C: 01517 0	I: 43015 1
11,2170	C: 03423 1	C: 01673 1	C: 34041 0	C: 27211 0	I: 77775 1	C: 00025 0	C: 02705 1	I: 63154 1
11,2200	C: 03504 0	C: 00001 0	I: 55134 1	C: 03504 0	C: 02703 1	I: 46135 1	C: 00050 1	C: 34000 0
11,2210	I: 52375 1	C: 03604 0	C: 00017 1	I: 77655 1	C: 02665 0	C: 16665 0	C: 03630 1	I: 77650 1
11,2220	C: 22056 1	I: 46135 1	C: 03747 0	C: 22240 1	I: 70575 1	C: 03620 0	C: 27620 0	C: 03612 1
11,2230	I: 77742 0	C: 27612 1	C: 03604 0	I: 77742 0	C: 27604 0	C: 03646 0	I: 77742 0	C: 03646 0
11,2240	I: 77201 1	C: 00001 0	C: 03604 0	C: 03415 1	I: 77614 1	C: 01227 1	C: 01023 1	I: 45020 1
11,2250	C: 00300 1	C: 47530 1	I: 77624 1	C: 34756 1	I: 66370 0	C: 00022 1	C: 00051 0	C: 00006 1
11,2260	I: 61373 1	C: 02736 1	C: 01734 0	I: 77656 1	C: 06736 0	I: 77700 0	C: 22260 0	I: 75160 1
11,2270	C: 00306 1	C: 02671 0	I: 77624 1	C: 34730 1	I: 77624 1	C: 47344 1	I: 77650 1	C: 00300 1
11,2300	C: 22437 1	C: 16067 1	C: 15625 1	C: 21042 1	C: 30276 1	C: 04773 0	C: 25004 1	C: 06702 1
11,2310	C: 16471 1	C: 01352 1	C: 21412 0	C: 20500 0	C: 25477 1	C: 03367 0	C: 27533 1	C: 07571 0
11,2320	I: 77745 1	C: 00041 1	C: 00745 1	I: 52014 0	C: 01753 1	C: 27364 0	C: 27350 1	I: 77420 1
11,2330	C: 03536 1	05402 1	C: 04022 0	06006 1	I: 77650 1	C: 03536 1	I: 40354 1	C: 02150 1
11,2340	C: 00001 0	I: 75543 1	C: 50037 0	I: 53515 0	C: 01535 0	I: 60325 0	C: 00045 0	C: 00047 1
11,2350	I: 77715 1	I: 65241 0	C: 01543 1	C: 02303 0	I: 60225 1	C: 01551 1	C: 00051 0	I: 77742 0
11,2360	I: 65271 0	C: 00003 1	I: 41405 0	C: 00005 1	I: 65316 0	C: 00005 1	I: 64716 0	C: 50037 0
11,2370	I: 40442 1	I: 47515 0	C: 01543 1	I: 44205 0	C: 00045 0	I: 41271 0	C: 00003 1	I: 53605 1

OCTAL LISTING FOR PARAGRAPH # 065, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
11,2400   C: 23771 1   C: 20176 0   I: 43260 1   C: 00050 1   I: 45257 0   C: 20211 1   I: 41205 0   C: 00001 0
11,2410   C: 00005 1   I: 53657 0   C: 20211 1   C: 20201 0   I: 65215 1   C: 01553 0   I: 53605 1   C: 00001 0
11,2420   C: 20202 0   I: 43204 0   C: 57544 0   I: 77626 0   C: 75500 0   I: 74020 0   C: 02267 0   C: 00012 1
11,2430   I: 74014 1   C: 00303 1   C: 24077 1   C: 00002 0   I: 77650 1   C: 24077 1   I: 66350 1   C: 01500 0

11,2440   C: 00051 0   C: 77762 1   I: 54345 1   C: 02305 0   C: 20612 0   I: 61500 0   C: 22447 0   I: 43206 1
11,2450   C: 01551 1   C: 16303 0   I: 77615 0   C: 01517 0   C: 35517 1   C: 22336 1   I: 73150 1   C: 02150 1
11,2460   C: 02150 1   I: 77775 1   C: 11762 1   C: 26202 0   C: 02152 0   I: 53257 1   C: 57605 0   C: 01535 0
11,2470   C: 02160 1   I: 65014 1   C: 01756 1   C: 22500 1   C: 01500 0   C: 12216 1   I: 77724 0   C: 01500 0

11,2500   I: 53575 0   C: 02152 0   C: 16152 0   C: 00045 0   C: 02301 1   I: 77624 1   C: 22602 0   I: 66175 1
11,2510   C: 02160 1   C: 00051 0   C: 16152 0   C: 02210 0   C: 02301 1   I: 71214 0   C: 00342 1   C: 22754 1
11,2520   C: 01517 0   I: 77624 1   C: 54136 1   I: 72174 0   C: 00002 0   C: 00051 0   I: 77614 1   C: 00343 0
11,2530   C: 22533 1   I: 77076 0   C: 00000 1   C: 02160 1   C: 26262 0   C: 00003 1   C: 02271 1   I: 77214 0

11,2540   C: 01756 1   C: 22554 0   C: 02152 0   I: 53761 1   C: 02301 1   C: 57175 0   I: 65051 0   C: 02160 1
11,2550   C: 01500 0   C: 12224 0   I: 77724 0   C: 01500 0   I: 62175 0   C: 02262 0   C: 00004 0   I: 43014 0
11,2560   C: 04260 1   C: 00343 0   C: 22567 0   I: 53261 1   C: 20612 0   C: 02271 1   C: 02271 1   I: 77624 1
11,2570   C: 22602 0   I: 62174 1   C: 00004 0   C: 00004 0   I: 77775 1   C: 02271 1   C: 36160 0   C: 22602 0

11,2600   I: 77650 1   C: 22754 1   I: 74575 0   C: 02160 1   I: 40236 1   C: 00001 0   I: 61501 1   C: 00040 0
11,2610   I: 60325 0   C: 02301 1   C: 00041 1   I: 63342 1   C: 02160 1   I: 77656 1   C: 16160 1   C: 00045 0
11,2620   C: 02210 0   I: 55301 0   C: 00042 1   I: 41562 0   I: 77743 1   C: 27732 1   C: 00051 0   I: 57124 1
11,2630   C: 00050 1   C: 00040 0   I: 71264 1   C: 00041 1   C: 00003 1   I: 65057 0   C: 57177 1   C: 00050 1

11,2640   I: 74406 0   I: 50315 0   C: 02152 0   C: 02160 1   I: 44372 1   I: 57206 1   C: 00005 1   I: 77752 1
11,2650   I: 43206 1   C: 33412 0   I: 75406 1   I: 41475 1   C: 00013 0   I: 43352 1   C: 33412 0   I: 43325 1
11,2660   C: 00013 0   C: 11760 0   I: 72475 1   C: 00011 1   I: 56215 1   C: 23747 1   C: 00017 1   I: 74275 1
11,2670   C: 00007 0   C: 02160 1   I: 64515 1   C: 02152 0   I: 41455 0   I: 41345 0   C: 00001 0   C: 00015 0

11,2700   I: 61501 1   C: 00037 0   I: 40665 0   C: 00003 1   C: 50037 0   I: 74276 1   I: 57124 1   C: 00050 1
11,2710   C: 00051 0   I: 55064 0   C: 00036 1   C: 00037 0   I: 77600 1   C: 22716 1   I: 65057 0   C: 57177 1
11,2720   C: 00050 1   I: 77655 1   C: 02202 0   C: 02202 0   I: 43400 1   C: 22726 1   I: 51575 1   C: 01521 0
11,2730   I: 77654 0   C: 22751 1   I: 54345 1   C: 02212 1   C: 20612 0   I: 44206 0   C: 01551 1   C: 16303 0

11,2740   C: 01517 0   I: 45425 0   C: 42260 0   C: 22336 1   I: 77624 1   C: 23420 0   I: 77614 1   C: 04020 1
11,2750   C: 27364 0   I: 77776 1     05726 1   C: 20430 1   I: 71354 0   C: 02150 1   C: 02301 1   I: 44601 0
11,2760   C: 00001 0   C: 50007 0   I: 43044 0   C: 23212 1   C: 00343 0   C: 23221 1   I: 65375 0   C: 02152 0
11,2770   C: 01517 0   I: 45125 0   C: 23745 0   C: 55370 0   C: 24017 1   C: 11754 1   I: 45006 0   C: 23227 1
```

OCTAL LISTING FOR PARAGRAPH # 066, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3000	I: 77715 1	C: 11760 0	I: 45006 0	C: 23227 1	I: 77772 0	C: 24041 1	I: 77772 0	C: 14025 0
11,3010	C: 00023 0	I: 65275 1	C: 23755 1	C: 00023 0	I: 57316 1	C: 23757 0	I: 41425 1	C: 23753 1
11,3020	I: 41275 1	C: 00023 0	C: 23763 1	I: 65372 1	C: 00001 0	I: 44275 1	C: 23771 1	I: 57206 1
11,3030	C: 00023 0	I: 65275 1	C: 23765 1	C: 00003 1	I: 44275 1	C: 23767 0	I: 56203 0	C: 50033 1
11,3040	C: 02301 1	I: 56615 0	C: 00005 1	C: 50027 1	I: 43271 1	C: 02301 1	C: 00003 1	I: 77761 1
11,3050	C: 02152 0	C: 14033 1	I: 70403 1	C: 50033 1	I: 43271 1	C: 02301 1	I: 50473 1	C: 50027 1
11,3060	I: 43271 1	C: 02301 1	I: 76561 1	C: 00025 0	I: 77645 0	C: 00033 1	C: 14033 1	C: 02301 1
11,3070	I: 63501 0	C: 00047 1	I: 60316 0	C: 00051 0	I: 54606 0	C: 50023 0	I: 40161 0	C: 00033 1
11,3100	C: 23101 0	I: 56070 0	C: 00046 0	C: 00046 0	I: 53670 0	C: 00050 1	C: 20153 1	I: 40055 0
11,3110	C: 02202 0	C: 22726 1	C: 16202 0	C: 00017 1	I: 41414 0	C: 00343 0	C: 23212 1	I: 65316 0
11,3120	C: 00021 1	I: 45316 1	I: 74205 0	C: 27756 0	C: 02152 0	I: 65332 0	I: 53361 0	C: 00041 1
11,3130	I: 47315 0	C: 00041 1	C: 00025 0	I: 74372 1	C: 00021 1	I: 41455 0	I: 77745 1	C: 00023 0
11,3140	I: 41516 0	I: 65205 0	C: 27756 0	I: 43302 1	C: 00011 1	I: 41221 0	C: 33416 1	C: 00017 1
11,3150	I: 74205 0	C: 27756 0	C: 02152 0	I: 65272 0	I: 74225 1	C: 33416 1	C: 00041 1	I: 53372 1
11,3160	I: 41325 0	C: 00017 1	C: 00023 0	I: 74205 0	C: 27756 0	C: 00025 0	I: 53352 0	I: 60325 0
11,3170	C: 02301 1	C: 00050 1	I: 67206 1	C: 01770 0	I: 74271 0	I: 63257 1	C: 57601 1	I: 67206 1
11,3200	C: 01767 0	I: 53361 0	I: 70257 0	C: 20146 0	I: 40055 0	C: 02202 0	C: 22726 1	C: 02202 0
11,3210	I: 77754 1	C: 02150 1	I: 72135 0	C: 01501 1	C: 00154 1	I: 73205 1	C: 27760 0	C: 00155 0
11,3220	C: 23234 0	I: 77745 1	C: 02156 1	C: 24023 0	C: 11754 1	I: 77650 1	C: 23007 1	I: 57435 1
11,3230	C: 02012 0	I: 77655 1	I: 43505 0	C: 00025 0	C: 23445 0	C: 23451 0	C: 23462 0	I: 45014 0
11,3240	C: 00342 1	C: 23245 0	C: 23317 0	I: 77640 0	C: 23354 1	I: 51575 1	C: 01521 0	I: 77600 1
11,3250	C: 23273 0	I: 51025 1	C: 23761 0	C: 23273 0	I: 53615 0	C: 23761 0	C: 57605 0	I: 45271 1
11,3260	C: 00013 0	C: 27762 1	I: 77244 0	C: 23273 0	C: 01527 0	I: 45246 0	C: 23761 0	I: 77600 1
11,3270	C: 23273 0	I: 77640 0	C: 23275 0	I: 77624 1	C: 23420 0	I: 77775 1	C: 01527 0	C: 24763 0
11,3300	C: 01521 0	C: 00755 0	I: 77614 1	C: 00261 1	I: 66375 0	C: 00755 0	C: 01501 1	C: 00000 1
11,3310	C: 16152 0	C: 11762 1	C: 02212 1	I: 52014 0	C: 00301 0	C: 23664 1	C: 22456 0	I: 43020 1
11,3320	C: 02267 0	C: 04340 1	C: 23332 1	I: 45145 0	C: 01517 0	C: 54141 1	I: 57414 1	C: 00343 0
11,3330	C: 23331 1	C: 02262 0	I: 77354 0	C: 02150 1	C: 01521 0	I: 53257 1	C: 57605 0	C: 01535 0
11,3340	I: 51414 1	C: 00343 0	C: 23347 0	I: 44302 0	C: 27764 1	I: 77650 1	C: 02267 0	I: 51451 0
11,3350	C: 02262 0	I: 52025 1	C: 27764 1	C: 02267 0	I: 77624 1	C: 23360 0	I: 77650 1	C: 23275 0
11,3360	I: 45020 1	C: 02267 0	C: 23420 0	I: 53775 1	C: 01535 0	C: 57576 1	I: 53651 0	C: 02262 0
11,3370	C: 57574 0	C: 01503 0	C: 15535 0	C: 01517 0	I: 77624 1	C: 54144 1	I: 57414 1	C: 00343 0

OCTAL LISTING FOR PARAGRAPH # 067, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
11,3400   C: 23401 0   I: 53715 1   C: 01543 1   C: 57576 1   I: 77651 0   I: 77657 0   C: 57574 0   C: 01511 0
11,3410   C: 01543 1   I: 67154 0   C: 02267 0   C: 00052 0   I: 52014 0   C: 00303 1   C: 27011 1   C: 27016 0
11,3420   I: 77354 0   C: 02150 1   C: 01521 0   I: 53257 1   C: 57605 0   C: 01535 0   C: 01503 0   C: 25535 0
11,3430   C: 01527 0   I: 53257 1   C: 57602 1   C: 01543 1   C: 01511 0   C: 25543 1   C: 11762 1   C: 01521 0

11,3440   C: 15527 0   C: 11762 1   C: 01551 1   C: 01553 0   I: 77616 0   I: 64575 1   C: 02202 0   C: 36166 0
11,3450   C: 23625 1   I: 74575 0   C: 02202 0   I: 53206 0   C: 02166 1   C: 26174 1   I: 53362 0   C: 02166 1
11,3460   C: 36166 0   C: 23625 1   I: 57345 1   C: 02212 1   C: 23771 1   I: 74206 0   C: 02166 1   I: 53372 1
11,3470   C: 00763 0   I: 53361 0   C: 02212 1   C: 00755 0   C: 24755 0   C: 02202 0   I: 53322 1   C: 02174 1

11,3500   I: 76561 1   I: 77655 1   C: 00763 0   C: 00763 0   I: 45014 0   C: 00341 1   C: 23556 0   C: 22327 1
11,3510   I: 77354 0   C: 00770 1   C: 00763 0   I: 77732 1   C: 12467 1   I: 77775 1   C: 00755 0   I: 40132 0
11,3520   C: 23650 0   C: 12401 1   I: 77624 1   C: 22327 1   I: 66354 0   C: 00770 1   C: 00052 0   C: 00000 1
11,3530   I: 67114 1   C: 00006 1   C: 00754 1   I: 45104 0   C: 23621 0   C: 22327 1   I: 67154 0   C: 00754 1

11,3540   C: 00770 1   I: 77624 1   C: 22327 1   I: 76754 0   C: 00770 1   C: 75376 1   I: 77722 0   C: 00755 0
11,3550   I: 76173 0   C: 75310 1   C: 00000 1   I: 77722 0   C: 34763 1   C: 23304 1   I: 77200 0   C: 22726 1
11,3560   C: 00763 0   C: 25527 0   C: 00755 0   C: 01521 0   I: 43014 0   C: 04715 0   C: 27656 1   C: 01756 1
11,3570   C: 27364 0   I: 77776 1      05402 1   C: 04022 0      05547 1   C: 00230 0      06006 1   I: 77731 1

11,3600   C: 00053 1   C: 23606 0   I: 52014 0   C: 01714 1   C: 26761 0   C: 27034 0   I: 66214 0   C: 00061 0
11,3610   C: 00771 0   C: 77741 0   I: 66214 0   C: 01755 1   C: 23541 0   C: 00771 0   C: 77717 0   I: 77650 1
11,3620   C: 23541 0   I: 77745 1   C: 00745 1   C: 34041 0   C: 27243 1   I: 43345 1   C: 02305 0   C: 02212 1
11,3630   I: 66110 1   C: 77763 0   C: 01500 0   C: 02212 1   I: 74561 0   C: 02202 0   I: 74255 0   C: 00763 0

11,3640   C: 02212 1   I: 77655 1   C: 00755 0   C: 02152 0   I: 52014 0   C: 00301 0   C: 23664 1   C: 22436 0
11,3650   I: 43014 0   C: 01676 1   C: 01671 0   I: 77614 1   C: 02676 1   I: 77414 0   C: 01472 1      05671 1
11,3660   C: 00421 0      06006 1   I: 77650 1   C: 27364 0   I: 70754 0   C: 02150 1   C: 50037 0   C: 36210 1
11,3670   C: 23712 1   C: 02202 0   I: 62014 0   C: 00342 1   C: 23212 1   C: 77771 0   I: 70744 1   C: 02150 1

11,3700   C: 50041 1   C: 36210 1   C: 23712 1   I: 50414 0   C: 00303 1   C: 23706 1   I: 77655 1   C: 02202 0
11,3710   C: 36202 1   C: 23212 1   I: 60575 0   C: 02152 0   I: 53513 0   C: 02216 0   I: 46315 1   C: 02152 0
11,3720   I: 52361 1   C: 23761 0   I: 60325 0   C: 00045 0   C: 00052 0   I: 63406 0   I: 77605 1   I: 65301 0
11,3730   C: 00043 0   C: 02210 0   I: 56342 1   I: 77761 1   I: 57154 0   C: 00051 0   C: 00051 0   I: 57074 0

11,3740   C: 00051 0   C: 00042 1   I: 43457 0   C: 57606 0   C: 04631 1   C: 23146 0   C: 14000 1   C: 00000 1
11,3750   C: 02314 0   C: 31463 1   C: 01400 1   C: 00000 1   C: 03000 1   C: 00000 1   C: 36000 1   C: 00000 1
11,3760   C: 30000 1   C: 00000 1   C: 22525 0   C: 12525 0   C: 22000 1   C: 00000 1   C: 01200 1   C: 00000 1
11,3770   C: 25252 0   C: 25253 1   C: 03772 0   C: 03773 1   CKSM 43450 1      @      @      @
```

OCTAL LISTING FOR PARAGRAPH # 070, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
12,2000      05167 1      44756 0      50064 0      26164 0      00072 1   I: 77620 0   C: 02551 1   C: 17405 0
12,2010  C: 03413 1   C: 34041 0   C: 45236 1   I: 43014 0   C: 01311 0   C: 24017 1   C: 00470 1   I: 77775 1
12,2020  C: 03546 0   C: 27640 0   C: 03540 0   C: 37632 1   C: 15756 1   I: 77624 1   C: 72721 0   I: 61375 1
12,2030  C: 03405 0   C: 00001 0   I: 77772 0   C: 37646 1   C: 02551 1   I: 43014 0   C: 01311 0   C: 24041 1

12,2040  C: 00470 1   I: 43345 1   C: 02355 0   C: 03663 1   C: 03663 1   I: 52025 1   C: 02461 0   C: 11662 0
12,2050  I: 77601 0   C: 00001 0   I: 51545 1   C: 03462 1   I: 50025 0   C: 13302 1   C: 45406 1   I: 43174 1
12,2060  C: 00007 0   C: 05700 0   C: 63566 1   I: 43014 0   C: 05742 0   C: 24070 0   C: 05703 0   C: 63566 1
12,2070  I: 71214 0   C: 05460 0   C: 13304 1   I: 77765 0   C: 03462 1   C: 37462 0   C: 45406 1   I: 77624 1

12,2100  C: 24577 1   I: 53575 0   C: 01503 0   C: 16647 0   C: 00045 0   C: 24041 1   C: 01503 0   I: 76441 1
12,2110  C: 01511 0   I: 76405 1   C: 00023 0   C: 24043 0   C: 01511 0   I: 57236 1   C: 00017 1   I: 52405 1
12,2120  C: 00041 1   I: 61425 0   C: 33410 1   C: 00045 0   I: 74421 0   C: 33410 1   I: 77671 1   C: 00041 1
12,2130  C: 00011 1   I: 71244 0   C: 24141 0   C: 33426 1   I: 40071 0   C: 00011 1   C: 24145 1   I: 52166 1

12,2140  C: 24145 1   I: 55366 1   C: 33430 0   I: 77600 1   C: 24145 1   C: 00013 0   I: 65205 0   C: 00023 0
12,2150  C: 00011 1   I: 65301 0   C: 00047 1   I: 56257 1   C: 20173 0   I: 50000 1   C: 24172 0   C: 24172 0
12,2160  I: 51525 1   C: 02303 0   I: 50025 0   C: 00001 0   C: 24172 0   I: 77765 0   C: 02303 0   C: 16303 0
12,2170  I: 77650 1   C: 24160 0   I: 71201 1   C: 00001 0   C: 02277 1   C: 00025 0   I: 53165 0   C: 02303 0

12,2200  C: 24347 1   I: 51440 0   C: 24347 1   I: 51025 1   C: 00013 0   C: 24347 1   I: 51145 0   C: 02303 0
12,2210  C: 24217 0   I: 57545 1   C: 00013 0   C: 14015 0   C: 11762 1   C: 34013 1   C: 24222 0   I: 77745 1
12,2220  C: 11762 1   C: 00015 0   I: 57345 1   C: 02303 0   C: 33421 0   I: 77646 0   C: 15026 1   C: 01553 0
12,2230  I: 77621 1   C: 00025 0   C: 02643 1   I: 63545 0   C: 00025 0   I: 41501 0   C: 00047 1   I: 53605 1

12,2240  C: 00011 1   C: 21573 0   C: 34031 1   C: 24462 1   I: 44200 0   C: 24355 1   C: 02303 0   C: 02645 1
12,2250  I: 44246 1   C: 01026 1   I: 71244 0   C: 24375 0   C: 00037 0   I: 60225 1   C: 01551 1   C: 00047 1
12,2260  I: 60325 0   C: 02643 1   C: 00050 1   I: 41260 0   C: 00047 1   C: 02645 1   I: 56257 1   C: 21202 1
12,2270  I: 41542 1   I: 71244 0   C: 24313 0   C: 00025 0   C: 00013 0   I: 45221 1   C: 00015 0   I: 51000 0

12,2300  C: 24305 1   C: 24305 1   I: 52145 0   C: 00001 0   C: 24325 0   I: 45345 1   C: 00015 0   C: 00025 0
12,2310  I: 52075 1   C: 33424 0   C: 24325 0   I: 77745 1   C: 00025 0   C: 00015 0   I: 45221 1   C: 00013 0
12,2320  I: 50000 1   C: 24341 1   C: 24341 1   I: 77745 1   C: 00001 0   C: 02643 1   I: 43254 0   C: 24375 0
12,2330  C: 00025 0   C: 14025 0   C: 00037 0   C: 01551 1   I: 46034 1   C: 24716 1   C: 24375 0   I: 77650 1

12,2340  C: 24233 0   I: 45345 1   C: 00013 0   C: 00025 0   I: 52075 1   C: 33424 0   C: 24325 0   I: 70545 1
12,2350  C: 00013 0   I: 77765 0   C: 02303 0   C: 34025 1   C: 24206 0   I: 50145 1   C: 00025 0   C: 24373 0
12,2360  C: 00013 0   I: 70545 1   C: 02643 1   C: 02643 1   I: 44254 1   C: 02267 0   C: 00025 0   C: 14025 0
12,2370  C: 01551 1   C: 34037 1   C: 24334 0   C: 34015 1   C: 24361 0   I: 44545 0   C: 00041 1   I: 74225 1
```

OCTAL LISTING FOR PARAGRAPH # 071, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
12,2400   C: 00035 1   C: 02647 0   I: 65372 1   C: 00025 0   I: 60316 0   C: 00047 1   I: 57275 0   C: 00023
12,2410   C: 00025 0   I: 53605 1   C: 00033 1   C: 21572 1   I: 77621 1   C: 00037 0   I: 74352 0   C: 01511 0
12,2420   I: 53372 1   I: 77712 0   C: 01535 0   I: 60246 1   C: 00050 1   C: 16655 0   C: 00031 0   I: 45275 0
12,2430   C: 00033 1   C: 33406 0   I: 76405 1   C: 00021 1   I: 53605 1   C: 00025 0   C: 56601 0   I: 74271 0

12,2440   C: 02655 0   C: 02647 0   I: 65372 1   C: 00035 1   I: 56257 1   C: 56602 0   C: 02655 0   I: 74221 0
12,2450   C: 33422 0   C: 01511 0   I: 42455 0   I: 77626 0   C: 62234 0   C: 00037 0   C: 15551 1   C: 00025 0
12,2460   C: 35553 1   C: 02267 0   I: 77776 1      07171 1   C: 00010 0   C: 02525 1   C: 12526 0   C: 67356 0
12,2470   C: 75666 0   C: 15001 1   C: 23771 1   C: 64342 0   C: 43674 0   C: 06563 1   C: 04645 1   C: 75173 0

12,2500   C: 52672 0   C: 00656 1   C: 14331 0   C: 77633 1   C: 40512 0   C: 00023 0   C: 11210 1   C: 77774 0
12,2510   C: 67506 0      06006 1   C: 14033 1   C: 00031 0   I: 77776 1      07171 1   C: 00010 0   C: 01000 0
12,2520   C: 00000 1   C: 72525 0   C: 52506 0   C: 13301 1   C: 15337 1   C: 62776 0   C: 54733 1   C: 11176 1
12,2530   C: 13267 0   C: 73410 0   C: 51674 0   C: 01446 0   C: 33641 1   C: 77451 1   C: 65233 0   C: 00055 1

12,2540   C: 37266 1   C: 77767 1   C: 52336 0      06006 1   I: 53605 1   C: 00001 0   C: 21574 1   C: 00035 1
12,2550   I: 72405 0   C: 00043 0   I: 65234 1   C: 45657 1   I: 53605 1   C: 00033 1   C: 21574 1   I: 72405 0
12,2560   C: 00045 0   I: 65234 1   C: 45657 1   C: 00041 1   I: 76261 0   C: 20607 1   I: 41301 0   C: 00047 1
12,2570   C: 00025 0   I: 76257 0   C: 20576 1   I: 57232 0   C: 00023 0   C: 00037 0   I: 77616 0   I: 40001 1

12,2600   C: 00001 0   C: 24602 0   I: 76731 0   C: 00027 1   C: 00024 1   C: 22301 0   C: 00017 1   I: 77616 0
12,2610   I: 71214 0   C: 00614 1   C: 24660 1   C: 00037 0   I: 60225 1   C: 02764 0   C: 00047 1   I: 60325 0
12,2620   C: 00015 0   C: 00050 1   I: 41260 0   C: 00047 1   C: 02762 0   I: 56257 1   C: 21202 1   I: 43142 1
12,2630   C: 04351 1   C: 24634 0   I: 75246 0   C: 02762 0   I: 51006 0   C: 24672 1   I: 43145 0   C: 03770 1

12,2640   C: 04311 0   C: 24643 0   C: 00017 1   I: 45221 1   C: 00011 1   I: 51000 0   C: 24652 0   C: 24652 0
12,2650   I: 77650 1   C: 24704 1   I: 45345 1   C: 00011 1   C: 03770 1   I: 52005 0   C: 33424 0   C: 24706 0
12,2660   I: 41335 1   C: 00051 0   C: 00011 1   I: 67206 1   C: 00051 0   I: 45205 1   C: 00017 1   I: 52165 1
12,2670   C: 02762 0   C: 24634 0   I: 43145 0   C: 03770 1   C: 04311 0   C: 24677 1   C: 00011 1   I: 45221 1

12,2700   C: 00017 1   I: 50000 1   C: 24710 1   C: 24710 1   I: 77745 1   C: 00001 0   C: 00015 0   I: 77616 0
12,2710   I: 45345 1   C: 00017 1   C: 03770 1   I: 52005 0   C: 33424 0   C: 24706 0      44770 1      50120 1
12,2720      26026 1      54154 0      06030 1   I: 44545 0   C: 00041 1   I: 74225 1   C: 00035 1   C: 02724 1
12,2730   I: 65372 1   C: 00025 0   I: 60316 0   C: 00047 1   I: 57275 0   C: 00023 0   C: 00025 0   I: 53605 1

12,2740   C: 00033 1   C: 21572 1   I: 77621 1   C: 00037 0   I: 74352 0   C: 02746 0   I: 53372 1   I: 41512 1
12,2750   I: 77646 0   I: 77701 1   C: 00047 1   C: 16722 1   C: 00031 0   I: 45205 1   C: 00033 1   C: 33406 0
12,2760   I: 76405 1   C: 00021 1   I: 53605 1   C: 00025 0   C: 21176 1   I: 74271 0   C: 02722 1   C: 02724 1
12,2770   I: 65372 1   C: 00035 1   I: 56257 1   C: 21175 1   C: 02722 1   I: 77621 1   C: 33422 0   I: 53361 0
```

OCTAL LISTING FOR PARAGRAPH # 072, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
12,3000  C: 02746 0  I: 43412 1  I: 45020 1  C: 02712 1  C: 25763 1  I: 77624 1  C: 37727 1  I: 45000 0
12,3010  C: 25027 0  C: 25032 1  I: 43145 0  C: 00031 0  C: 04310 1  C: 25760 1  I: 45014 0  C: 04273 0
12,3020  C: 24462 1  I: 45014 0  C: 03706 0  C: 02712 1  C: 24723 1  I: 77650 1  C: 02712 1  I: 77614 1
12,3030  C: 04033 0  C: 25760 1  I: 66374 1  C: 00003 1  C: 00052 0  C: 00001 0  I: 77614 1  C: 04276 0

12,3040  I: 65366 1  C: 02734 0  I: 44342 1  C: 33412 0  I: 54325 1  C: 02732 0  C: 21607 0  I: 77671 1
12,3050  I: 77600 1  C: 25165 1  I: 41225 1  C: 03770 1  I: 40132 0  C: 25165 1  I: 63406 0  I: 65351 0
12,3060  C: 00155 0  C: 02744 1  I: 76202 0  I: 75440 0  C: 25250 1  I: 43306 0  I: 61000 0  C: 25163 1
12,3070  C: 25056 0  I: 40065 0  C: 33406 0  C: 25250 1  I: 41440 1  C: 25250 1  I: 77716 1  I: 41301 0

12,3100  C: 00047 1  C: 02744 1  I: 77457 1  C: 21567 0     07171 1  C: 00005 1  C: 20000 0  C: 00000 1
12,3110  C: 72525 0  C: 52471 1  C: 03146 1  C: 15003 0  C: 75556 0  C: 45210 0  C: 01615 1  C: 13553 0
12,3120  C: 76371 0  C: 63777 0  C: 01232 0  C: 27367 0     06006 1  I: 76405 1  I: 43006 0  C: 04316 1
12,3130  C: 25235 1  I: 60316 0  C: 00047 1  I: 53605 1  C: 02744 1  C: 21565 1  C: 14031 0  C: 00041 1

12,3140  I: 75542 0  I: 41306 1  I: 77632 0  C: 00025 0  I: 60316 0  C: 00047 1  I: 41325 0  C: 02742 1
12,3150  C: 00041 1  I: 75452 0  I: 56405 0  C: 03770 1  C: 14043 0  C: 02744 1  I: 43021 0  C: 33410 1
12,3160  C: 04270 0  C: 00045 0  I: 77616 0  I: 77774 0  C: 00003 1  I: 51001 1  C: 00001 0  C: 25172 1
12,3170  I: 77614 1  C: 04076 1  I: 75545 1  C: 02742 1  I: 41325 0  C: 02732 0  C: 03770 1  I: 65352 0

12,3200  C: 02734 0  I: 43202 0  C: 33416 1  I: 41225 1  I: 55301 0  C: 00047 1  C: 02732 0  I: 51457 0
12,3210  C: 21174 0  I: 63406 0  C: 14043 0  C: 33414 0  I: 63406 0  I: 65234 1  C: 45657 1  C: 02744 1
12,3220  I: 40405 1  C: 00043 0  I: 77771 0  I: 75440 0  C: 25250 1  I: 77615 0  I: 60304 0  C: 25214 1
12,3230  C: 00047 1  I: 77665 1  I: 52057 1  C: 21172 0  C: 25074 0  I: 50145 1  C: 02744 1  C: 25250 1

12,3240  I: 60366 1  C: 00047 1  I: 53665 1  C: 33430 0  C: 20176 0  I: 41425 1  I: 77650 1  C: 25131 0
12,3250  I: 40001 1  C: 00001 0  C: 25253 1  I: 43414 1  C: 04070 1  I: 45020 1  C: 02712 1  C: 24577 1
12,3260  I: 57345 1  C: 02673 1  C: 33415 1  C: 03772 0  I: 77214 0  C: 00474 0  C: 02657 1  I: 45115 0
12,3270  C: 02665 0  C: 13717 1  C: 16732 0  C: 02722 1  I: 65301 0  C: 00047 1  C: 00041 1  I: 56342 1

12,3300  I: 65257 1  C: 20173 0  I: 77626 0  C: 75043 1  I: 44342 1  C: 33412 0  C: 02736 1  I: 53106 0
12,3310  C: 25524 0  I: 65301 0  C: 00047 1  C: 00001 0  I: 56342 1  I: 75457 0  C: 20176 0  I: 54325 1
12,3320  C: 02732 0  C: 20607 1  I: 43271 1  C: 02736 1  I: 77626 0  C: 77760 0  I: 50000 1  C: 25334 1
12,3330  C: 25337 1  I: 50025 0  C: 33434 1  C: 25337 1  I: 77745 1  C: 33434 1  C: 00017 1  I: 54345 1

12,3340  C: 02734 0  C: 20607 1  I: 45425 0  C: 61037 1  C: 02675 1  I: 71240 1  C: 25543 1  C: 02740 0
12,3350  I: 56352 0  C: 02732 0  I: 77600 1  C: 25543 1  C: 00011 1  I: 66214 0  C: 00715 1  C: 25530 0
12,3360  C: 00051 0  C: 00001 0  I: 77745 1  C: 03770 1  I: 77605 1  C: 02732 0  I: 45342 0  C: 02740 0
12,3370  I: 65301 0  C: 00047 1  C: 02736 1  I: 56257 1  C: 20170 0  I: 53040 0  C: 25462 0  C: 25462 0
```

OCTAL LISTING FOR PARAGRAPH # 073, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3400	C: 16742 1	C: 03770 1	I: 43316 1	C: 33420 1	I: 41301 0	C: 00047 1	C: 02742 1	I: 44257 1
12,3410	C: 20571 0	C: 33416 1	C: 16744 1	C: 02742 1	I: 45000 0	C: 25465 1	C: 25032 1	I: 77745 1
12,3420	C: 00037 0	C: 16764 0	C: 00031 0	I: 45014 0	C: 04310 1	C: 25462 0	C: 24462 1	I: 44200 0
12,3430	C: 25501 1	C: 02673 1	C: 02762 0	I: 44246 1	C: 03772 0	I: 47044 1	C: 25546 1	C: 24716 1
12,3440	I: 43030 0	C: 25511 0	C: 00714 0	C: 25451 0	I: 45345 1	C: 00037 0	C: 02764 0	I: 77654 0
12,3450	C: 25511 0	I: 77624 1	C: 24610 0	I: 53145 1	C: 00155 0	C: 25511 0	I: 77615 0	C: 03770 1
12,3460	C: 37770 0	C: 25364 1	I: 51145 0	C: 00015 0	C: 25504 1	I: 71201 1	C: 00001 0	C: 03770 1
12,3470	C: 00011 1	I: 70545 1	C: 00015 0	C: 00015 0	I: 44254 1	C: 25511 0	C: 03770 1	C: 37770 0
12,3500	C: 25364 1	I: 77745 1	C: 02764 0	C: 00037 0	I: 71201 1	C: 00001 0	C: 03770 1	C: 34017 0
12,3510	C: 25471 1	I: 51545 1	C: 02762 0	I: 41325 0	C: 02673 1	C: 33412 0	I: 45215 0	C: 33432 1
12,3520	I: 43044 0	C: 25546 1	C: 02434 0	C: 02712 1	I: 43001 1	C: 00001 0	C: 02434 0	C: 02712 1
12,3530	I: 71331 0	C: 00051 0	C: 10000 0	C: 00011 1	I: 65342 1	C: 00017 1	I: 43342 0	I: 77626 0
12,3540	C: 74007 0	C: 34015 1	C: 25364 1	I: 52145 0	C: 33436 0	C: 25354 1	I: 60345 0	C: 00041 1
12,3550	C: 00047 1	I: 70525 1	C: 02742 1	I: 77671 1	I: 75457 0	C: 20175 0	I: 72405 0	C: 00021 1
12,3560	I: 41206 0	C: 03770 1	I: 74261 1	C: 20206 1	C: 02724 1	I: 77725 1	I: 76561 1	C: 02676 1
12,3570	I: 53235 0	C: 02724 1	I: 43172 1	C: 02674 0	C: 02746 0	I: 53135 0	C: 02704 0	C: 25602 1
12,3600	I: 77650 1	C: 02712 1	I: 45145 0	C: 02722 1	C: 24751 1	C: 36705 0	C: 02712 1	I: 45020 1
12,3610	C: 02712 1	C: 25763 1	I: 77624 1	C: 37727 1	I: 71200 0	C: 25027 0	C: 33416 1	I: 41225 1
12,3620	C: 02744 1	C: 02742 1	I: 41366 1	C: 03770 1	I: 74212 0	C: 02714 1	I: 45325 1	C: 33410 1
12,3630	C: 02744 1	I: 52361 1	C: 02724 1	I: 53512 1	I: 77600 1	C: 25713 0	I: 60325 0	C: 02760 1
12,3640	C: 00047 1	I: 41325 0	C: 00041 1	C: 02742 1	I: 56257 1	C: 20201 0	I: 56225 1	C: 33414 0
12,3650	C: 00045 0	C: 00031 0	I: 63400 0	C: 20453 1	I: 50021 1	C: 33412 0	C: 20453 1	I: 75366 0
12,3660	C: 02757 0	I: 77614 1	C: 04272 1	I: 76561 1	C: 02676 1	I: 63235 0	C: 00001 0	I: 53361 0
12,3670	C: 00031 0	I: 41572 1	I: 56241 0	C: 02724 1	C: 33412 0	I: 40142 1	C: 25677 0	C: 26734 0
12,3700	C: 02724 1	I: 76435 1	I: 72441 0	C: 02676 1	C: 16732 0	C: 02742 1	I: 77624 1	C: 25032 1
12,3710	I: 77614 1	C: 02634 1	C: 25012 0	I: 43001 1	C: 00001 0	C: 02434 0	C: 25760 1	I: 45020 1
12,3720	C: 02712 1	C: 25763 1	I: 77624 1	C: 37727 1	I: 77600 1	C: 25726 0	I: 42405 0	C: 02744 1
12,3730	I: 75421 1	C: 33410 1	C: 02754 0	I: 65215 1	C: 33404 1	C: 00041 1	I: 72405 0	C: 02742 1
12,3740	I: 77671 1	I: 60325 0	C: 02744 1	C: 00047 1	I: 53725 1	C: 00041 1	C: 20174 1	I: 45271 1
12,3750	I: 50000 1	C: 25755 1	C: 25755 1	I: 77650 1	C: 02712 1	I: 52145 0	C: 11773 1	C: 02712 1
12,3760	I: 77776 1	03726 1	C: 20607 1	I: 40001 1	C: 00001 0	C: 25766 1	I: 63375 0	C: 02657 1
12,3770	C: 02746 0	I: 77616 0	C: 03772 0	C: 03773 1	CKSM 76240 0	@	@	@

OCTAL LISTING FOR PARAGRAPH # 074, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2000	I: 43014 0	C: 01474 1	C: 01751 0	C: 26006 0	I: 77614 1	C: 01476 0	I: 45014 0	C: 1667 1
13,2010	C: 27236 0	I: 71214 0	C: 04307 1	C: 26031 1	C: 01571 0	C: 34041 0	C: 27516 0	I: 45014 0
13,2020	C: 01674 0	C: 26744 1	I: 43014 0	C: 02756 1	C: 26026 1	C: 01476 0	I: 45014 0	C: 1467 0
13,2030	C: 27236 0	I: 77614 1	C: 01236 1	C: 26732 0	I: 43414 1	C: 01474 1	52134 0	53115 1
13,2040	25114 1	30006 1	75041 0	27115 1	51114 1	27777 0	04642 0	02053 0
13,2050	02052 1	25114 1	25114 1	53115 1	52006 0	22164 1	50001 0	30001 0
13,2060	24001 0	24001 0	53115 1	06006 1	I: 77624 1	C: 01114 1	I: 77776 1	23115 0
13,2070	16010 1	31214 1	74770 1	55545 0	00006 1	31450 1	53413 1	35026 0
13,2100	04636 0	C: 20743 0	12234 1	02105 1	02077 0	05402 1	C: 04024 0	51545 1
13,2110	32237 0	04636 0	C: 20743 0	12234 1	02116 0	02107 0	06006 1	I: 43145 0
13,2120	C: 03413 1	C: 01076 1	C: 00041 1	I: 77711 0	C: 03546 0	C: 26241 1	I: 53575 0	C: 0001 1
13,2130	I: 77676 0	C: 00031 0	I: 53435 0	C: 00007 0	C: 00023 0	I: 53435 0	C: 00031 0	C: 00015 0
13,2140	I: 46135 1	C: 03546 0	C: 26146 0	I: 52175 0	C: 03405 0	C: 26150 1	I: 77775 1	C: 03540 0
13,2150	I: 76505 0	C: 00015 0	I: 77655 1	C: 00007 0	C: 00007 0	I: 77624 1	C: 27516 0	I: 77624 1
13,2160	C: 26245 0	I: 53775 1	C: 00007 0	C: 57176 0	C: 25543 1	C: 00001 0	I: 77657 0	C: 57176 0
13,2170	C: 15535 0	C: 03413 1	C: 01517 0	I: 71214 0	C: 01673 1	C: 01571 0	C: 34041 0	C: 27211 0
13,2200	I: 77624 1	C: 27516 0	I: 77624 1	C: 26245 0	I: 77775 1	C: 00017 1	C: 01503 0	C: 15535 0
13,2210	C: 00015 0	C: 25517 0	C: 00025 0	I: 77624 1	C: 23434 0	I: 77776 1	05402 1	C: 04024 0
13,2220	06006 1	I: 62214 1	C: 05062 0	C: 03546 0	C: 26243 0	I: 77624 1	C: 27525 0	I: 77414 0
13,2230	C: 01276 0	37702 0	55722 0	14105 0	37702 0	55722 0	14103 0	C: 01524 0
13,2240	C: 01521 0	C: 27161 1	C: 27145 1	C: 27034 0	C: 26761 0	I: 67214 1	C: 00263 0	C: 00050 1
13,2250	I: 43030 0	C: 26253 1	C: 00063 1	I: 77616 0	30737 1	55131 1	05362 0	C: 00004 0
13,2260	C: 05022 1	C: 13000 0	04636 0	C: 03731 1	06006 1	I: 43014 0	C: 04346 1	C: 26271 1
13,2270	C: 00472 0	I: 43014 0	C: 01274 1	C: 04261 0	I: 43014 0	C: 01671 0	C: 02676 1	I: 76131 0
13,2300	C: 00051 0	C: 00006 1	C: 00044 1	I: 77214 0	C: 04461 0	C: 11762 1	C: 07604 1	I: 43100 1
13,2310	C: 26306 0	C: 01664 1	I: 47014 1	C: 00270 1	C: 51751 0	C: 35062 0	C: 56462 1	I: 77624 1
13,2320	C: 27236 0	I: 43014 0	C: 00462 1	C: 01663 0	I: 43014 0	C: 04343 1	C: 26330 0	C: 01463 1
13,2330	I: 77624 1	C: 60304 0	I: 77776 1	05362 0	C: 00004 0	C: 05022 1	C: 13000 0	06006 1
13,2340	I: 45014 0	C: 00466 0	C: 31005 0	I: 77776 1	04103 1	I: 77620 0	C: 00300 1	C: 36607 0
13,2350	C: 54136 1	C: 26752 0	C: 00003 1	C: 16744 1	C: 02607 1	C: 34041 0	C: 27170 1	I: 61131 0
13,2360	C: 00052 0	C: 00000 1	C: 26405 1	I: 52375 1	C: 02752 0	C: 00001 0	I: 77656 1	C: 26752 0
13,2370	C: 00001 0	I: 57456 1	C: 16736 1	C: 34636 0	I: 77624 1	C: 26445 0	C: 14017 1	C: 34654 1

OCTAL LISTING FOR PARAGRAPH # 075, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2400	C: 24023 0	C: 02744 1	I: 77656 1	C: 36744 0	C: 26432 0	I: 40575 1	C: 02752 0	I: 51362 1
13,2410	C: 02744 1	I: 77656 1	C: 26744 1	C: 02752 0	I: 53455 0	C: 00001 0	I: 77676 0	C: 26736 1
13,2420	C: 00001 0	I: 57456 1	C: 16752 0	C: 34634 1	I: 77624 1	C: 26445 0	C: 14023 0	C: 34654 1
13,2430	C: 24017 1	C: 02744 1	I: 77635 1	C: 34644 0	C: 27452 1	C: 00007 0	I: 53361 0	C: 34642 0
13,2440	C: 03452 1	C: 17452 1	C: 34656 0	C: 34021 0	C: 00300 1	I: 70471 1	C: 00045 0	I: 43336 0
13,2450	C: 34640 1	I: 70546 1	I: 77616 0	I: 40220 0	C: 02241 1	C: 00001 0	C: 24007 0	C: 2152 0
13,2460	I: 51406 1	C: 16301 1	C: 11762 1	I: 71414 0	C: 01743 0	C: 26466 1	I: 77624 1	C: 55570 0
13,2470	I: 77656 1	C: 36152 1	C: 35766 0	I: 77624 1	C: 26654 1	I: 63545 0	C: 02152 0	I: 63525 0
13,2500	C: 02154 0	I: 75415 0	I: 76405 1	C: 00011 1	C: 14021 1	C: 02156 1	C: 34023 1	C: 26614 0
13,2510	C: 14747 0	C: 02152 0	C: 14021 1	C: 02154 0	C: 34023 1	C: 26614 0	C: 14751 1	C: 023 1 1
13,2520	I: 77625 0	C: 02240 0	C: 34753 1	C: 02241 1	I: 40220 0	C: 02241 1	C: 00001 0	C: 34007 1
13,2530	C: 35766 0	I: 73545 1	C: 00747 0	I: 65275 1	C: 00011 1	C: 00747 0	I: 65346 0	C: 00751 1
13,2540	I: 57356 0	I: 71525 0	C: 00747 0	I: 71525 0	C: 00751 1	I: 55475 1	I: 41456 0	C: 36152 1
13,2550	C: 26654 1	I: 43145 0	C: 11762 1	C: 01743 0	C: 26556 0	I: 77746 1	I: 77624 1	C: 55545 0
13,2560	C: 16152 0	C: 02240 0	I: 74215 1	C: 00753 0	C: 02152 0	I: 77772 0	C: 36152 1	C: 2241 1
13,2570	I: 63545 0	C: 02156 1	I: 44352 0	C: 11760 0	I: 44275 1	C: 26611 0	C: 11760 0	I: 75465 1
13,2600	C: 26605 0	I: 77622 1	C: 02240 0	I: 77616 0	C: 00446 1	C: 00305 1	C: 17711 0	C: 5254 1
13,2610	C: 00155 0	C: 25250 1	C: 00302 0	C: 17755 0	I: 77600 1	C: 26616 1	I: 63545 0	C: 00023 0
13,2620	I: 63525 0	C: 00021 1	I: 77615 0	I: 75454 0	C: 26642 0	I: 40065 0	C: 00023 0	C: 26647 0
13,2630	I: 67542 0	C: 00025 0	I: 50125 1	C: 00021 1	C: 26636 0	I: 43545 1	I: 57545 1	I: 43244 1
13,2640	C: 26644 0	C: 11760 0	C: 00025 0	I: 77616 0	I: 52025 1	C: 11760 0	C: 26642 0	I: 75345 1
13,2650	C: 33412 0	C: 00023 0	C: 00025 0	I: 77616 0	I: 71220 1	C: 00051 0	C: 26701 0	I: 71214 0
13,2660	C: 01703 1	C: 26671 0	C: 26613 1	I: 45014 0	C: 00742 0	C: 26667 1	C: 26570 1	C: 36240 1
13,2670	C: 00051 0	I: 77214 0	C: 00702 1	C: 26667 1	C: 02026 1	I: 64446 0	I: 77650 1	C: 26667 1
13,2700	C: 00065 1	C: 01265 1	05402 1	C: 00052 0	35047 1	05135 0	C: 02711 1	C: 26063 0
13,2710	05314 1	06006 1	I: 47014 1	C: 04712 1	C: 26753 1	C: 51751 0	C: 00041 1	I: 45014 0
13,2720	C: 04274 1	C: 27516 0	I: 45014 0	C: 01076 1	C: 26744 1	I: 52014 0	C: 01466 1	C: 26000 0
13,2730	C: 00003 1	C: 25140 0	I: 77414 0	C: 01672 0	05402 1	C: 20032 1	00006 1	32731 0
13,2740	05332 0	C: 02702 0	C: 26063 0	05205 0	I: 43014 0	C: 01472 1	C: 01673 1	I: 43014 0
13,2750	C: 01676 1	C: 01675 1	I: 77616 0	I: 77776 1	05402 1	C: 00002 0	05561 0	C: 00221 0
13,2760	05205 0	I: 47020 0	C: 00051 0	C: 26774 1	I: 45014 0	C: 04063 0	C: 20240 0	I: 43014 0
13,2770	C: 00303 1	C: 00051 0	C: 04223 0	C: 00051 0	03140 1	55500 1	51500 0	31502 1

OCTAL LISTING FOR PARAGRAPH # 076, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
13,3000      51500 0      55554 0      11500 1      12775 1      06030 1   I: 43034 1   C: 27023 0   C: 04303 0
13,3010  C: 27016 0   I: 66214 0   C: 00263 0   C: 02151 0   C: 00000 1   I: 77616 0   I: 66214 0   C: 00063 1
13,3020  C: 02151 0   C: 00002 0   I: 77616 0      03140 1      55500 1      51500 0      31554 1      51500 0
13,3030      55502 0      11500 1      13024 0      06030 1   I: 47020 0   C: 00051 0   C: 27047 1   I: 45014 0

13,3040  C: 04064 1   C: 20264 0   I: 43014 0   C: 00303 1   C: 00051 0   C: 04224 1   C: 00051 0      03140 1
13,3050      55500 1      51500 0      31502 1      51500 0      55626 0      11500 1      13050 0      06030 1
13,3060  I: 47014 1   C: 04307 1   C: 27101 1   C: 27070 0   I: 52014 0   C: 04304 1   C: 27016 0   C: 27011 1
13,3070      03140 1      55500 1      51500 0      31626 1      51500 0      55502 0      11500 1      13071 0

13,3100      06030 1   I: 77201 1   C: 00001 0   C: 02026 1   I: 41525 0   C: 00041 1   C: 15517 0   C: 27756 0
13,3110  I: 77624 1   C: 55345 0   C: 25535 0   C: 11754 1   C: 14001 0   C: 01517 0   C: 14007 0   C: 27756 0
13,3120  I: 45014 0   C: 00063 1   C: 55345 0   I: 74235 0   C: 01535 0   C: 27137 1   C: 25543 1   C: 11762 1
13,3130  C: 01521 0   I: 67174 1   C: 00002 0   C: 02150 1   C: 35527 1   C: 27252 1   C: 07112 1   C: 06620 0

13,3140      33144 0      54006 0      33553 1      00002 0   C: 26063 0   I: 45020 1   C: 00046 0   C: 27516 0
13,3150  I: 43130 1   C: 02213 0   C: 01474 1   I: 43014 0   C: 01467 0   C: 01676 1   I: 77614 1   C: 01633 0
13,3160  C: 27240 1   I: 45020 1   C: 00046 0   C: 27516 0   I: 43130 1   C: 02213 0   C: 01634 1   C: 27153 0
13,3170  I: 45020 1   C: 00046 0   C: 27516 0   I: 43130 1   C: 02213 0   C: 01474 1   I: 43014 0   C: 01676 1

13,3200  C: 01433 1   C: 27240 1   I: 45020 1   C: 00046 0   C: 27516 0   I: 43130 1   C: 02213 0   C: 01634 1
13,3210  C: 27176 1   I: 66214 0   C: 01467 0   C: 02151 0   C: 00000 1   I: 66214 0   C: 00343 0   C: 27222 0
13,3220  C: 02151 0   C: 00002 0   I: 77220 1   C: 02213 0   C: 11762 1   C: 01521 0   C: 35527 1   C: 23420 0
13,3230  I: 43014 0   C: 01676 1   C: 04062 1   I: 77614 1   C: 04020 1   C: 22320 0   I: 77620 0   C: 02213 0

13,3240  I: 43014 0   C: 04060 0   C: 04062 1   I: 77731 1   C: 00053 1   C: 22320 0   I: 52014 0   C: 01714 1
13,3250  C: 27005 1   C: 27060 1   I: 45014 0   C: 00342 1   C: 27263 0   C: 23317 0   I: 45044 0   C: 27263 0
13,3260  C: 23360 0   I: 77754 1   C: 02150 1   I: 77414 0   C: 01652 1   C: 27304 0      05402 1   C: 04022 0
13,3270      05547 1   C: 00230 0      06006 1   I: 77731 1   C: 00053 1   C: 27302 0   I: 52014 0   C: 01714 1

13,3300  C: 26761 0   C: 27034 0   I: 77624 1   C: 22327 1   I: 45001 1   C: 00001 0   C: 23420 0   I: 53775 1
13,3310  C: 01503 0   C: 57576 1   I: 53715 1   C: 01511 0   C: 57576 1   I: 63325 0   C: 01517 0   C: 01503 0
13,3320  I: 64715 0   C: 01511 0   C: 50037 0   I: 76006 0   C: 77765 0   I: 76014 0   C: 00303 1   C: 27331 0
13,3330  C: 77775 1   I: 40001 1   C: 00001 0   C: 27334 0   I: 43014 0   C: 04675 1   C: 01672 0   I: 43014 0

13,3340  C: 04676 1   C: 01667 1   I: 77535 1   C: 02214 1      30154 1      50120 1      54052 1      03527 1
13,3350  I: 45345 1   C: 00745 1   C: 01517 0   C: 36303 1   C: 23420 0   I: 77624 1   C: 22336 1   I: 43345 1
13,3360  C: 01551 1   C: 01517 0   C: 35517 1   C: 27304 0   I: 43014 0   C: 04752 0   C: 27371 1   C: 01632 1
13,3370  C: 27331 0   I: 73001 1   C: 00013 0   C: 02150 1   I: 51575 1   C: 01535 0   I: 43006 0   C: 00262 1
```

OCTAL LISTING FOR PARAGRAPH # 077, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,3400	I: 50023 0	C: 66600 1	C: 27405 0	I: 77614 1	C: 00062 0	I: 41345 0	C: 00013 0	C: 00043 0
13,3410	I: 55762 1	C: 50037 0	I: 41366 1	C: 23751 0	I: 40442 1	I: 54345 1	C: 00155 0	C: 20220 0
13,3420	I: 40006 0	C: 27446 1	I: 50021 1	C: 27515 0	C: 27446 1	I: 45345 1	C: 00745 1	C: 01517 0
13,3430	I: 54234 0	C: 45636 0	C: 20211 1	C: 02305 0	I: 51400 1	C: 27452 1	I: 50025 0	C: 00015 0
13,3440	C: 27456 0	I: 75345 1	C: 00015 0	C: 02305 0	C: 36305 1	C: 27456 0	I: 65345 0	C: 27515 0
13,3450	I: 77650 1	C: 27425 1	I: 77634 0	C: 45761 0	C: 36305 1	C: 27441 0	I: 51545 1	C: 02305 0
13,3460	I: 50025 0	C: 27513 0	C: 27252 1	I: 43014 0	C: 01746 0	C: 23237 0	C: 01707 0	C: 23237 0
13,3470	I: 45345 1	C: 02305 0	C: 00015 0	I: 43040 1	C: 27252 1	C: 04242 1	C: 23237 0	I: 45345 1
13,3500	C: 00745 1	C: 01517 0	I: 77640 0	C: 27331 0	I: 40525 1	C: 02305 0	I: 44322 1	I: 52040 1
13,3510	C: 27331 0	C: 23237 0	C: 00000 1	C: 01400 1	C: 14152 1	C: 00000 1	I: 77776 1	30106 0
13,3520	74346 0	00006 1	13561 1	33565 1	05163 0	I: 77776 1	13547	40106 1
13,3530	74754 1	10000 0	03547 1	50120 1	30052 0	55261 1	05422 1	C: 04022 0
13,3540	31261 0	50120 1	54052 1	34754 0	70106 1	00006 1	13563 0	33565 1
13,3550	05167 1	10064 1	13547 0	C: 00051 0	44346 0	70106 1	54106 1	00003 1
13,3560	13563 0	34753 1	26106 1	06006 1	I: 77616 0	C: 27517 1	I: 45022 1	C: 00773 1
13,3570	C: 27516 0	I: 43145 0	C: 13771 1	C: 04674 0	C: 37466 1	C: 27612 1	I: 45022 1	C: 00773 1
13,3600	C: 27516 0	I: 47014 1	C: 04474 1	C: 51751 0	I: 44215 1	C: 13771 1	C: 00041 1	I: 45044 0
13,3610	C: 27616 0	C: 13756 1	I: 43234 0	C: 51751 0	C: 03466 0	C: 00041 1	I: 45014 0	C: 01676 1
13,3620	C: 26034 1	I: 43014 0	C: 01673 1	C: 04475 0	I: 77624 1	C: 27236 0	I: 66134 1	C: 03746 1
13,3630	C: 03745 1	I: 67214 1	C: 00275 1	C: 03747 0	I: 43054 1	C: 27637 0	C: 00075 0	I: 77775 1
13,3640	C: 00001 0	C: 25071 0	C: 00007 0	C: 15077 0	C: 00015 0	C: 01105 1	I: 77776 1	00004 0
13,3650	00006 1	40025 1	20155 1	07226 0	30773 1	04660 0	I: 47014 1	C: 04754 0
13,3660	C: 27675 0	C: 51751 0	I: 44215 1	C: 13771 1	C: 00745 1	I: 45044 0	C: 27364 0	C: 13756 1
13,3670	I: 43234 0	C: 51751 0	C: 03466 0	C: 34745 0	C: 27364 0	I: 45345 1	C: 00745 1	C: 01517 0
13,3700	I: 45246 0	C: 13755 1	I: 77644 1	C: 27670 0	I: 44234 1	C: 51751 0	C: 01517 0	I: 51025 1
13,3710	C: 13773 0	C: 27252 1	I: 43345 1	C: 03466 0	C: 13771 1	C: 37466 1	C: 27670 0	C: 77764 1
13,3720	C: 77775 1	C: 77766 0	C: 77771 0	C: 77775 1	C: 77775 1	C: 00000 1	C: 77763 0	C: 77766 0
13,3730	C: 77773 1	C: 77770 1	C: 77771 0	C: 27446 1	C: 14620 0	C: 16471 1	C: 01352 1	C: 22437 1
13,3740	C: 16067 1	C: 00000 1	C: 00000 1	C: 02302 1	C: 24736 0	C: 77651 0	C: 76237 0	C: 77776 1
13,3750	C: 53032 0	C: 10407 0	C: 05344 1	C: 13710 0	C: 35320 0	C: 24000 1	C: 00000 1	C: 74631 0
13,3760	C: 63145 1	C: 00243 1	C: 32703 1	C: 03654 0	C: 21000 1	C: 03654 0	C: 21000 1	C: 04627 0
13,3770	C: 25200 1	C: 03771 0	C: 03772 0	CKSM 45306 0	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 100, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,2000	I: 43573 1	C: 33776 1	05561 0	C: 00027 1	05561 0	C: 00031 0	04636 0	C: 3731 1
14,2010	06006 1	I: 77414 0	C: 05310 0	C: 30276 1	30104 1	74760 0	00006 1	12025 0
14,2020	11351 0	12023 0	12025 0	05547 1	C: 00031 0	34765 1	70076 1	10000 0
14,2030	02033 0	36214 0	02034 1	34770 0	54776 0	34770 0	04636 0	C: 21074 1
14,2040	04103 1	02043 1	02035 0	40776 0	76214 1	00006 1	12407 1	74770 1
14,2050	00006 1	12167 1	00006 1	34772 1	53251 1	35027 1	05535 1	31250 1
14,2060	00006 1	12063 1	12066 1	00006 1	30025 0	53251 1	30776 1	74767 1
14,2070	10000 0	12145 1	06006 1	I: 43014 0	C: 01463 1	C: 00462 1	I: 77775 1	C: 02026 1
14,2100	C: 14001 0	C: 01251 0	C: 02607 1	C: 34007 1	C: 55345 0	I: 77742 0	C: 16152 0	C: 2607 1
14,2110	I: 77624 1	C: 26453 1	I: 77624 1	C: 62363 0	I: 77776 1	35036 1	05535 1	06006 1
14,2120	I: 77624 1	C: 62371 0	I: 45145 0	C: 02607 1	C: 26524 0	I: 53575 0	C: 02152 0	C: 14307 0
14,2130	C: 02607 1	C: 34041 0	C: 27145 1	I: 47375 0	C: 00001 0	C: 00007 0	I: 53435 0	C: 00307 0
14,2140	C: 00323 0	I: 53435 0	C: 00307 0	C: 34315 1	C: 30170 1	06006 1	I: 77745 1	C: 01251 0
14,2150	C: 34041 0	C: 27145 1	I: 77201 1	C: 00001 0	C: 00001 0	I: 53476 1	C: 24323 0	C: 00007 0
14,2160	I: 53435 0	C: 00001 0	C: 00315 0	I: 53435 0	C: 00323 0	C: 00307 0	I: 77776 1	06006 1
14,2170	I: 77624 1	C: 22247 0	I: 77776 1	35025 0	04636 0	C: 20743 0	04103 1	02201 0
14,2200	02167 0	40106 1	74762 1	00006 1	12320 0	34775 0	04636 0	C: 21067 0
14,2210	14103 0	12334 0	06006 1	I: 64375 1	C: 00307 0	C: 01734 0	I: 77656 1	C: 26714 1
14,2220	C: 00315 0	I: 53521 1	C: 01734 0	C: 26722 1	C: 00323 0	I: 53521 1	C: 01734 0	C: 36730 0
14,2230	C: 47240 1	I: 43014 0	C: 01260 1	C: 01662 1	I: 77776 1	32275 0	04636 0	C: 20710 0
14,2240	33002 0	04636 0	C: 17244 0	04636 0	C: 17644 1	03766 0	05402 1	C: 04024 0
14,2250	06006 1	I: 75160 1	C: 00306 1	C: 01733 1	I: 77624 1	C: 34730 1	I: 43014 0	C: 01273 0
14,2260	C: 01462 0	I: 77234 1	C: 31566 0	C: 11762 1	C: 01472 1	I: 43014 0	C: 01060 0	C: 05350 1
14,2270	C: 30757 1	I: 77614 1	C: 05276 1	I: 77776 1	14105 0	C: 04024 0	I: 74575 0	C: 01734 0
14,2300	I: 74515 0	C: 01742 1	I: 57414 1	C: 05316 0	C: 30305 1	I: 53455 0	I: 77626 0	C: 53470 1
14,2310	C: 01750 1	C: 00323 0	I: 53435 0	C: 00307 0	C: 00315 0	I: 52014 0	C: 01073 1	C: 30170 1
14,2320	34764 0	04636 0	C: 21067 0	04103 1	02212 1	06006 1	I: 77414 0	C: 05316 0
14,2330	C: 30273 1	05671 1	C: 00402 1	02320 1	06006 1	I: 77624 1	C: 22247 0	I: 66234 1
14,2340	C: 34744 1	C: 00051 0	C: 00001 0	I: 40370 1	C: 00003 1	C: 00005 1	I: 70543 1	C: 01313 1
14,2350	I: 70523 1	C: 00005 1	I: 51425 0	I: 45206 1	C: 34743 0	I: 71240 1	C: 30376 0	I: 51025 1
14,2360	C: 34744 1	C: 30376 0	I: 77776 1	05402 1	C: 04024 0	03742 0	06006 1	I: 77234 1
14,2370	C: 31566 0	C: 11762 1	C: 01472 1	I: 52014 0	C: 01060 0	C: 30400 0	I: 77700 0	C: 30346 0

OCTAL LISTING FOR PARAGRAPH # 101, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
14,2400    I: 75160 1    C: 02671 0    C: 01733 1    I: 77624 1    C: 34730 1    I: 77414 0    C: 01462 0        54 2 1
14,2410    C: 04024 0        34776 0        04636 0    C: 21067 0        04103 1        02417 1        02622 0        06006 1
14,2420    I: 43234 0    C: 51751 0    C: 34652 1    I: 77624 1    C: 26345 1    I: 77624 1    C: 47530 1    I: 45001 1
14,2430    C: 00001 0    C: 34756 1    I: 71214 0    C: 01465 1    C: 11762 1    C: 24303 1    C: 02714 1    I: 63361 0

14,2440    C: 30575 0    C: 02730 1    I: 74370 0    C: 00344 1    C: 30577 1    I: 77655 1    I: 53505 1    C: 01734 0
14,2450    C: 02760 1    I: 66331 0    C: 00051 0    C: 00006 1    C: 00052 0    C: 00006 1    I: 52100 1    C: 30461 1
14,2460    C: 30606 1    I: 45173 0    C: 33776 1    C: 30552 0    I: 73014 0    C: 01710 0    C: 30456 0    C: 00046 0
14,2470    I: 52104 0    C: 30473 1    C: 30456 0    I: 45173 0    C: 44001 0    C: 30552 0    I: 76614 0    C: 01710 0

14,2500    C: 30470 1    C: 33776 1    I: 45237 0    C: 44001 0    C: 30601 0    I: 43240 0    C: 30470 1    C: 30603 1
14,2510    I: 77644 1    C: 30470 1    I: 50373 0    C: 33776 1    C: 02760 1    I: 50025 0    C: 30605 1    C: 30456 0
14,2520    I: 50373 0    C: 44001 0    C: 02760 1    I: 50025 0    C: 30605 1    C: 30470 1    I: 77614 1    C: 01605 0
14,2530    C: 30545 0    I: 65120 1    C: 00302 0    C: 00303 1    I: 47773 1    C: 33776 1    C: 44001 0    I: 43006 0

14,2540    C: 01545 1    C: 30531 0    I: 45345 1    I: 77644 1    C: 30470 1    I: 67130 1    C: 00302 0    C: 00303 1
14,2550    I: 77650 1    C: 30470 1    I: 51321 0    C: 02736 1    C: 00017 1    I: 77654 0    C: 30571 1    I: 75240 0
14,2560    C: 30571 1    C: 00160 0    I: 75240 0    C: 30571 1    C: 00162 1    I: 43040 1    C: 30571 1    C: 01630 0
14,2570    C: 00052 0    I: 77614 1    C: 01430 1    C: 00052 0    C: 21150 0    C: 25157 0    C: 32766 1    C: 22713 1

14,2600    C: 01736 1    C: 35137 1    C: 73003 0    C: 65403 0    C: 06233 0    C: 26112 1    I: 77414 0    C: 01745 0
14,2610    C: 30621 1        05671 1    C: 00405 0        35023 0        04636 0    C: 20743 0        04103 1        02622 0
14,2620        02407 0    I: 77776 1        34770 0        54304 1        05561 0    C: 00025 0        05402 1    C: 05024 1
14,2630    C: 13000 0        50304 0        30302 0        00006 1        73004 1        55140 1        06006 1    I: 77624 1

14,2640    C: 30761 1    I: 72131 1    C: 00051 0    C: 00000 1    C: 00304 0    I: 77700 0    C: 30651 0    C: 36617 1
14,2650    C: 30652 0    C: 02611 0    I: 54335 0    C: 01215 0    C: 20215 0    I: 45030 0    C: 30753 0    C: 36105 0
14,2660    I: 77624 1    C: 36052 0    C: 02617 0    I: 45145 0    C: 02607 1    C: 31651 1    I: 53521 1    C: 01734 0
14,2670    I: 77776 1        10304 1        02744 1        06006 1    C: 26736 1    C: 02617 0    C: 24007 0    C: 02611 0

14,2700    C: 24015 0    C: 02601 1    C: 36744 0    C: 34657 1    I: 45014 0    C: 00354 0    C: 30757 1    C: 47432 1
14,2710    I: 77624 1    C: 47240 1    I: 77776 1        35040 0        04636 0    C: 20743 0        04103 1        02721 1
14,2720        02734 0        05402 1    C: 00314 1        33002 0        04636 0    C: 17244 0        04636 0    C: 17644 1
14,2730        03766 0        05402 1    C: 05024 1    C: 13000 0        05561 0    C: 00051 0        35775 1        04636 0

14,2740    C: 21067 0        04103 1        02407 0        04103 1        06006 1    C: 26601 1    C: 02617 0    C: 02611 0
14,2750    I: 77776 1        34772 1        12623 0    I: 77624 1    C: 31005 0    I: 77650 1    C: 30660 1    I: 77776 1
14,2760        02736 1    I: 77420 1    C: 02657 1        33003 1        05540 0        02771 1        36211 0        05516 0
14,2770        15205 1        03636 1        04362 1        02763 1        06006 1    I: 45034 1    C: 51751 0    C: 31651 1
```

OCTAL LISTING FOR PARAGRAPH # 102, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3000	I: 77650 1	C: 02657 1	C: 02757 0	C: 00306 1	C: 05253 0	I: 77614 1	C: 04265 1	I: 77420 1
14,3010	C: 02576 1	35043 0	56003 1	55577 1	00006 1	30036 1	53313 0	00006 1
14,3020	30025 0	52364 1	06006 1	I: 43131 0	C: 01324 0	C: 00000 1	C: 00271 0	I: 43014 0
14,3030	C: 00705 0	C: 31222 1	C: 03660 1	I: 77776 1	31354 1	00006 1	63245 1	06006 1
14,3040	I: 43234 0	C: 51751 0	C: 31271 1	I: 45214 1	C: 04741 1	C: 31047 0	C: 31273 0	C: 02347 0
14,3050	I: 43014 0	C: 00705 0	C: 31066 0	C: 00706 0	C: 31075 1	I: 72131 1	C: 00051 0	C: 00000 1
14,3060	C: 00304 0	I: 77700 0	C: 31116 0	I: 52175 0	C: 02617 0	C: 31120 0	I: 77745 1	C: 02347 0
14,3070	C: 34041 0	C: 27202 1	I: 52175 0	C: 00001 0	C: 31105 1	I: 71214 0	C: 04305 0	C: 54040 1
14,3100	C: 02347 0	I: 77624 1	C: 26524 0	I: 77775 1	C: 02152 0	C: 16766 1	C: 02347 0	C: 34041 0
14,3110	C: 27170 1	I: 52375 1	C: 02766 1	C: 00001 0	I: 52056 0	C: 31120 0	I: 77775 1	C: 02611 0
14,3120	I: 53521 1	C: 01734 0	C: 02766 1	I: 45001 1	C: 00001 0	C: 47530 1	I: 77624 1	C: 46034 1
14,3130	I: 71214 0	C: 01710 0	C: 31276 0	C: 02776 0	I: 51025 1	C: 31267 0	C: 31241 1	I: 45345 1
14,3140	C: 02776 0	C: 31275 0	I: 77440 1	C: 31241 1	31775 0	54330 0	06006 1	I: 43014 0
14,3150	C: 00705 0	C: 31170 0	C: 04741 1	C: 31161 0	I: 71214 0	C: 04241 1	C: 16530 0	C: 02347 0
14,3160	C: 00364 0	I: 77414 0	C: 00311 1	C: 31170 0	33265 0	04636 0	C: 20710 0	06006 1
14,3170	I: 77776 1	30330 1	55312 1	31773 0	55313 0	05354 0	C: 00031 1	13202 0
14,3200	34773 0	13203 1	35011 1	04636 0	C: 01731 0	34757 0	70075 1	10000 0
14,3210	03223 1	34752 0	70103 1	00006 1	13034 1	31577 0	54003 0	06006 1
14,3220	I: 77650 1	C: 02576 1	I: 77776 1	04636 0	C: 76333 0	34764 0	70075 1	00006 1
14,3230	13215 0	06006 1	I: 52014 0	C: 00750 0	C: 31236 1	C: 31040 1	I: 77776 1	33311 1
14,3240	13203 1	I: 77776 1	33266 0	54330 0	03146 1	34763 1	70074 0	10000 0
14,3250	03316 0	00004 0	37645 1	05135 0	C: 03260 0	C: 30067 0	00003 1	03316 0
14,3260	06006 1	I: 77624 1	C: 31571 0	I: 77776 1	05205 0	C: 01534 1	C: 25252 0	C: 25254 0
14,3270	C: 00000 1	C: 00360 1	C: 00000 1	C: 00062 0	C: 61740 0	C: 77777 0	I: 77414 0	C: 00705 0
14,3300	C: 31241 1	33310 0	04636 0	C: 21766 0	13312 0	13175 0	13175 0	15205 1
14,3310	C: 00404 1	C: 00264 1	04636 0	C: 20575 1	04655 0	C: 16031 1	05354 0	C: 00030 1
14,3320	13202 0	11131 1	13407 0	40076 1	74766 0	10000 0	13037 1	06006 1
14,3330	I: 46135 1	C: 03754 1	C: 31411 1	I: 54160 1	C: 03530 1	C: 03753 0	I: 70730 1	C: 01077 0
14,3340	C: 00001 0	I: 47044 1	C: 31344 0	C: 31037 1	C: 03670 0	C: 34041 0	C: 27170 1	I: 77775 1
14,3350	C: 00017 1	C: 01046 1	I: 45150 1	C: 01077 0	C: 47017 1	C: 25072 0	C: 01046 1	I: 77656 1
14,3360	C: 36152 1	C: 26654 1	I: 43345 1	C: 02240 0	C: 00753 0	C: 02240 0	I: 77624 1	C: 61331 1
14,3370	I: 70414 1	C: 04343 1	C: 31373 1	C: 16152 0	C: 03670 0	I: 77624 1	C: 26453 1	I: 77624 1

OCTAL LISTING FOR PARAGRAPH # 103, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3400	C: 62363 0	I: 77414 0	C: 04061 1	05561 0	C: 00052 0	44770 1	60737 1	55131 1
14,3410	13037 1	I: 52160 1	C: 03573 0	C: 31336 0	41333 1	74760 0	10000 0	03423 1
14,3420	05671 1	C: 00210 1	04103 1	04636 0	C: 03745 1	34776 0	04636 0	C: 21067 0
14,3430	04103 1	03454 1	05402 1	C: 05024 1	C: 13000 0	34772 1	55307 0	55310 0
14,3440	55311 1	35025 0	04636 0	C: 20705 1	33565 1	04636 0	C: 20705 1	03742 0
14,3450	05402 1	C: 05024 1	C: 13000 0	13425 0	06006 1	I: 40331 1	C: 00035 1	C: 00000 1
14,3460	C: 00001 0	I: 77234 1	C: 31566 0	C: 11762 1	C: 01472 1	I: 43014 0	C: 01060 0	C: 00666 1
14,3470	I: 77776 1	05402 1	C: 05024 1	C: 13000 0	05354 0	C: 00065 1	13504 1	06006 1
14,3500	I: 77624 1	C: 36105 0	I: 77650 1	C: 31507 1	06006 1	I: 77624 1	C: 31571 0	I: 77624 1
14,3510	C: 36052 0	I: 77606 1	I: 53135 0	C: 00305 1	C: 31520 1	I: 45575 1	C: 41160 0	C: 31526 1
14,3520	I: 45575 1	C: 61166 1	C: 02607 1	I: 77624 1	C: 31651 1	C: 02601 1	I: 77776 1	05402 1
14,3530	C: 05024 1	C: 13000 0	10304 1	13542 0	05402 1	C: 05024 1	C: 13000 0	34770 0
14,3540	54304 1	13471 1	05402 1	C: 05024 1	C: 13000 0	06006 1	I: 45145 0	C: 02607 1
14,3550	C: 31651 1	C: 24015 0	C: 02601 1	C: 24007 0	C: 02611 0	C: 26736 1	C: 02617 0	C: 36744 0
14,3560	C: 34657 1	I: 77414 0	C: 00314 1	C: 11716 1	03425 1	C: 12200 0	30025 0	55277 0
14,3570	16030 0	I: 43020 1	C: 03457 1	C: 00071 1	I: 77776 1	04636 0	C: 16000 0	05354 0
14,3600	C: 00030 1	13603 0	13612 0	05354 0	C: 00026 0	34766 1	63650 1	60301 0
14,3610	00006 1	13575 1	04636 0	C: 16073 1	34772 1	04636 0	C: 20715 0	44763 0
14,3620	61214 1	00006 1	63631 0	33635 1	05535 1	03636 1	04362 1	03623 0
14,3630	03732 1	06006 1	I: 77614 1	C: 03420 1	C: 03457 1	C: 00307 0	11140 1	13643 1
14,3640	16710 0	00002 0	00002 0	63647 1	00006 1	66710 1	00002 0	C: 77730 0
14,3650	C: 77772 0	C: 02607 1	I: 45020 1	C: 02777 1	C: 26345 1	I: 77775 1	C: 02736 1	C: 24001 0
14,3660	C: 02744 1	C: 26736 1	C: 00001 0	C: 02744 1	I: 77776 1	03732 1	10000 0	13700 1
14,3670	35035 1	05535 1	06006 1	I: 74375 0	C: 03705 0	C: 31731 0	I: 52056 0	C: 31723 0
14,3700	40000 0	63727 0	00006 1	63714 0	50304 0	30302 0	50120 1	54046 1
14,3710	06006 1	I: 52173 0	C: 33776 1	C: 31723 0	06006 1	I: 70740 0	C: 00304 0	C: 00303 1
14,3720	I: 76740 0	C: 00154 1	C: 02372 0	I: 53455 0	C: 03452 1	I: 77650 1	C: 02777 1	C: 00343 0
14,3730	C: 22363 1	C: 11623 0	47677 1	71140 1	00006 1	76211 1	56001 0	50304 0
14,3740	54302 1	00002 0	30002 0	55777 0	31335 0	00006 1	13753 1	35016 0
14,3750	04636 0	C: 01731 0	03744 0	04636 0	C: 16724 1	04636 0	C: 17644 1	03766 0
14,3760	04636 0	C: 17133 0	04636 0	C: 17644 1	03766 0	01777 1	00004 0	30002 0
14,3770	05673 0	C: 00217 0	01363 0	C: 03773 1	C: 03774 0	CKSM 64443 0	@	@

OCTAL LISTING FOR PARAGRAPH # 104, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2000	I: 47201 1	C: 00001 0	C: 34644 0	C: 27452 1	C: 03715 1	I: 53361 0	C: 34642 0	C: 03452 1
15,2010	C: 27452 1	C: 11762 1	C: 27204 1	C: 03707 1	I: 53476 1	C: 17707 1	C: 00045 0	C: 02307 1
15,2020	I: 41535 1	C: 01356 0	I: 67254 0	C: 73257 0	C: 32050 0	I: 77621 1	I: 77244 0	C: 73242 1
15,2030	C: 11762 1	C: 17715 1	C: 11762 1	C: 02307 1	I: 41335 1	C: 32047 0	C: 00001 0	I: 76750 1
15,2040	C: 00155 0	C: 33776 1	I: 53455 0	C: 03452 1	I: 77650 1	C: 73226 0	C: 00006 1	C: 00046 0
15,2050	I: 77201 1	C: 00007 0	C: 02611 0	I: 63276 1	C: 02541 0	I: 57456 1	I: 47206 0	C: 02611 0
15,2060	I: 77772 0	C: 00001 0	I: 77616 0	34355 0	27725 1	34763 1	71334 0	00006 1
15,2070	12076 0	44770 1	70102 0	54102 0	06000 1	02143 0	30032 0	57661 1
15,2100	00006 1	21661 0	55675 0	30033 1	57662 1	00006 1	21662 0	55676 0
15,2110	30034 0	57663 0	00006 1	21663 1	55677 1	30102 1	74767 1	10000 0
15,2120	12135 0	06000 1	05402 1	C: 00006 1	05314 1	34770 0	55720 1	34355 0
15,2130	05223 1	C: 02063 0	11720 1	02165 1	05314 1	40102 0	74770 1	00006 1
15,2140	12125 1	26102 0	34772 1	55711 0	55706 0	55707 1	55710 1	55723 1
15,2150	02126 0	54001 1	00002 0	50000 1	34751 0	26001 1	00002 0	40000 0
15,2160	61720 0	00006 1	74753 0	61720 0	00002 0	31663 0	05060 1	55511 1
15,2170	31661 1	05061 0	55512 1	00006 1	71511 1	55514 1	31661 1	05060 1
15,2200	55513 0	00006 1	71511 1	55515 0	41677 1	00006 1	71512 1	53721 0
15,2210	41676 0	00006 1	71515 0	21721 0	31720 0	57707 0	02157 0	55702 1
15,2220	41677 1	00006 1	71513 0	53721 0	31676 1	00006 1	71514 1	21721 0
15,2230	31720 0	57710 0	02157 0	55703 0	31663 0	05061 0	55510 0	00006 1
15,2240	71676 0	55720 1	34772 1	20001 1	61675 1	61720 0	40000 0	55720 1
15,2250	57706 1	02157 0	55701 1	11723 1	02256 1	02300 0	41664 0	05061 0
15,2260	00006 1	71723 1	55721 0	00006 1	72626 0	27701 1	31664 1	05060 1
15,2270	40000 0	00006 1	71723 1	27702 1	41721 0	00006 1	72627 1	27703 0
15,2300	34755 1	70102 0	00006 1	15314 0	34750 1	54030 0	00006 1	32313 1
15,2310	52113 0	05314 1	C: 02314 0	C: 32066 0	22016 0	00006 1	22012 1	30021 1
15,2320	60000 1	55623 0	31702 0	61665 0	02151 0	55665 1	05060 1	55506 1
15,2330	55705 0	00006 1	71701 1	57705 1	00006 1	71703 0	55704 1	31665 0
15,2340	05061 0	55507 0	00006 1	71703 0	27705 0	41507 0	00006 1	71701 1
15,2350	27704 1	27666 1	05061 0	00006 1	71705 0	61665 0	02151 0	55665 1
15,2360	40000 0	61603 0	02151 0	55477 0	55572 1	31705 1	61664 1	02151 0
15,2370	55714 0	55664 0	41666 1	61604 1	55573 0	34766 1	70102 0	00006 1

OCTAL LISTING FOR PARAGRAPH # 105, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2400	12466 0	44770 1	55700 0	55477 0	55500 1	41701 1	00006 1	72626 0
15,2410	61703 1	02456 1	50000 1	32631 1	55720 1	31702 0	02456 1	50000 1
15,2420	32634 1	27720 1	00006 1	01005 0	11711 0	02645 1	03325 0	03332 0
15,2430	10000 0	62624 0	12462 1	62624 0	12463 0	55624 1	10000 0	42623 0
15,2440	12442 0	32623 1	60001 0	22002 0	02430 1	52002 1	11624 1	62621 0
15,2450	12452 1	62621 0	54000 0	12455 0	22007 0	57624 0	10000 0	62622 0
15,2460	12463 0	62622 0	40000 0	55721 0	34772 1	00002 0	55700 0	11506 1
15,2470	62625 1	12473 1	62625 1	54000 0	12555 1	11506 1	12477 0	11727 0
15,2500	02513 1	02503 0	02513 1	05402 1	C: 40334 1	44770 1	55727 0	32620 1
15,2510	05233 0	C: 02375 1	C: 54066 0	11711 0	12522 1	12522 1	34772 1	00006 1
15,2520	01006 0	55711 0	11506 1	31573 1	12530 1	44772 0	55700 0	41573 0
15,2530	55573 0	55500 1	54001 1	11700 0	02537 1	34770 0	50000 1	31703 1
15,2540	02435 1	00006 1	04001 1	50000 1	32631 1	55720 1	31572 0	54001 1
15,2550	31702 0	02435 1	00006 1	04001 1	12417 0	25700 1	44770 1	55711 0
15,2560	11727 0	55727 0	12563 1	11507 0	41573 0	12567 0	31573 1	55713 1
15,2570	00006 1	74753 0	57713 0	54001 1	11507 0	41704 1	02600 0	31704 0
15,2600	02435 1	00006 1	04001 1	50000 1	32634 1	00006 1	01006 0	31717 1
15,2610	00006 1	21664 0	54001 1	11507 0	30001 0	02530 0	40001 1	02530 0
15,2620	C: 04064 1	C: 37734 0	C: 37756 1	C: 00067 0	C: 37267 0	C: 11277 0	C: 65033 1	C: 36044 1
15,2630	C: 00120 1	C: 00000 1	C: 00240 1	C: 00005 1	C: 00000 1	C: 00012 1	40025 1	55712 0
15,2640	34770 0	55711 0	05402 1	C: 00001 0	05314 1	44770 1	55617 1	45004 1
15,2650	00006 1	71701 1	60001 0	55613 0	41664 0	54021 0	40102 0	74765 0
15,2660	00006 1	12667 0	26102 0	31715 0	60021 1	57614 0	12727 0	34753 1
15,2670	60000 1	61715 0	57614 0	30021 1	64751 0	64751 0	57614 0	27614 1
15,2700	11613 0	64770 0	12704 1	64770 0	00006 1	71613 0	00006 1	73375 1
15,2710	00006 1	11506 1	54001 1	11614 1	34753 1	12717 0	44753 0	61614 0
15,2720	60001 0	54001 1	12727 0	50000 1	44752 1	60000 1	27614 1	31614 0
15,2730	00006 1	71506 1	55614 1	11700 0	03323 0	02736 1	31614 0	55614 1
15,2740	55571 1	55713 1	31613 1	54021 0	30021 1	55570 0	57613 1	00006 1
15,2750	71613 0	00006 1	73375 1	55616 0	60000 1	40000 0	63401 1	54001 1
15,2760	11613 0	40001 1	12764 1	30001 0	61614 0	63401 1	00006 1	63004 0
15,2770	40000 0	63401 1	63401 1	00006 1	63013 0	44355 1	61616 1	00006 1

OCTAL LISTING FOR PARAGRAPH # 10c, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3000	63305 1	41617 1	55620 0	03066 1	41613 0	55613 0	54021 0	41614 1
15,3010	55614 1	41617 1	55617 1	44355 1	61616 1	00006 1	63020 0	13025 1
15,3020	43377 0	61614 0	60021 1	00006 1	63305 1	41617 1	55620 0	43401 0
15,3030	61616 1	61614 0	55615 0	63400 0	40000 0	00006 1	63044 1	31615 1
15,3040	00006 1	74753 0	20001 1	03047 1	00006 1	22007 0	43400 1	55567 0
15,3050	61613 1	60000 1	00006 1	73375 1	55621 1	00006 1	63060 1	03072 1
15,3060	10002 1	13066 0	31620 1	55617 1	41621 1	13071 0	41613 0	55567 0
15,3070	34772 1	55621 1	31567 1	60000 1	00006 1	73375 1	60000 1	55607 0
15,3100	40000 0	00006 1	63106 0	55607 0	31617 0	55620 0	41607 0	00006 1
15,3110	71567 0	55615 0	41567 0	00006 1	13130 1	61613 1	00006 1	71621 1
15,3120	61615 1	61614 0	22007 0	56001 0	00006 1	11567 0	00006 1	13132 0
15,3130	35020 0	13137 0	56001 0	00006 1	11567 0	00006 1	75020 1	55605 1
15,3140	33376 0	00006 1	71621 1	55621 1	33376 0	00006 1	71607 0	55607 0
15,3150	34772 1	55711 0	34770 0	54305 0	30025 0	64753 1	64753 1	27712 0
15,3160	33374 1	27712 0	44767 1	61621 0	00006 1	63177 0	51617 0	32634 1
15,3170	55622 1	31621 0	27712 0	00006 1	63201 1	34772 1	13232 0	44770 1
15,3200	55621 1	44767 1	61605 0	00006 1	63213 1	31605 0	27712 0	00006 1
15,3210	63215 1	34772 1	13234 0	44770 1	55605 1	44767 1	61607 1	00006 1
15,3220	63235 0	51620 1	32634 1	55610 0	31607 1	27712 0	00006 1	63237 1
15,3230	34772 1	13236 1	55621 1	44770 1	55605 1	44770 1	55607 0	34772 1
15,3240	55611 1	55612 1	55606 1	53622 1	10000 0	13262 0	23612 0	44770 1
15,3250	53606 1	10000 0	13262 0	23612 0	44770 1	53610 0	10000 0	13262 0
15,3260	23612 0	03270 1	56001 0	27612 1	56001 0	64770 0	05223 1	C: 03276 1
15,3270	31612 0	00006 1	01006 0	11611 1	05314 1	03333 1	34767 0	55611 1
15,3300	70102 0	00006 1	13271 1	22007 0	13246 0	41700 0	74770 1	54001 1
15,3310	50000 1	31714 1	50001 0	54000 0	60001 0	02151 0	55717 0	34772 1
15,3320	00006 1	01006 0	55567 0	55711 0	03275 1	41705 0	00006 1	71506 1
15,3330	00006 1	74753 0	27713 1	34753 1	00006 1	71713 1	55476 1	40305 0
15,3340	54305 0	00006 1	63346 0	04714 1	C: 42425 1	03364 0	66214 0	00006 1
15,3350	63354 0	30025 0	54304 1	44776 1	54305 0	00006 1	31702 0	50305 1
15,3360	52324 0	31703 1	50305 1	54325 1	31623 1	54021 0	00006 1	33373 0
15,3370	52113 0	05323 0	C: 03226 1	C: 12060 1	C: 77464 1	C: 23617 0	C: 01440 0	C: 00266 0

OCTAL LISTING FOR PARAGRAPH # 107, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3400	C: 70706 1	C: 00133 0	C: 00000 1	C: 04000 0	C: 00000 1	C: 00200 0	C: 00000 1	C: 00400 0
15,3410	C: 00000 1	C: 10000 0	C: 00000 1	C: 02000 0	C: 00000 1	C: 01000 0	C: 00000 1	C: 00020 0
15,3420	C: 00000 1	C: 00100 0	C: 00000 1	C: 34631 1	C: 23146 0	C: 77467 1	C: 77777 0	C: 03110 1
15,3430	C: 17665 1	C: 00000 1	C: 00001 0	C: 37767 0	C: 37737 0	C: 40010 1	C: 40040 1	C: 15264 0
15,3440	C: 07253 1	C: 74133 0	C: 45130 1	C: 70034 1	C: 53644 1	C: 15015 1	C: 35262 1	C: 67072 0
15,3450	C: 57521 0	C: 02552 1	C: 27310 0	C: 07210 0	C: 34714 1	C: 67300 0	C: 47414 0	C: 13262 0
15,3460	C: 27671 1	C: 05101 1	C: 34175 0	C: 70717 1	C: 46031 1	C: 62467 0	C: 45023 1	C: 10655 0
15,3470	C: 16340 1	C: 63237 1	C: 45012 0	C: 73711 1	C: 62337 1	C: 07207 0	C: 34100 1	C: 61751 0
15,3500	C: 60311 1	C: 02344 0	C: 11437 1	C: 03243 1	C: 10132 0	C: 62031 1	C: 55616 0	C: 70716 0
15,3510	C: 43617 0	C: 01747 1	C: 01335 0	C: 63532 0	C: 54217 1	C: 12010 0	C: 11614 1	C: 76152 0
15,3520	C: 45651 1	C: 60371 1	C: 57632 1	C: 03370 0	C: 03556 1	C: 76127 1	C: 67425 0	C: 72436 0
15,3530	C: 61577 0	C: 61041 0	C: 46271 1	C: 72303 1	C: 40213 0	C: 62637 1	C: 74356 1	C: 70711 1
15,3540	C: 46567 1	C: 67366 0	C: 44175 1	C: 64424 1	C: 41241 0	C: 07156 1	C: 23036 0	C: 63330 1
15,3550	C: 75735 1	C: 67512 0	C: 62476 0	C: 05227 0	C: 10611 0	C: 64757 0	C: 51701 0	C: 71233 0
15,3560	C: 53334 0	C: 66425 1	C: 76017 0	C: 66546 0	C: 64151 0	C: 73256 1	C: 65757 1	C: 14120 1
15,3570	C: 32444 1	C: 61251 0	C: 56124 0	C: 72307 0	C: 65764 1	C: 74742 0	C: 65735 0	C: 70607 1
15,3600	C: 77742 0	C: 77151 1	C: 74615 0	C: 61600 0	C: 60003 1	C: 60605 1	C: 64345 1	C: 77026 0
15,3610	C: 54200 1	C: 73160 1	C: 42475 1	C: 60430 0	C: 66614 1	C: 00653 1	C: 13072 0	C: 04042 0
15,3620	C: 27232 1	C: 62162 0	C: 44274 0	C: 07322 0	C: 33165 0	C: 03265 0	C: 32741 1	C: 63467 1
15,3630	C: 50064 0	C: 11655 1	C: 11373 0	C: 75477 1	C: 77366 1	C: 70425 0	C: 51217 1	C: 07505 0
15,3640	C: 32504 1	C: 13726 0	C: 15341 0	C: 72157 1	C: 66255 0	C: 11142 0	C: 32737 0	C: 64200 1
15,3650	C: 43016 1	C: 71316 0	C: 64201 0	C: 16400 1	C: 36737 1	C: 01364 1	C: 14350 1	C: 75051 1
15,3660	C: 60001 0	C: 17027 1	C: 31661 1	C: 73321 0	C: 43422 1	C: 77007 0	C: 51442 1	C: 11514 1
15,3670	C: 32502 1	C: 63215 1	C: 47106 0	C: 02140 0	C: 02335 0	C: 12716 1	C: 12356 1	C: 13401 0
15,3700	C: 37404 0	C: 03154 1	C: 15267 0	C: 17403 0	C: 01743 0	C: 75552 1	C: 76050 0	C: 05465 0
15,3710	C: 17001 0	C: 16221 1	C: 27572 1	C: 04420 0	C: 14273 1	C: 06440 1	C: 11323 0	C: 07767 0
15,3720	C: 30366 1	C: 14155 0	C: 23047 0	C: 13176 0	C: 03307 0	C: 13247 1	C: 03342 1	C: 01070 1
15,3730	C: 26607 1	C: 10557 1	C: 32115 0	C: 10404 0	C: 00124 0	C: 65500 1	C: 72703 0	C: 00151 1
15,3740	C: 25431 0	C: 00077 1	C: 37176 0	C: 17777 0	C: 02143 0	C: 07675 1	C: 02702 0	C: 03420 1
15,3750	C: 01470 0	C: 62414 1	C: 50541 1	C: 07506 0	C: 14361 0	C: 01674 0	C: 36075 0	C: 15736 1
15,3760	C: 21775 1	C: 16745 0	C: 13112 1	C: 02620 1	C: 31757 0	C: 73011 0	C: 60052 0	C: 15776 0
15,3770	C: 01237 0	C: 00330 1	C: 35521 1	C: 07573 1	C: 21256 0	C: 16004 1	C: 03776 1	CKSM 76540 1

OCTAL LISTING FOR PARAGRAPH # 110, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2000	I: 77775 1	C: 02665 0	C: 03604 0	I: 52375 1	C: 03612 1	C: 03576 0	C: 27646 0	C: 02705 1
16,2010	C: 37620 1	C: 22221 0	I: 77624 1	C: 63606 1	C: 26625 1	C: 00007 0	C: 36617 1	C: 56674 1
16,2020	I: 40375 1	C: 02453 1	C: 00001 0	I: 45115 0	C: 03546 0	C: 45174 1	I: 77624 1	C: 45330 0
16,2030	C: 27472 0	C: 03546 0	I: 63201 1	C: 00001 0	C: 02453 1	I: 65325 0	C: 02461 0	C: 03663 1
16,2040	I: 62525 1	C: 33430 0	I: 45006 0	C: 72740 1	I: 77624 1	C: 45304 1	I: 77745 1	C: 03744 0
16,2050	I: 73401 0	C: 00007 0	I: 53515 0	C: 03540 0	C: 00001 0	I: 47315 0	C: 02611 0	I: 77656 1
16,2060	I: 71525 0	C: 03744 0	I: 45561 1	C: 43754 0	C: 16440 0	I: 45345 1	C: 03413 1	C: 34531 1
16,2070	C: 14041 1	C: 03656 1	I: 77625 0	C: 00041 1	C: 37423 0	C: 61650 0	I: 77775 1	C: 03612 1
16,2100	C: 17713 1	C: 03413 1	C: 00041 1	I: 77621 1	C: 03656 1	C: 37423 0	C: 61650 0	I: 41575 0
16,2110	C: 03646 0	C: 37721 1	C: 11200 0	I: 77601 0	C: 00001 0	I: 45175 0	C: 03632 0	C: 77270 1
16,2120	I: 70372 0	C: 34523 1	I: 52315 1	C: 03612 1	C: 03713 1	I: 52341 0	C: 34523 1	I: 72561 0
16,2130	C: 03703 0	C: 24015 0	C: 03721 0	I: 41456 0	I: 74241 0	C: 00015 0	C: 00001 0	I: 51352 1
16,2140	C: 00015 0	C: 14015 0	C: 03727 0	I: 56261 1	C: 21605 1	C: 03076 0	I: 63316 0	C: 00015 0
16,2150	I: 77636 1	I: 75421 1	I: 76561 1	I: 53455 0	C: 00015 0	C: 37713 0	C: 50331 0	I: 77775 1
16,2160	C: 11760 0	C: 27351 0	C: 03713 1	C: 00307 0	I: 53435 0	C: 03632 0	C: 34007 1	C: 61702 0
16,2170	C: 00315 0	I: 57435 1	C: 00307 0	I: 77772 0	C: 34323 1	C: 50444 0	06006 1	I: 45001 1
16,2200	C: 00001 0	C: 34331 1	I: 77745 1	C: 03074 1	C: 03335 1	I: 77776 1	05402 1	C: 10035 0
16,2210	06006 1	I: 51575 1	C: 03432 1	I: 67206 1	C: 01345 1	I: 44205 0	C: 34533 0	I: 67240 0
16,2220	C: 51143 0	C: 01351 1	I: 44205 0	C: 34530 0	C: 03335 1	C: 03074 1	I: 77614 1	C: 01344 0
16,2230	C: 51603 0	I: 77414 0	C: 04700 1	C: 34325 1	31465 1	74753 0	10000 0	34770 0
16,2240	50000 1	31421 1	55633 1	06006 1	I: 51375 1	C: 03432 1	C: 03705 0	I: 77656 1
16,2250	I: 41441 0	C: 03460 0	I: 56244 0	C: 51137 0	C: 34632 1	I: 41215 1	C: 11760 0	I: 70501 1
16,2260	C: 00047 1	I: 60325 0	C: 00045 0	C: 00050 1	I: 77665 1	I: 53664 0	C: 00046 0	C: 57607 1
16,2270	I: 41405 0	C: 34525 1	I: 54335 0	C: 03014 1	C: 20617 0	I: 45421 1	C: 74347 1	I: 77615 0
16,2300	C: 01044 0	C: 17413 1	C: 03430 0	I: 50025 0	C: 34527 0	C: 51102 0	I: 74375 0	C: 03705 0
16,2310	C: 03703 0	I: 52352 1	C: 03432 1	I: 63256 0	C: 03460 0	I: 47256 0	I: 45121 1	C: 01734 0
16,2320	C: 47633 1	I: 77761 1	C: 03227 0	C: 37126 0	C: 51603 0	I: 77545 0	C: 36534 0	30154 1
16,2330	12242 0	I: 43020 1	C: 03374 1	C: 01307 1	C: 34360 0	I: 50135 0	C: 03325 0	C: 61721 1
16,2340	I: 53375 0	C: 03327 1	C: 03432 1	C: 03335 1	I: 77776 1	34770 0	61724 1	55725 1
16,2350	05402 1	C: 10035 0	31725 0	55724 0	06006 1	I: 77775 1	C: 03335 1	C: 03327 1
16,2360	I: 77775 1	C: 03432 1	I: 53245 1	C: 03705 0	C: 03721 0	C: 03460 0	I: 77646 0	C: 03763 0
16,2370	I: 77776 1	05402 1	C: 10035 0	06006 1	I: 77775 1	C: 03460 0	C: 37721 1	C: 03374 1

OCTAL LISTING FOR PARAGRAPH # 111, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2400	06006 1	I: 71201 1	C: 00001 0	C: 11762 1	I: 43125 0	C: 34517 0	C: 03705 0	C: 34412 1
16,2410	I: 77745 1	C: 34521 0	I: 77606 1	I: 45014 0	C: 00675 0	C: 22002 0	I: 77776 1	05402 1
16,2420	C: 05021 1	C: 10000 0	06006 1	I: 77214 0	C: 01310 1	C: 34442 1	C: 03612 1	I: 65251 1
16,2430	C: 03466 0	C: 03474 0	I: 54225 0	C: 03476 1	C: 20222 1	I: 74265 0	C: 34523 1	I: 76451 0
16,2440	C: 01046 1	C: 03705 0	I: 57535 0	C: 03747 0	I: 77640 0	C: 34462 0	I: 53575 0	C: 01030 0
16,2450	I: 45345 1	C: 01044 0	C: 03450 0	I: 56205 0	C: 34515 1	C: 00043 0	I: 53361 0	C: 01054 1
16,2460	C: 03646 0	C: 03646 0	I: 77776 1	05402 1	C: 04021 0	06006 1	I: 77745 1	C: 03474 0
16,2470	C: 27476 1	C: 03612 1	C: 03466 0	I: 77414 0	C: 01270 0	44770 1	55724 0	05402 1
16,2500	C: 00001 0	15205 1	06006 1	I: 77775 1	C: 11762 1	C: 17327 1	C: 11762 1	C: 27325 0
16,2510	C: 03721 0	C: 03646 0	I: 77776 1	12475 1	C: 55340 0	C: 61710 0	C: 04000 0	C: 00000 1
16,2520	C: 00707 1	C: 03434 1	C: 01440 0	C: 00000 1	C: 77715 1	C: 77777 0	C: 00000 1	C: 00620 0
16,2530	C: 00000 1	C: 00310 0	C: 00040 0	C: 00000 1	34762 0	00006 1	06031 0	74762 1
16,2540	54157 0	06006 1	I: 41545 0	C: 03763 0	I: 53135 0	C: 00160 0	C: 34556 0	I: 56345 0
16,2550	C: 34630 0	C: 03076 0	I: 72414 0	C: 00700 0	C: 34555 0	I: 41421 0	I: 56345 0	C: 00001 0
16,2560	C: 34632 1	I: 44342 1	C: 11760 0	I: 41205 0	C: 03076 0	C: 00001 0	I: 40061 1	C: 20213 0
16,2570	C: 34617 0	I: 41225 1	C: 01764 0	C: 34624 0	I: 41471 0	C: 01766 1	I: 51025 1	C: 34626 1
16,2600	C: 34617 0	I: 51145 0	C: 00003 1	C: 34607 1	I: 56205 0	C: 01766 1	C: 01765 1	I: 77414 0
16,2610	C: 01066 0	07224 1	06006 1	I: 54215 0	C: 34624 0	C: 20617 0	C: 03430 0	I: 77776 1
16,2620	05402 1	C: 00003 1	15205 1	C: 00144 0	C: 00000 1	C: 00764 1	C: 00000 1	C: 00000 1
16,2630	C: 04263 1	C: 17602 0	C: 25124 1	C: 00065 1	C: 01265 1	C: 00302 0	C: 24533 1	C: 00343 0
16,2640	C: 21616 0	C: 00000 1	C: 13143 0	C: 00000 1	C: 00000 1	C: 77777 0	C: 53213 1	C: 00001 0
16,2650	C: 17630 1	C: 00001 0	C: 16700 1	C: 07760 1	C: 14473 1	C: 07564 1	C: 15042 0	I: 43020 1
16,2660	C: 02777 1	C: 00074 1	I: 77760 0	C: 02735 1	I: 47773 1	C: 00001 0	C: 00007 0	I: 65552 0
16,2670	C: 00025 0	I: 43014 0	C: 00354 0	C: 34702 0	C: 00174 0	I: 71360 1	C: 00006 1	C: 00025 0
16,2700	C: 34023 1	C: 34664 1	I: 45345 1	C: 00025 0	C: 00023 0	I: 47046 0	C: 45636 0	C: 01251 0
16,2710	I: 77414 0	C: 00074 1	34772 1	04636 0	C: 20715 0	32727 1	04636 0	C: 20743 0
16,2720	14103 0	02724 1	05561 0	C: 00014 1	06006 1	I: 77650 1	C: 02777 1	C: 01405 1
16,2730	I: 77773 1	C: 00001 0	C: 10001 1	I: 77773 1	C: 00007 0	C: 10007 1	I: 77773 1	C: 00015 0
16,2740	C: 10015 1	I: 77616 0	C: 00056 1	C: 37722 1	00004 0	00006 1	30033 1	50120 1
16,2750	52002 1	30034 0	50120 1	54003 0	00003 1	06030 1	I: 41345 0	C: 01142 1
16,2760	C: 01152 0	I: 77676 0	I: 70525 1	C: 01144 1	I: 41325 0	C: 01150 1	C: 01152 0	I: 76466 1
16,2770	C: 16714 1	C: 01146 0	I: 72405 0	C: 01144 1	C: 00033 1	I: 65205 0	C: 01142 1	C: 01154 0

OCTAL LISTING FOR PARAGRAPH # 112, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3000	I: 45205 1	C: 01150 1	I: 41325 0	C: 01146 0	C: 01152 0	I: 65276 1	C: 01154 0	I: 65205 0
16,3010	C: 01142 1	C: 01150 1	I: 43205 1	C: 00033 1	I: 76466 1	C: 02730 1	I: 76435 1	C: 02714 1
16,3020	C: 02722 1	I: 77616 0	I: 45345 1	C: 03726 1	C: 03724 0	I: 45246 0	C: 35035 1	I: 67240 0
16,3030	C: 65076 0	C: 35037 0	I: 77650 1	C: 65100 0	C: 00040 0	C: 30447 0	C: 00613 0	40102 0
16,3040	74076 0	00006 1	63217 0	35011 1	05223 1	C: 03037 0	30032 0	57645 1
16,3050	57646 1	31447 1	00006 1	21645 0	55476 1	00006 1	74751 1	55647 1
16,3060	36214 0	05223 1	C: 03342 1	04714 1	C: 42425 1	11634 0	13074 0	04714 1
16,3070	C: 13347 0	04714 1	C: 36452 1	34351 1	55634 0	11446 1	13102 0	13115 0
16,3100	13106 1	13115 0	55661 0	34766 1	55644 1	13215 0	31633 0	00006 1
16,3110	63217 0	55445 1	34767 0	55644 1	13126 0	34762 0	70101 0	10000 0
16,3120	13122 1	13217 1	25644 0	34754 0	55445 1	25644 0	31465 1	74754 1
16,3130	00006 1	13133 1	31445 0	61445 0	55444 0	37702 0	55661 0	00006 1
16,3140	31606 0	53656 1	00006 1	41606 1	20001 1	20001 1	53612 1	00006 1
16,3150	31602 1	20001 1	20001 1	21612 1	00006 1	31612 0	00006 1	71444 0
16,3160	21656 1	00006 1	31610 1	53660 1	00006 1	41610 0	20001 1	20001 1
16,3170	53612 1	00006 1	31604 1	20001 1	20001 1	21612 1	00006 1	31612 0
16,3200	00006 1	71444 0	21660 1	25644 0	00006 1	31656 0	55423 1	53606 1
16,3210	00006 1	31660 0	55424 0	53610 0	25644 0	31661 1	55446 1	34772 1
16,3220	55644 1	15314 0	22016 0	00006 1	22012 1	11644 1	13230 1	13233 1
16,3230	34322 0	05223 1	C: 03325 0	47663 1	71635 1	10000 0	13315 1	13244 1
16,3240	41635 1	74767 1	00006 1	13321 0	34761 0	64756 1	00006 1	05012 1
16,3250	33331 0	54112 1	33335 1	54030 0	15323 1	22016 0	34767 0	00006 1
16,3260	05012 1	33333 1	54112 1	37663 0	54030 0	15325 1	22016 0	00006 1
16,3270	22012 1	44772 0	61623 1	54054 1	44772 0	61624 0	54053 0	35050 1
16,3300	00006 1	05014 1	11635 1	13313 1	13313 1	10000 0	03311 1	04655 0
16,3310	C: 36166 0	04714 1	C: 36351 0	04655 0	C: 36326 0	51635 0	33331 0	04720 0
16,3320	13244 1	00006 1	31424 1	53624 1	13244 1	51644 0	33335 1	50000 1
16,3330	10000 0	C: 03255 0	C: 41005 1	C: 03266 0	C: 41171 0	C: 37772 1	C: 03123 1	C: 03126 1
16,3340	C: 03204 1	C: 03215 1	31645 1	00006 1	21646 0	00006 1	74764 1	22000 1
16,3350	55533 1	31571 0	00006 1	13355 0	13363 0	31573 1	00006 1	13363 0
16,3360	34772 1	55573 0	15314 0	41533 1	00006 1	71631 0	00006 1	71533 1
16,3370	63756 0	55573 0	31533 0	00006 1	63377 1	34770 0	13400 1	44770 1

OCTAL LISTING FOR PARAGRAPH # 113, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3400	55651 0	00006 1	71573 0	40001 1	61647 0	55652 0	00006 1	63412 0
16,3410	34346 1	13413 0	34752 0	55653 1	51653 0	01651 1	40000 0	00006 1
16,3420	63471 0	51653 0	01533 0	55654 0	63763 0	00006 1	63550 1	31533 0
16,3430	00006 1	74753 0	55573 0	31647 0	00006 1	73757 0	20001 1	20001 1
16,3440	20001 1	61573 1	51653 0	00000 1	40000 0	63761 1	40000 0	00006 1
16,3450	63661 0	31654 1	63762 1	00006 1	63661 0	51653 0	01647 0	40000 0
16,3460	63756 0	40000 0	00006 1	63661 0	31647 0	55652 0	31533 0	55650 1
16,3470	13500 0	51653 0	03756 0	27652 0	43760 1	51653 0	00000 1	55650 1
16,3500	00006 1	71631 0	60000 1	00006 1	73757 0	55573 0	00006 1	71650 1
16,3510	55650 1	44756 0	51653 0	00000 1	27573 0	51653 0	01652 1	40000 0
16,3520	63756 0	40000 0	00006 1	73757 0	27650 1	33760 0	00006 1	74756 0
16,3530	61650 0	56001 0	34772 1	00006 1	11573 0	00006 1	13544 0	10000 0
16,3540	34750 1	13553 0	44750 0	13553 0	22000 1	00006 1	11573 0	13553 0
16,3550	43763 1	51653 0	00000 1	55573 0	00006 1	61533 0	55573 0	13562 1
16,3560	50000 1	44751 1	00006 1	77652 0	00006 1	71631 0	20001 1	20001 1
16,3570	55573 0	13574 0	50000 1	44751 1	55573 0	00006 1	13661 1	31573 1
16,3600	00006 1	71571 1	10000 0	13607 1	13612 0	13661 1	13612 0	34772 1
16,3610	55653 1	13623 1	11573 0	64770 0	13616 1	64770 0	40000 0	65001 0
16,3620	40000 0	00006 1	63661 0	31573 1	00006 1	74766 0	00006 1	13635 0
16,3630	10000 0	33764 1	13634 1	43764 0	55573 0	11573 0	34750 1	13641 0
16,3640	34752 0	55571 1	40000 0	00006 1	63647 1	41573 0	55573 0	31653 0
16,3650	00006 1	13653 0	13664 1	30031 0	00006 1	61573 1	00006 1	65314 1
16,3660	13664 1	44772 0	55571 1	55573 0	00006 1	33755 0	52111 1	31573 1
16,3670	54031 1	31653 0	00006 1	15314 0	11571 1	13701 0	13742 1	13722 1
16,3700	13742 1	31572 0	74770 1	00006 1	13714 1	44770 1	71572 1	55572 1
16,3710	35014 1	00006 1	01006 0	13742 1	34770 0	27572 1	34773 0	00006 1
16,3720	01006 0	13742 1	31572 0	74767 1	00006 1	13735 1	44767 1	71572 1
16,3730	55572 1	33765 0	00006 1	01006 0	13742 1	34767 0	27572 1	34355 0
16,3740	00006 1	01006 0	34752 0	00006 1	05013 0	15314 0	22016 0	34772 1
16,3750	55571 1	00006 1	01006 0	15325 1	C: 03746 1	C: 34066 0	C: 00344 1	C: 06315 0
16,3760	C: 00111 0	C: 00510 0	C: 01330 0	C: 07071 0	C: 07640 1	C: 00240 1	I: 43145 0	C: 26607 1
16,3770	C: 01743 0	C: 35774 0	I: 77735 0	C: 11760 0	C: 00011 1	I: 77616 0	C: 03776 1	CKSM 72767 1

OCTAL LISTING FOR PARAGRAPH # 114, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2000	06006 1	I: 77624 1	C: 27516 0	I: 43014 0	C: 04064 1	C: 04303 0	C: 36011 1	I: 77614 1
17,2010	C: 04264 0	I: 77776 1	32032 1	05607 0	C: 01554 1	C: 01626 1	06006 1	I: 77624 1
17,2020	C: 27005 1	I: 45154 0	C: 02150 1	C: 20240 0	I: 77624 1	C: 20264 0	I: 77624 1	C: 27525 0
17,2030	I: 77634 0	C: 21275 1	C: 00051 0	06006 1	I: 77624 1	C: 27516 0	I: 43014 0	C: 04063 0
17,2040	C: 04304 1	C: 36044 1	I: 77614 1	C: 04263 1	I: 77776 1	32032 1	05607 0	C: 01626 1
17,2050	C: 01554 1	12016 0	I: 77745 1	C: 03723 1	C: 02607 1	I: 77760 0	C: 03722 0	I: 77620 0
17,2060	C: 00300 1	I: 66744 0	C: 00304 0	C: 41673 0	I: 76744 1	C: 00154 1	C: 00001 0	C: 10001 1
17,2070	I: 77743 1	C: 00006 1	C: 10006 0	I: 77773 1	C: 00003 1	C: 35172 0	C: 46000 0	I: 77624 1
17,2100	C: 47642 1	C: 34041 0	C: 00300 1	C: 03674 1	C: 03460 0	I: 77420 1	C: 03457 1	32162 0
17,2110	05535 1	04636 0	C: 16062 1	34772 1	04636 0	C: 20715 0	32161 0	04636 0
17,2120	C: 20601 1	14103 0	12116 1	06006 1	I: 77745 1	C: 03726 1	C: 16774 1	C: 03730 0
17,2130	C: 02776 0	I: 77776 1	00004 0	04606 0	00006 1	30025 0	53723 1	30033 1
17,2140	55724 0	30034 0	55726 1	30032 0	55730 0	00003 1	35043 0	54003 0
17,2150	05527 1	34321 0	04636 0	C: 21067 0	04103 1	12157 1	12111 0	04636 0
17,2160	C: 31614 0	C: 15200 1	C: 01536 0	22016 0	00006 1	22012 1	32524 0	10000 0
17,2170	55446 1	34772 1	54001 1	51446 0	53530 1	11446 1	12167 1	00006 1
17,2200	32540 1	52113 0	34750 1	54030 0	15323 1	22016 0	00006 1	22012 1
17,2210	04714 1	C: 13313 1	31465 1	74753 0	10000 0	34770 0	55446 1	51446 0
17,2220	32521 0	55704 1	02412 1	51446 0	31416 0	55630 1	02452 0	41446 1
17,2230	50000 1	34767 0	55626 0	40000 0	64750 1	64770 0	55625 0	44752 1
17,2240	70105 1	54105 1	51446 0	31414 1	00006 1	71626 0	22000 1	53627 1
17,2250	51446 0	31421 1	55633 1	51446 0	32530 0	55446 1	34351 1	55634 0
17,2260	31423 0	55605 1	55623 0	55601 0	31424 1	55607 0	55624 1	55603 1
17,2270	31465 1	74754 1	00006 1	12321 1	34770 0	55611 1	51611 0	31664 1
17,2300	00006 1	72527 1	00006 1	12313 0	00006 1	62310 1	32526 1	12311 1
17,2310	42526 0	51611 0	55664 0	11611 1	12275 1	31664 1	55575 0	31665 0
17,2320	55577 1	41501 0	74766 0	27501 0	04714 1	C: 42425 1	34772 1	55635 1
17,2330	30032 0	55645 0	32524 0	05233 0	C: 03037 0	C: 34066 0	00006 1	32536 0
17,2340	52113 0	31625 1	54030 0	15323 1	00004 0	31635 0	55611 1	44767 1
17,2350	55635 1	00006 1	23613 1	32525 1	55661 0	34772 1	54001 1	51661 1
17,2360	53541 1	11661 0	10000 0	12354 0	40105 1	74752 1	26105 1	31420 0
17,2370	55630 1	02461 0	32532 1	55626 0	32533 0	55633 1	00006 1	31602 1

OCTAL LISTING FOR PARAGRAPH # 115, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2400	53606 1	00006 1	31604 1	53610 0	32523 1	55704 1	02412 1	31611 0
17,2410	55635 1	01613 1	00006 1	51704 0	30001 0	53706 0	00006 1	51704 0
17,2420	30003 1	53710 1	00006 1	51704 0	30005 1	53712 0	00006 1	51704 0
17,2430	30007 0	53714 0	00006 1	51704 0	30011 1	53716 1	00006 1	51704 0
17,2440	30013 0	53720 1	00006 1	51704 0	30015 0	53722 0	51704 0	30016 0
17,2450	55723 1	00002 0	31467 0	00006 1	72534 0	20001 1	20001 1	20001 1
17,2460	55631 0	31630 0	00006 1	71471 0	20001 1	20001 1	55632 0	00002 0
17,2470	C: 37777 1	C: 67657 1	C: 01703 1	C: 47472 0	C: 27656 1	C: 37777 1	C: 60361 0	C: 00000 1
17,2500	C: 67304 1	C: 00000 1	C: 37777 1	C: 65371 1	C: 65337 0	C: 42700 0	C: 33045 0	C: 01000 0
17,2510	C: 00000 1	C: 00000 1	C: 42700 0	C: 33045 0	C: 20000 0	C: 60730 0	C: 17145 1	C: 41323 0
17,2520	C: 35773 1	C: 02470 0	C: 01425 0	C: 02502 1	C: 00063 1	C: 00027 1	C: 00210 1	C: 00170 1
17,2530	C: 00005 1	C: 00000 1	C: 00247 0	C: 00232 1	C: 33074 1	C: 03227 0	C: 40066 0	C: 02205 1
17,2540	C: 36066 1	22016 0	32624 0	61634 1	54030 0	12550 1	37663 0	54030 0
17,2550	33302 0	54031 1	00006 1	22012 1	04542 0	34752 0	00006 1	05013 0
17,2560	32623 1	00006 1	06031 0	72623 0	00006 1	12625 0	55502 0	00006 1
17,2570	74760 0	76214 1	55513 0	55514 1	31502 1	00006 1	74762 1	76214 1
17,2600	55515 0	31502 1	00006 1	74764 1	76214 1	55516 0	31465 1	74753 0
17,2610	00006 1	12614 1	46214 1	12615 0	44767 1	55617 1	11631 0	55513 0
17,2620	12631 0	55514 1	12631 0	C: 07700 1	C: 37772 1	55513 0	55514 1	55515 0
17,2630	55516 0	11562 0	34770 0	12635 1	34767 0	55520 0	11626 0	12643 0
17,2640	12653 1	12645 0	12653 1	34322 0	12655 1	35775 1	12655 1	C: 00000 1
17,2650	C: 00003 1	C: 00006 1	C: 00000 1	51513 1	32647 0	61520 1	50000 1	32703 1
17,2660	72722 0	55452 1	00006 1	74762 1	55523 0	11563 1	34770 0	12671 1
17,2670	34767 0	55521 1	11627 1	12677 1	12724 0	12701 1	12724 0	34322 0
17,2700	12726 1	35775 1	12726 1	C: 00000 1	C: 05125 1	C: 05252 1	C: 00231 1	C: 02421 1
17,2710	C: 02610 1	C: 00146 1	C: 02504 1	C: 02442 1	C: 00000 1	C: 02421 1	C: 02442 1	C: 00000 1
17,2720	C: 02504 1	C: 02610 1	C: 01417 1	C: 06360 1	51514 0	32647 0	61521 0	50000 1
17,2730	32703 1	72723 1	55454 1	00006 1	74764 1	55524 1	11561 0	34770 0
17,2740	12742 0	34767 0	55517 1	11630 1	13035 0	13035 0	12747 0	11626 0
17,2750	12754 1	12764 1	12756 0	12764 1	34322 0	12766 0	35775 1	12766 0
17,2760	C: 00000 1	C: 00001 0	C: 00002 0	C: 00000 1	51515 1	32647 0	61517 0	50000 1
17,2770	33117 0	73136 1	55450 0	31516 1	00006 1	63027 1	11627 1	36214 0

OCTAL LISTING FOR PARAGRAPH # 116, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3000	13002 1	36211 0	51516 1	62760 1	50000 1	33140 1	73151 0	61450 1
17,3010	55502 0	00006 1	74762 1	66061 0	55522 1	00006 1	13022 0	31502 1
17,3020	55450 0	13263 1	11561 0	13027 0	13017 0	13027 0	13017 0	31450 1
17,3030	00006 1	74762 1	67701 0	55522 1	13263 1	11627 1	13042 0	13046 1
17,3040	13044 0	13046 1	34322 0	13050 0	35775 1	13050 0	51516 1	32647 0
17,3050	61517 0	50000 1	33117 0	73137 0	55450 0	31515 1	00006 1	13111 1
17,3060	11626 0	36214 0	13064 1	36211 0	51515 1	62760 1	50000 1	33140 1
17,3070	73152 0	61450 1	55502 0	00006 1	74765 0	66061 0	55522 1	00006 1
17,3100	13104 0	31502 1	55450 0	13263 1	11561 0	13111 1	13101 0	13111 1
17,3110	13101 0	31450 1	00006 1	74765 0	67701 0	55522 1	13263 1	C: 11000 1
17,3120	C: 22125 1	C: 00252 1	C: 11231 1	C: 15421 1	C: 04610 1	C: 11146 1	C: 15504 1	C: 04442 1
17,3130	C: 11000 1	C: 15504 1	C: 04610 1	C: 11000 1	C: 15421 1	C: 04442 1	C: 03760 0	C: 34017 0
17,3140	C: 11000 1	C: 11231 1	C: 11146 1	C: 11000 1	C: 04610 1	C: 15504 1	C: 11000 1	C: 15421 1
17,3150	C: 04442 1	C: 03417 0	C: 34360 0	11562 0	13163 1	13157 0	13161 0	55550 1
17,3160	13361 1	41523 0	55523 0	31562 1	00006 1	51523 1	73342 0	55460 0
17,3170	63275 1	00006 1	63203 0	51523 1	33276 1	55550 1	40000 0	27562 0
17,3200	33277 0	55460 0	13346 1	41460 0	63302 0	00006 1	63211 0	33302 0
17,3210	55460 0	31460 1	00006 1	71523 0	23550 0	55562 0	13346 1	11563 1
17,3220	13227 1	13223 0	13225 0	55551 0	13525 1	41524 1	55524 1	31563 0
17,3230	00006 1	51524 0	73342 0	55462 1	63275 1	00006 1	63247 0	51524 0
17,3240	33276 1	55551 0	40000 0	27563 1	33277 0	55462 1	13512 0	41462 1
17,3250	63302 0	00006 1	63255 0	33302 0	55462 1	31462 0	00006 1	71524 1
17,3260	23551 1	55563 1	13512 0	11561 0	13303 0	13267 0	13303 0	51522 0
17,3270	33276 1	55547 1	13505 0	C: 77037 0	C: 77277 0	C: 77537 0	C: 00000 1	C: 00240 1
17,3300	C: 00500 1	C: 00740 1	C: 00027 1	31561 1	00006 1	51522 0	73342 0	55456 0
17,3310	63275 1	00006 1	63323 0	51522 0	33276 1	55547 1	40000 0	27561 0
17,3320	33277 0	55456 0	13366 0	41456 0	63302 0	00006 1	63331 0	33302 0
17,3330	55456 0	31456 1	00006 1	71522 1	23547 0	55561 0	13366 0	C: 65252 1
17,3340	C: 57777 1	C: 40000 0	C: 00000 1	C: 37777 1	C: 20000 0	C: 12525 0	11626 0	13355 0
17,3350	13352 1	13355 0	51513 1	32647 0	50000 1	32703 1	72722 0	55453 0
17,3360	13217 1	31452 0	55453 0	34772 1	55460 0	13217 1	11515 0	13377 0
17,3370	34772 1	55451 1	11516 0	13442 1	34772 1	27451 1	13153 1	11630 1

OCTAL LISTING FOR PARAGRAPH # 117, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3400	13415 0	13415 0	13403 1	11626 0	13370 1	13407 0	13370 1	51515 1
17,3410	32647 0	50000 1	33117 0	73136 1	13371 0	11626 0	36214 0	13421 1
17,3420	36211 0	51515 1	62760 1	50000 1	33140 1	73152 0	55451 1	00006 1
17,3430	74765 0	67701 0	55522 1	41456 0	63277 0	00006 1	71522 1	30001 0
17,3440	27547 1	13372 0	11630 1	13473 0	13473 0	13446 0	11627 1	36214 0
17,3450	13452 0	36211 0	51516 1	62760 1	50000 1	33140 1	73151 0	27451 1
17,3460	00006 1	74762 1	67701 0	55522 1	41456 0	63277 0	00006 1	71522 1
17,3470	30001 0	27547 1	13153 1	11627 1	13374 0	13477 1	13374 0	51516 1
17,3500	32647 0	50000 1	33117 0	73137 0	13375 1	31450 1	55451 1	34772 1
17,3510	55456 0	13153 1	11627 1	13521 0	13516 1	13521 0	51514 0	32647 0
17,3520	50000 1	32703 1	72723 1	55455 0	13531 1	31454 0	55455 0	34772 1
17,3530	55462 1	34772 1	55457 1	34766 1	55461 1	34775 0	55463 0	41456 0
17,3540	61460 1	00006 1	63566 1	41460 0	61462 0	00006 1	63572 1	41460 0
17,3550	27462 1	41456 0	27460 0	00006 1	33565 1	52113 0	44770 1	71501 0
17,3560	55501 0	44772 0	55464 1	15323 1	C: 02140 0	C: 42066 1	53457 1	53461 1
17,3570	53457 1	13543 1	53461 1	53463 0	53461 1	41456 0	61460 1	00006 1

17,3600	63602 0	13547 0	53457 1	53461 1	53457 1	13547 0	22016 0	00006 1
17,3610	22012 1	10031 1	15323 1	13615 1	15323 1	41501 0	74770 1	00006 1
17,3620	13631 1	27501 0	31450 1	00006 1	01006 0	31452 0	61454 0	00006 1
17,3630	01005 0	11456 0	13711 1	13650 0	13636 0	13650 0	11460 0	13714 1
17,3640	13655 0	13643 1	13655 0	11462 1	13717 1	13662 1	15323 1	13662 1
17,3650	51457 0	03667 0	44770 1	55456 0	13636 0	51461 0	03667 0	44770 1
17,3660	55460 0	13643 1	51463 1	03667 0	44770 1	55462 1	15323 1	31451 0
17,3670	00006 1	01006 0	00002 0	32723 0	00006 1	02005 0	61453 1	00006 1
17,3700	01005 0	00002 0	32722 1	00006 1	02005 0	61455 1	00006 1	01005 0
17,3710	00002 0	34772 1	57456 1	13721 1	34772 1	57460 1	13721 1	34772 1
17,3720	57462 0	54031 1	04542 0	34752 0	00006 1	05013 0	15323 1	I: 43020 1
17,3730	C: 02755 1	C: 03665 1	I: 77614 1	C: 04273 0	I: 45131 0	C: 02675 1	C: 27777 0	C: 13717 1
17,3740	C: 14045 0	I: 56261 1	C: 20606 0	C: 00045 0	C: 33770 1	C: 22301 0	C: 14017 1	C: 02722 1
17,3750	I: 60316 0	C: 00047 1	I: 41275 1	C: 00017 1	C: 00041 1	I: 77657 0	C: 21576 0	I: 44206 0
17,3760	C: 33416 1	C: 16744 1	I: 60205 0	C: 00045 0	C: 00047 1	I: 53605 1	C: 00045 0	C: 20575 1
17,3770	C: 36742 0	C: 02755 1	C: 03772 0	C: 03773 1	CKSM 53362 0	@	@	@

OCTAL LISTING FOR PARAGRAPH # 120, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2000	34772 1	54061 1	54062 1	00006 1	50061 0	30165 0	50062 0	52662 1
20,2010	50061 0	30167 1	50062 0	54663 0	40062 1	65000 1	00006 1	12025 0
20,2020	35775 1	26061 1	36214 0	26062 1	12003 1	35024 1	54003 0	34775 0
20,2030	05607 0	C: 01436 1	C: 00706 0	34772 1	54061 1	54062 1	50061 0	31156 1
20,2040	50062 0	54722 1	40062 1	64773 0	00006 1	12052 0	34767 0	26061 1
20,2050	24062 0	12036 1	30157 1	54730 1	00006 1	30066 1	52732 0	30067 0
20,2060	54707 0	30063 1	54713 0	04651 1	I: 77776 1	34767 0	70104 0	00006 1
20,2070	12075 0	00006 1	34750 1	53717 0	12104 1	00006 1	30025 0	21717 0
20,2100	45016 1	54001 1	44772 0	21717 0	00004 0	44770 1	55340 0	40774 1
20,2110	66211 0	00006 1	62114 1	12117 0	41501 0	74752 1	27501 0	00006 1
20,2120	31711 1	53526 0	00006 1	31713 0	53530 1	00006 1	31715 0	53532 0
20,2130	31675 1	55564 0	31677 0	55565 1	31701 0	55566 1	30025 0	65016 0
20,2140	57671 0	04655 0	C: 45077 0	00004 0	40025 1	61671 0	10000 0	64770 0
20,2150	12153 0	64752 0	40000 0	05223 1	C: 02161 0	00003 1	35016 0	27671 1
20,2160	15205 1	34767 0	70104 0	00006 1	12171 0	11774 0	12170 1	12176 1
20,2170	55774 0	37650 0	05135 0	C: 03037 0	C: 44066 1	05314 1	37650 0	05135 0
20,2200	C: 02374 0	C: 74066 1	05314 1	30032 0	55646 0	30033 1	55650 1	30034 0
20,2210	55652 0	00002 0	I: 77725 1	C: 20146 0	C: 03550 1	I: 77745 1	I: 40005 0	C: 03550 1
20,2220	C: 40221 1	I: 43352 1	C: 03546 0	I: 40006 0	C: 40303 0	C: 03546 0	I: 74346 0	C: 03552 0
20,2230	I: 73525 1	I: 53361 0	C: 03560 1	I: 53435 0	C: 03574 1	I: 63206 0	C: 03605 1	I: 50256 0
20,2240	I: 63352 0	I: 65241 0	C: 03566 1	I: 75326 1	I: 73406 1	C: 16732 0	I: 74146 1	C: 00002 0
20,2250	C: 26734 0	C: 03605 1	C: 26657 1	C: 03613 0	C: 02746 0	I: 74014 1	C: 04343 1	C: 40261 0
20,2260	C: 00012 1	I: 45014 0	C: 03666 1	C: 25002 1	I: 43345 1	C: 00037 0	C: 03540 0	C: 27542 1
20,2270	I: 77650 1	C: 60061 0	I: 50025 0	C: 15334 1	C: 40215 0	I: 77625 0	C: 20142 1	I: 75225 0
20,2300	C: 15334 1	I: 77650 1	C: 40216 0	I: 43345 1	C: 03540 0	C: 36161 1	I: 52014 0	C: 02465 1
20,2310	C: 76023 1	00006 1	30025 0	53022 1	32330 0	05223 1	C: 02331 1	05402 1
20,2320	C: 40023 1	34754 0	00006 1	05012 1	34766 1	00006 1	05011 1	05314 1
20,2330	C: 01750 1	44754 1	00006 1	03012 1	44766 0	00006 1	03011 1	05362 0
20,2340	C: 00003 1	C: 05014 1	C: 77777 0	00006 1	32354 1	53460 0	34664 1	05135 0
20,2350	C: 02523 1	C: 50067 0	15314 0	C: 00000 1	C: 23420 0	40102 0	74076 0	00006 1
20,2360	62362 1	15314 0	44770 1	55444 0	34770 0	55446 1	44772 0	55323 0
20,2370	44767 1	00006 1	03012 1	32460 1	00006 1	05012 1	05255 0	C: 00006 1

OCTAL LISTING FOR PARAGRAPH # 121, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2400	34767 0	00006 1	05012 1	05255 0	C: 00002 0	11446 1	12446 1	31444 1
20,2410	55446 1	00006 1	62444 1	44772 0	55446 1	32462 0	02431 0	32461 0
20,2420	02431 0	32462 0	02431 0	41446 1	10000 0	12444 0	44770 1	55446 1
20,2430	12415 1	00006 1	23004 1	51446 0	54054 1	51446 0	34756 1	00006 1
20,2440	05014 1	05255 0	C: 00310 0	01004 1	05255 0	C: 00620 0	44772 0	61423 0
20,2450	54054 1	44772 0	61424 1	54053 0	35050 1	00006 1	05014 1	15314 0
20,2460	C: 02200 1	C: 77527 1	C: 00124 0	31465 1	76214 1	60000 1	54774 1	00004 0
20,2470	31465 1	74346 0	64751 0	00006 1	12501 0	44767 1	70103 1	54103 1
20,2500	12504 0	40103 1	74767 1	26103 1	00003 1	31465 1	74765 0	00006 1
20,2510	62512 0	32612 0	62613 1	55655 1	31465 1	74762 1	00006 1	62521 0
20,2520	34770 0	55631 0	31465 1	74757 1	00006 1	62527 0	44770 1	27631 0
20,2530	00004 0	00006 1	12537 0	40075 1	74752 1	26075 1	12542 1	44752 1
20,2540	70075 1	54075 1	00003 1	31466 1	74754 1	00006 1	62550 0	12551 0
20,2550	44770 1	40000 0	55630 1	31466 1	74757 1	10000 0	12562 0	34770 0
20,2560	55626 0	12572 1	34772 1	55626 0	31466 1	74765 0	10000 0	12572 1
20,2570	44770 1	55626 0	31466 1	74762 1	10000 0	12601 0	34770 0	55627 1
20,2600	00002 0	34772 1	55627 1	31466 1	74770 1	10000 0	00002 0	44770 1
20,2610	55627 1	00002 0	C: 00631 0	C: 00056 1	31467 0	00006 1	72641 1	55623 0
20,2620	31470 0	00006 1	72641 1	55624 1	55625 0	00006 1	32643 1	00006 1
20,2630	11467 1	55620 0	00006 1	32643 1	00006 1	11470 1	55621 1	55622 1
20,2640	00002 0	C: 25137 0	C: 00023 0	C: 12522 1	22016 0	00006 1	22012 1	33620 0
20,2650	54112 1	31625 1	54030 0	30033 1	57636 0	00006 1	21636 1	02670 1
20,2660	55642 1	30034 0	57637 1	00006 1	21637 0	02670 1	55643 0	12701 1
20,2670	55611 1	00006 1	73621 0	00006 1	12677 1	34772 1	55611 1	31611 0
20,2700	00002 0	00006 1	31576 1	53665 1	00006 1	31530 0	21665 1	41151 1
20,2710	00006 1	71153 0	20001 1	00006 1	71642 1	20001 1	53536 1	41643 0
20,2720	00006 1	71145 1	20001 1	21536 1	00006 1	41536 1	21665 1	03246 1
20,2730	00006 1	31542 0	53671 1	00006 1	31546 1	53675 0	00006 1	31552 1
20,2740	53701 1	03300 1	00006 1	31606 0	21667 0	03261 1	41623 0	61666 0
20,2750	26054 1	34756 1	00006 1	05014 1	00006 1	31544 0	53673 0	00006 1
20,2760	31550 0	53677 1	00006 1	31554 1	53703 0	03372 1	31602 1	00006 1
20,2770	73623 1	55663 1	31601 1	00006 1	73623 1	21663 1	31666 0	00006 1

OCTAL LISTING FOR PARAGRAPH # 122, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3000	73622 0	21663 1	03004 0	15323 1	25635 0	00006 1	31671 0	53542 1
20,3010	00006 1	31673 1	53544 1	00006 1	31675 1	53546 0	00006 1	31677 0
20,3020	53550 1	00006 1	31701 0	53552 0	00006 1	31703 1	53554 0	00006 1
20,3030	31665 0	55477 0	53576 0	31666 0	55623 0	00006 1	31663 0	53602 0
20,3040	25635 0	00002 0	22016 0	00006 1	22012 1	33616 0	54112 1	31625 1
20,3050	54030 0	30033 1	57640 1	00006 1	21640 0	02670 1	55642 1	30034 0
20,3060	57641 0	00006 1	21641 1	02670 1	55643 0	00006 1	31600 0	53665 1
20,3070	00006 1	31532 1	21665 1	31151 0	00006 1	71145 1	20001 1	00006 1
20,3100	71642 1	20001 1	53540 0	41643 0	00006 1	71153 0	20001 1	21540 0
20,3110	00006 1	41540 0	21665 1	03246 1	00006 1	31556 0	53671 1	00006 1
20,3120	31562 1	53675 0	00006 1	31566 0	53701 1	03300 1	00006 1	31610 1
20,3130	21667 0	03261 1	41624 1	61666 0	26053 0	34755 1	00006 1	05014 1
20,3140	00006 1	31560 0	53673 0	00006 1	31564 1	53677 1	00006 1	31570 1
20,3150	53703 0	03372 1	31604 1	00006 1	73623 1	55663 1	31603 0	00006 1
20,3160	73623 1	21663 1	31666 0	00006 1	73622 0	21663 1	03170 1	15323 1
20,3170	25635 0	00006 1	31671 0	53556 1	00006 1	31673 1	53560 1	00006 1
20,3200	31675 1	53562 0	00006 1	31677 0	53564 0	00006 1	31701 0	53566 1
20,3210	00006 1	31703 1	53570 0	00006 1	31665 0	55500 1	53600 1	31666 0
20,3220	55624 1	00006 1	31663 0	53604 0	34772 1	55635 1	00002 0	22016 0
20,3230	37702 0	61625 1	64752 0	61625 1	54030 0	33616 0	54112 1	30033 1
20,3240	55636 1	55640 0	30034 0	55637 0	55641 1	15325 1	31664 1	00006 1
20,3250	74766 0	00006 1	13260 1	11664 0	34754 0	13257 0	44754 1	55664 0
20,3260	00002 0	31667 1	60000 1	54001 1	34772 1	61666 0	00006 1	73615 1
20,3270	00006 1	13277 1	11666 1	33614 1	13276 0	43614 0	55666 1	00002 0
20,3300	34772 1	55615 0	55617 1	55621 1	55666 1	55662 0	31665 0	00006 1
20,3310	71705 0	55616 0	31664 1	00006 1	71705 0	21616 0	53671 1	21616 0
20,3320	31616 1	00006 1	71712 0	55620 0	31615 1	00006 1	71712 0	21620 0
20,3330	53675 0	21620 0	31465 1	74753 0	10000 0	13344 0	00006 1	31620 1
20,3340	20001 1	20001 1	53622 1	13356 0	31620 1	00006 1	71717 0	55622 1
20,3350	31617 0	00006 1	71717 0	21622 1	53701 1	21622 1	41622 1	00006 1
20,3360	71632 0	55667 0	41621 1	00006 1	71632 0	21667 0	53667 0	20001 1
20,3370	53667 0	00002 0	34772 1	55611 1	55613 0	31665 0	00006 1	71706 0

OCTAL LISTING FOR PARAGRAPH # 123, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3400	55612 1	31664 1	00006 1	71706 0	21612 1	41616 0	00006 1	71710 1
20,3410	55614 1	41615 0	00006 1	71710 1	21614 1	53614 1	21612 1	53612 1
20,3420	20001 1	21673 0	53673 0	53671 1	34772 1	55611 1	55672 1	31665 0
20,3430	00006 1	71707 1	55612 1	31664 1	00006 1	71707 1	21612 1	41616 0
20,3440	00006 1	71711 0	55673 0	41615 0	00006 1	71711 0	21673 0	53612 1
20,3450	21673 0	34772 1	55611 1	55613 0	31616 1	00006 1	71713 1	55612 1
20,3460	31615 1	00006 1	71713 1	21612 1	41620 0	00006 1	71715 1	55614 1
20,3470	41617 1	00006 1	71715 1	21614 1	53614 1	21612 1	53612 1	20001 1
20,3500	21677 1	53677 1	53675 0	34772 1	55611 1	55676 0	31616 1	00006 1
20,3510	71714 0	55612 1	31615 1	00006 1	71714 0	21612 1	41620 0	00006 1
20,3520	71716 1	55677 1	41617 1	00006 1	71716 1	21677 1	53612 1	21677 1
20,3530	31465 1	74754 1	10000 0	00002 0	34772 1	55611 1	55613 0	31620 1
20,3540	00006 1	71720 1	55612 1	31617 0	00006 1	71720 1	21612 1	41622 1
20,3550	00006 1	71722 0	55614 1	41621 1	00006 1	71722 0	21614 1	53614 1
20,3560	21612 1	53612 1	20001 1	21703 0	53703 0	53701 1	34772 1	55611 1
20,3570	55702 1	31620 1	00006 1	71721 0	55612 1	31617 0	00006 1	71721 0
20,3600	21612 1	41622 1	00006 1	71723 1	55703 0	41621 1	00006 1	71723 1
20,3610	21703 0	53612 1	21703 0	00002 0	C: 00375 0	C: 00101 1	C: 02644 0	C: 03227 0
20,3620	C: 03042 1	C: 00115 1	C: 00243 1	C: 37535 0	04611 0	05561 0	C: 00132 1	05561 0
20,3630	C: 00133 0	00006 1	33747 0	52113 0	00006 1	33747 0	52111 1	06000 1
20,3640	47673 0	71465 0	55465 0	03647 1	35011 1	04636 0	C: 01731 0	34756 1
20,3650	70102 0	00006 1	13644 0	44770 1	55501 0	55727 0	30007 0	55711 0
20,3660	55713 1	00004 0	00006 1	31666 0	53604 0	31664 1	55717 0	00006 1
20,3670	74753 0	55715 1	40102 0	74755 0	26102 0	40076 1	74770 1	26076 1
20,3700	00003 1	04655 0	C: 54343 1	04611 0	00004 0	41044 1	55720 1	34753 1
20,3710	64753 1	60025 0	27720 1	44773 1	61720 0	10000 0	63745 1	13715 0
20,3720	13721 1	64770 0	55725 1	05233 0	C: 02063 0	C: 32066 0	43744 1	70102 0
20,3730	64355 0	54102 0	30007 0	55666 1	34770 0	54305 0	05362 0	C: 40116 0
20,3740	C: 05024 1	C: 13000 0	04655 0	C: 54327 0	C: 16017 0	C: 77766 0	C: 03226 1	C: 12060 1
20,3750	C: 03750 0	C: 03751 1	CKSM 56542 1	a	a	a	a	a
20,3760	a	a	a	a	a	a	a	a
20,3770	a	a	a	a	a	a	a	a

OCTAL LISTING FOR PARAGRAPH # 124, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2000	22016 0	00006 1	22012 1	34540 1	54112 1	37661 1	54030 0	32031 1
21,2010	00006 1	06031 0	72031 0	04714 1	C: 43152 0	51656 0	31710 0	55476 1
21,2020	51657 1	31710 0	55477 0	51660 0	31710 0	55500 1	04714 1	C: 42425 1
21,2030	15323 1	C: 00077 1	22016 0	00006 1	22012 1	02042 0	15323 1	C: 02140 0
21,2040	C: 42066 1	C: 37704 0	32041 0	54030 0	55464 1	41501 0	74766 0	27501 0
21,2050	00006 1	32040 1	52113 0	44076 0	70102 0	64753 1	54102 0	00002 0
21,2060	55512 1	00006 1	71511 1	55511 1	34772 1	57510 1	00006 1	71512 1
21,2070	21511 1	00002 0	21511 1	00006 1	12111 0	11510 0	12112 0	12101 1
21,2100	12114 0	11511 1	12117 0	12105 0	40000 0	64750 1	55511 1	34750 1
21,2110	55510 0	00002 0	64752 0	12110 1	40000 0	64750 1	12110 1	64752 0
21,2120	55511 1	34752 0	12110 1	22016 0	31464 0	00006 1	62130 1	12132 1
21,2130	44770 1	55464 1	00006 1	32137 0	52113 0	12141 0	C: 02140 0	C: 42066 1
21,2140	22016 0	00006 1	22012 1	34752 0	05654 0	12170 1	41501 0	74753 0
21,2150	27501 0	34750 1	55340 0	34772 1	55567 0	55570 0	55571 1	34753 1
21,2160	05654 0	12170 1	55464 1	37661 1	54030 0	02642 0	12355 1	C: 37770 0
21,2170	11464 1	12551 0	12674 1	12553 1	55464 1	30030 1	55634 0	37663 0
21,2200	54030 0	41334 0	74763 0	10000 0	12215 1	41501 0	74753 0	27501 0
21,2210	34753 1	55340 0	05654 0	12424 0	12541 1	31501 1	74753 0	00006 1
21,2220	12222 0	12355 1	34767 0	55506 1	60000 1	55507 0	51507 1	41552 0
21,2230	00006 1	51617 0	73121 1	51507 1	21553 1	00006 1	51507 1	41534 0
21,2240	53511 1	34754 0	02060 0	53511 1	51507 1	21553 1	11506 1	12223 1
21,2250	30032 0	57635 0	00006 1	21635 1	40000 0	22007 0	53516 0	30033 1
21,2260	57636 0	00006 1	21636 1	40000 0	55502 0	00006 1	71640 0	21516 0
21,2270	31641 0	00006 1	71502 0	53520 0	31643 1	00006 1	71502 0	53522 1
21,2300	30034 0	57637 1	00006 1	21637 0	40000 0	55502 0	00006 1	71642 1
21,2310	21520 0	31644 0	00006 1	71502 0	21522 1	34767 0	55506 1	60000 1
21,2320	55507 0	00006 1	51507 1	31516 1	51507 1	21553 1	00006 1	51507 1
21,2330	31516 1	51507 1	21542 1	51507 1	31552 1	60000 1	60000 1	00006 1
21,2340	51617 0	73137 0	51507 1	21534 0	51506 0	31620 1	00006 1	51506 0
21,2350	71547 1	51507 1	21534 0	11506 1	12316 0	31560 0	74777 0	10000 0
21,2360	12366 1	37656 0	05121 0	C: 03560 1	C: 44066 1	34322 0	55560 1	41340 0
21,2370	00006 1	62416 0	34767 0	55506 1	60000 1	55507 0	00006 1	50000 1

OCTAL LISTING FOR PARAGRAPH # 125, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2400	31647 0	53511 1	00006 1	51507 1	31576 1	02072 0	00006 1	31511 0
21,2410	51506 0	55572 1	51507 1	53647 1	11506 1	12373 0	41501 0	74765 0
21,2420	00006 1	13202 0	27501 0	02425 0	15323 1	34765 1	00006 1	02012 0
21,2430	00006 1	12436 0	41501 0	74766 0	27501 0	00002 0	31501 1	76211 1
21,2440	00006 1	12476 1	74766 0	00006 1	12467 1	44763 0	00006 1	03012 1
21,2450	44772 0	55476 1	55477 0	55500 1	55503 1	55504 0	55505 1	54050 0
21,2460	54051 1	54052 1	46211 1	71501 0	64767 0	55501 0	00002 0	34763 1
21,2470	00006 1	05012 1	46211 1	71501 0	55501 0	00002 0	34763 1	00006 1
21,2500	02012 0	00006 1	12432 1	34767 0	55506 1	44754 1	00006 1	51506 0
21,2510	71476 1	54001 1	10000 0	32547 0	12516 0	42547 1	60001 0	55502 0
21,2520	12524 1	50000 1	32547 0	54001 1	51506 0	41503 1	60001 0	51506 0
21,2530	26050 0	51506 0	23503 0	11506 1	12504 0	37673 1	00006 1	05014 1
21,2540	00002 0	32545 1	54030 0	55464 1	15323 1	C: 37754 0	C: 77177 0	C: 37200 1
21,2550	C: 00600 1	34770 0	55340 0	04714 1	C: 40463 1	04714 1	C: 40614 0	32633 0
21,2560	10000 0	55506 1	34772 1	54001 1	51506 0	53527 1	11506 1	12560 1
21,2570	55525 0	02642 0	44772 0	55633 1	55632 0	32634 1	55654 0	34766 1
21,2600	55634 0	34775 0	55617 1	30032 0	55635 1	30033 1	55636 1	30034 0
21,2610	55637 0	34772 1	55464 1	41334 0	74763 0	10000 0	12622 1	55617 1
21,2620	32635 0	12627 1	37656 0	05121 0	C: 03560 1	C: 44066 1	34766 1	55501 0
21,2630	32636 0	54030 0	05323 0	C: 00043 0	C: 07534 1	C: 20004 1	C: 37772 1	C: 03606 1
21,2640	C: 36066 1	C: 62524 0	34775 0	55506 1	34772 1	51506 0	55450 0	11506 1
21,2650	12643 0	34766 1	55461 1	34775 0	55463 0	44770 1	71501 0	55501 0
21,2660	00006 1	32640 1	52111 1	33075 0	54031 1	00006 1	22070 0	04542 0
21,2670	34752 0	00006 1	05013 0	00070 0	11617 1	13170 0	12700 0	12700 0
21,2700	37663 0	56030 1	27634 0	10034 1	12710 1	12717 0	12710 1	12717 0
21,2710	62641 0	00006 1	62717 1	05547 1	C: 00020 0	34772 1	55540 0	31501 1
21,2720	74752 1	00006 1	12724 0	44770 1	55617 1	43057 1	71501 0	55501 0
21,2730	00006 1	00031 0	54001 1	31632 1	00006 1	06001 0	73063 0	00006 1
21,2740	62753 1	22000 1	55632 0	30001 0	00006 1	74764 1	30001 0	27501 0
21,2750	41501 0	73064 1	27501 0	41632 0	73063 0	00006 1	63272 0	55340 0
21,2760	03152 1	40075 1	74753 0	26075 1	34753 1	05654 0	13076 1	31501 1
21,2770	74753 0	10000 0	12541 1	44773 1	60774 0	00006 1	63001 0	44770 1

OCTAL LISTING FOR PARAGRAPH # 126, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3000	55617 1	34767 0	55506 1	60000 1	55507 0	51506 0	31656 0	00006 1
21,3010	13032 1	60774 0	54002 1	50002 0	33064 0	00006 1	74760 0	51507 1
21,3020	53526 0	31501 1	73064 1	00006 1	13042 0	34772 1	22007 0	51507 1
21,3030	53542 1	13050 0	22007 0	51507 1	53526 0	31501 1	73064 1	00006 1
21,3040	13050 0	13025 1	50002 0	43064 1	00006 1	74762 1	51507 1	21542 1
21,3050	51507 1	31541 0	51506 0	55567 0	11506 1	13002 1	13452 0	C: 01760 1
21,3060	C: 01400 1	C: 00060 1	C: 00300 1	C: 00077 1	C: 16000 0	C: 00165 0	C: 77612 1	C: 00722 0
21,3070	C: 77055 1	C: 02215 0	C: 75562 1	C: 11064 0	C: 66713 1	C: 00027 1	31501 1	00006 1
21,3100	74756 0	55502 0	41632 0	71502 0	13320 1	34772 1	55567 0	55570 0
21,3110	55571 1	13763 1	C: 00000 1	C: 00740 1	C: 77037 0	C: 00000 1	C: 06604 0	C: 32703 1
21,3120	C: 06604 0	C: 02031 1	C: 12132 1	C: 13030 0	C: 14047 1	C: 15241 1	C: 16650 0	C: 20555 0
21,3130	C: 23065 0	C: 26137 0	C: 32053 0	C: 35712 0	C: 00435 0	C: 13412 1	C: 00435 0	C: 00032 0
21,3140	C: 01350 0	C: 01575 1	C: 02103 1	C: 02523 1	C: 03327 1	C: 04432 0	C: 06264 1	C: 11351 0
21,3150	C: 17324 1	C: 33622 1	55502 0	76214 1	55657 0	31502 1	00006 1	74754 1
21,3160	55502 0	76214 1	55660 1	31502 1	00006 1	74754 1	55656 1	00002 0
21,3170	55617 1	32167 0	61634 1	54030 0	13177 1	37663 0	54030 0	44772 0
21,3200	55464 1	15323 1	44765 0	71501 0	55501 0	40074 0	74760 0	00006 1
21,3210	13217 1	00006 1	41570 0	53477 0	41571 1	55500 1	15323 1	30105 0
21,3220	74763 0	00006 1	13265 1	00006 1	31311 0	53514 1	31307 1	00006 1
21,3230	20032 1	55476 1	31513 1	00006 1	20033 0	55502 0	00006 1	71640 0
21,3240	27476 1	31502 1	00006 1	71641 1	55477 0	31502 1	00006 1	71643 0
21,3250	55500 1	31514 0	00006 1	20034 1	55502 0	00006 1	71642 1	27477 0
21,3260	31502 1	00006 1	71644 1	27500 1	15323 1	00006 1	31015 1	53514 1
21,3270	31013 1	13227 1	34753 1	05654 0	13310 1	31501 1	74753 0	10000 0
21,3300	12541 1	34754 0	05654 0	13404 0	31340 1	00006 1	63334 0	13410 0
21,3310	34770 0	55340 0	00006 1	00032 0	54001 1	40000 0	71633 1	23633 0
21,3320	73063 0	03152 1	51656 0	34614 0	55561 0	51657 1	34614 0	55562 0
21,3330	51660 0	34614 0	55563 1	13105 1	30032 0	00006 1	21572 1	55567 0
21,3340	30033 1	00006 1	21573 0	55502 0	00006 1	71640 0	27567 0	31502 1
21,3350	00006 1	71641 1	55570 0	31502 1	00006 1	71643 0	55571 1	30034 0
21,3360	00006 1	21574 1	55502 0	00006 1	71642 1	27570 0	31502 1	00006 1
21,3370	71644 1	27571 1	41340 0	00006 1	63452 1	31564 1	27567 0	31565 0

OCTAL LISTING FOR PARAGRAPH # 127, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3400	27570 0	31566 0	27571 1	13452 0	11340 0	13410 0	13334 1	13410 0
21,3410	34772 1	55525 0	55526 0	55527 1	55530 1	55531 0	55532 0	55564 0
21,3420	55565 1	55566 1	31501 1	73064 1	00006 1	13433 1	34772 1	55567 0
21,3430	55570 0	55571 1	13452 0	55340 0	00006 1	30033 1	53573 0	30034 0
21,3440	55574 1	13334 1	C: 00114 0	C: 00022 1	C: 06426 1	C: 00012 1	C: 35415 1	C: 0 016 0
21,3450	C: 22021 1	C: 12173 1	31655 0	64766 1	55502 0	34767 0	55506 1	60000 1
21,3460	55507 0	00006 1	50000 1	31534 1	53516 0	31340 1	00006 1	13474 1
21,3470	00006 1	51507 1	41526 0	21516 0	51506 0	31567 1	55517 1	11515 0
21,3500	13510 1	13503 0	13520 1	11516 0	13510 1	13510 1	13520 1	13520 1
21,3510	00006 1	31516 1	53521 1	31502 1	55523 0	31517 0	55522 1	13527 1
21,3520	00006 1	41516 0	53521 1	41502 0	55523 0	41517 1	55522 1	00006 1
21,3530	61655 0	63442 0	00006 1	63562 0	41502 0	61522 0	00006 1	63541 1
21,3540	13553 0	00006 1	41521 1	00006 1	11654 0	00006 1	61522 0	61655 0
21,3550	00006 1	63641 1	13715 0	45006 0	00006 1	61502 1	61522 0	00006 1
21,3560	63645 0	13656 0	00006 1	43444 1	53514 1	00006 1	31521 0	21514 1
21,3570	11513 0	13704 0	13574 0	13600 0	11514 1	13704 0	13704 0	13600 0
21,3600	00006 1	31521 0	00006 1	11654 0	61502 1	61522 0	13000 1	13715 0
21,3610	13715 0	13613 1	13715 0	00006 1	43446 0	53514 1	00006 1	31521 0
21,3620	21514 1	11513 0	13715 0	13625 1	13631 1	11514 1	13715 0	13715 0
21,3630	13631 1	31522 0	61502 1	65006 1	10000 0	13727 1	13727 1	13704 0
21,3640	13704 0	00006 1	41516 0	53511 1	13740 0	41517 1	61523 1	00006 1
21,3650	73451 0	53511 1	00006 1	41516 0	21511 1	13740 0	11515 0	13675 1
21,3660	13662 1	13666 0	11516 0	13675 1	13675 1	13666 0	00006 1	41516 0
21,3670	53511 1	00006 1	33450 0	21511 1	13740 0	00006 1	41516 0	53511 1
21,3700	00006 1	43450 1	21511 1	13740 0	11515 0	13666 0	13710	13675 1
21,3710	11516 0	13666 0	13666 0	13675 1	13675 1	51506 0	44754 1	71501 0
21,3720	55501 0	51506 0	33060 1	71501 0	00006 1	13761 0	13641 0	41517 1
21,3730	00006 1	61523 1	00006 1	73451 0	53511 1	00006 1	41516 0	21511 1
21,3740	51506 0	31623 1	02060 0	34756 1	02060 0	11510 0	13752 0	13756 1
21,3750	13754 0	13756 1	34750 1	13757 0	34752 0	13757 0	31511 0	51506 0
21,3760	55561 0	11506 1	13456 1	00006 1	33770 1	52113 0	15323 1	C: 02541 0
21,3770	C: 36066 1	C: 03771 0	C: 03772 0	CKSM 73463 1	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 130, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2000	06006 1	I: 77634 0	C: 44370 0	C: 03262 1	I: 72364 0	C: 03320 0	C: 03262 1	I: 77624 1
22,2010	C: 44377 1	I: 72364 0	C: 03425 1	C: 01310 1	I: 77624 1	C: 44377 1	I: 45160 1	C: 03320 0
22,2020	C: 44334 0	I: 77775 1	I: 77626 0	C: 50474 0	I: 77626 0	C: 50502 0	I: 77626 0	C: 74510 0
22,2030	I: 75160 1	C: 03266 0	C: 03425 1	I: 77624 1	C: 44304 0	I: 45575 1	C: 50335 1	I: 77626 0
22,2040	C: 50343 0	I: 77626 0	C: 74351 0	I: 45001 1	C: 00023 0	C: 44343 0	I: 45575 1	C: 50474 0
22,2050	I: 77626 0	C: 50502 0	I: 77626 0	C: 74510 0	I: 45345 1	C: 03271 0	C: 03430 0	I: 45325 1
22,2060	C: 03432 1	C: 03273 1	I: 45325 1	C: 03301 0	C: 03440 1	I: 77666 1	C: 03311 1	I: 43345 1
22,2070	C: 03426 1	C: 03446 1	I: 43225 0	C: 15326 1	C: 03436 0	C: 03317 1	I: 77726 1	C: 03365 1
22,2100	I: 51025 1	C: 04367 1	C: 44111 0	I: 77776 1	00004 0	44770 1	55340 0	03163 0
22,2110	12723 1	I: 45345 1	C: 03365 1	C: 04370 1	I: 77244 0	C: 44123 1	C: 03311 1	I: 77656 1
22,2120	C: 03343 0	I: 77650 1	C: 44745 1	I: 53375 0	C: 03426 1	C: 03267 1	I: 77762 1	C: 27267 1
22,2130	C: 03434 1	I: 74455 0	C: 03275 1	C: 27275 1	C: 03442 0	I: 74455 0	C: 03303 1	C: 03303 1
22,2140	I: 70545 1	C: 03317 1	I: 45325 1	C: 15334 1	C: 03317 1	I: 65204 1	C: 45761 0	C: 03307 0
22,2150	I: 56225 1	C: 00001 0	C: 00003 1	I: 65366 1	C: 03277 0	I: 56225 1	C: 00001 0	C: 00003 1
22,2160	I: 65366 1	C: 03267 1	I: 56225 1	C: 00001 0	C: 00003 1	I: 55566 1	I: 77656 1	C: 03343 0
22,2170	I: 45345 1	C: 03343 0	C: 03345 0	I: 71240 1	C: 44203 0	C: 03343 0	I: 50025 0	C: 03347 1
22,2200	C: 44260 0	I: 77650 1	C: 44234 1	I: 45345 1	C: 03345 0	C: 03347 1	I: 77640 0	C: 44260 0
22,2210	I: 51145 0	C: 03313 0	C: 44216 1	I: 57575 1	C: 03343 0	C: 03343 0	I: 51145 0	C: 03271 0
22,2220	C: 44224 0	I: 57545 1	C: 03343 0	C: 03343 0	I: 51145 0	C: 03301 0	C: 44745 1	I: 57545 1
22,2230	C: 03347 1	C: 03347 1	I: 77650 1	C: 44745 1	I: 51145 0	C: 03311 1	C: 44242 0	I: 57575 1
22,2240	C: 03343 0	C: 03343 0	I: 51145 0	C: 03271 0	C: 44250 0	I: 57545 1	C: 03345 0	C: 03345 0
22,2250	I: 51145 0	C: 03273 1	C: 44745 1	I: 57545 1	C: 03347 1	C: 03347 1	I: 77650 1	C: 44745 1
22,2260	I: 51145 0	C: 03315 0	C: 44266 0	I: 57575 1	C: 03343 0	C: 03343 0	I: 51145 0	C: 03273 1
22,2270	C: 44274 0	I: 57545 1	C: 03343 0	C: 03343 0	I: 51145 0	C: 03301 0	C: 44745 1	I: 57545 1
22,2300	C: 03345 0	C: 03345 0	I: 77650 1	C: 44745 1	I: 77601 0	C: 00001 0	I: 64743 0	C: 77762 1
22,2310	C: 77770 1	I: 55523 0	C: 77776 1	I: 64717 1	C: 00001 0	C: 77760 0	I: 64723 0	C: 77766 0
22,2320	C: 77774 0	I: 63666 1	C: 00001 0	I: 64723 0	C: 77756 0	C: 77764 1	I: 55523 0	C: 77772 0
22,2330	I: 41517 1	C: 00001 0	I: 77650 1	C: 44343 0	I: 76601 1	C: 00001 0	C: 00001 0	I: 62713 0
22,2340	C: 00007 0	C: 00015 0	I: 77606 1	I: 65345 0	C: 00003 1	C: 00007 0	C: 14013 1	I: 77626 0
22,2350	C: 63770 1	C: 00005 1	I: 77725 1	C: 00015 0	C: 14005 1	I: 77626 0	C: 63762 1	C: 00013 0
22,2360	I: 77725 1	C: 00017 1	C: 14013 0	I: 77626 0	C: 77760 0	I: 77616 0	C: 00013 0	C: 17071 1
22,2370	00004 0	30034 0	54156 1	00006 1	30033 1	00003 1	16445 0	I: 66370 0

OCTAL LISTING FOR PARAGRAPH # 131, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2400	C: 00003 1	C: 00051 0	C: 00001 0	C: 00010 0	I: 77601 0	C: 00001 0	I: 47133 0	C: 00 13 0
22,2410	C: 51754 0	C: 00013 0	I: 65356 1	C: 00013 0	I: 41546 0	I: 71300 1	C: 44406 0	C: 00007 0
22,2420	I: 72405 0	C: 00013 0	C: 10001 1	I: 77745 1	C: 00005 1	I: 65205 0	C: 00001 0	C: 00007 0
22,2430	I: 41205 0	C: 00011 1	C: 00003 1	I: 44352 0	C: 00015 0	I: 77752 1	C: 10003 0	I: 77745 1
22,2440	C: 00003 1	I: 65205 0	C: 00005 1	C: 00007 0	I: 41205 0	C: 00011 1	C: 00001 0	I: 77752 1
22,2450	I: 72415 1	C: 00017 1	C: 10005 0	I: 77745 1	C: 00011 1	C: 10007 1	I: 77745 1	C: 00013 0
22,2460	I: 72405 0	C: 00003 1	C: 10011 0	I: 77745 1	C: 00013 0	I: 57405 1	C: 00001 0	I: 77752 1
22,2470	C: 10013 1	I: 77745 1	C: 00005 1	I: 57405 1	C: 00013 0	I: 77752 1	C: 10015 1	I: 77745 1
22,2500	I: 72405 0	C: 00011 1	I: 41325 0	C: 00007 0	C: 00001 0	I: 72415 1	I: 77626 0	C: 67760 1
22,2510	I: 77745 1	I: 72405 0	C: 00011 1	I: 41325 0	C: 00007 0	C: 00003 1	I: 72425 1	I: 77626 0
22,2520	C: 67756 1	I: 77616 0	I: 41401 1	C: 00001 0	I: 65356 1	I: 41546 0	I: 65302 0	I: 41021 1
22,2530	C: 15334 1	C: 45761 0	I: 77725 1	C: 03343 0	I: 41316 0	C: 00005 1	I: 52415 0	C: 00003 1
22,2540	I: 77604 0	C: 45761 0	C: 17426 1	C: 03345 0	I: 41316 0	C: 00005 1	I: 52415 0	C: 00003 1
22,2550	I: 77604 0	C: 45761 0	C: 17436 0	C: 03347 1	I: 41316 0	C: 00005 1	I: 52415 0	C: 00003 1
22,2560	I: 77604 0	C: 45761 0	C: 03446 1	I: 41345 0	C: 03343 0	C: 03345 0	I: 72405 0	C: 00005 1
22,2570	I: 41325 0	C: 03347 1	C: 00001 0	I: 43206 1	C: 00007 0	I: 41112 0	C: 45761 0	C: 17434 1
22,2600	I: 62421 1	I: 77604 0	C: 45761 0	C: 17430 0	C: 03343 0	I: 41205 0	C: 03347 1	C: 00005 1
22,2610	I: 65352 0	C: 03345 0	I: 41405 0	C: 00001 0	I: 62415 0	C: 00007 0	I: 77604 0	C: 45761 0
22,2620	C: 17432 1	I: 62421 1	I: 77604 0	C: 45761 0	C: 17442 0	C: 03345 0	I: 41205 0	C: 3347 1
22,2630	C: 00005 1	I: 65352 0	C: 03343 0	I: 41405 0	C: 00001 0	I: 62415 0	C: 00007 0	I: 77604 0
22,2640	C: 45761 0	C: 17444 0	I: 62421 1	I: 77604 0	C: 45761 0	C: 03440 1	I: 77616 0	I: 67543 1
22,2650	C: 00007 0	I: 71406 0	I: 41152 1	C: 45761 0	C: 00051 0	I: 57543 1	C: 00015 0	I: 67471 1
22,2660	C: 00051 0	I: 51123 0	C: 00001 0	C: 44675 0	I: 57545 1	I: 43244 1	C: 44672 1	C: 15334 1
22,2670	I: 77650 1	C: 44674 1	I: 77625 0	C: 15334 1	I: 77606 1	I: 57543 1	C: 00013 0	I: 67471 1
22,2700	C: 00051 0	I: 51123 0	C: 00011 1	C: 44715 1	I: 57545 1	I: 43244 1	C: 44712 0	C: 15334 1
22,2710	I: 77650 1	C: 44716 1	I: 52025 1	C: 15334 1	C: 44716 1	I: 77745 1	I: 43466 1	I: 77776 1
22,2720	00004 0	04636 0	C: 40203 1	00004 0	04463 1	34767 0	70104 0	00006 1
22,2730	12740 1	35016 0	05233 0	C: 02320 1	C: 74066 1	05402 1	C: 00111 0	5205 0
22,2740	34767 0	05233 0	C: 02311 0	C: 20066 0	15205 1	I: 70740 0	C: 00774 0	C: 05002 0
22,2750	I: 45002 1	C: 44522 1	I: 74343 0	C: 05002 0	C: 03343 0	I: 77721 0	C: 05014 1	C: 17311 1
22,2760	C: 03365 1	I: 55605 1	C: 05012 1	C: 05002 0	I: 77661 0	C: 20606 0	C: 03317 1	I: 77214 0
22,2770	C: 00313 0	C: 71747 0	C: 03311 1	I: 77761 1	C: 05036 1	C: 03275 1	I: 77614 1	C: 01035 0

OCTAL LISTING FOR PARAGRAPH # 132, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,3000	C: 45053 0	C: 00044 1	C: 15053 0	C: 00221 0	C: 24255 0	C: 00554 0	C: 02660 0	C: 02660 0
22,3010	C: 13301 1	C: 00003 1	C: 04000 0	C: 03146 1	C: 14632 0	C: 00000 1	C: 00000 1	C: 00000 1
22,3020	C: 00000 1	C: 00000 1	C: 00000 1	C: 03131 1	C: 11275 1	C: 77461 1	C: 47370 0	C: 00000 1
22,3030	C: 00000 1	C: 00316 0	C: 30407 1	C: 03131 1	C: 11275 1	C: 00004 0	C: 05253 0	34767 0
22,3040	70104 0	00006 1	13047 0	34764 0	70075 1	00006 1	13161 0	41340 0
22,3050	00006 1	62720 0	06006 1	I: 75160 1	C: 03320 0	C: 03425 1	I: 77624 1	C: 44304 0
22,3060	I: 45575 1	C: 50442 0	I: 77626 0	C: 50450 0	I: 77626 0	C: 74456 0	I: 45160 1	C: 03320 0
22,3070	C: 44647 1	I: 77634 0	C: 45644 0	C: 03267 1	I: 77414 0	C: 01215 0	C: 40064 1	34767 0
22,3100	55664 0	60000 1	55665 1	51664 1	31666 0	00006 1	51664 1	21661 0
22,3110	00006 1	73013 1	51665 0	53576 0	51664 1	31666 0	51664 1	57661 1
22,3120	51665 0	55646 0	11664 0	13100 1	00003 1	03135 0	04655 0	C: 40143 0
22,3130	34770 0	05233 0	C: 02303 0	C: 20066 0	15205 1	00006 1	40025 1	53673 0
22,3140	00006 1	31717 1	21673 0	11672 1	00002 0	13147 1	13157 0	11673 0
22,3150	00002 0	13153 1	40000 0	65016 0	00006 1	63157 1	24002 0	24002 0
22,3160	16706 1	04655 0	C: 74416 1	31307 1	55646 0	31310 1	55650 1	31311 0
22,3170	55652 0	00002 0	C: 00302 0	C: 17755 0	I: 53754 1	C: 03746 1	C: 57176 0	C: 26746 0
22,3200	I: 53750 0	C: 03745 1	C: 57176 0	C: 02657 1	I: 45020 1	C: 01023 1	C: 45222 1	C: 37456 1
22,3210	C: 25717 1	I: 41401 1	C: 00003 1	I: 65225 1	C: 03456 0	C: 00001 0	I: 45206 1	C: 03456 0
22,3220	I: 52006 0	C: 01023 1	I: 41545 0	C: 05173 1	I: 63130 0	C: 00047 1	C: 00002 0	I: 46135 1
22,3230	C: 00050 1	C: 45235 1	I: 51575 1	C: 02026 1	I: 77725 1	I: 43545 1	I: 77620 0	C: 01023 1
22,3240	C: 36635 1	C: 27202 1	I: 77624 1	C: 45300 0	I: 77745 1	C: 02635 0	C: 34041 0	C: 27170 1
22,3250	I: 77624 1	C: 45310 1	I: 53575 0	C: 03554 0	I: 53435 0	C: 03562 0	C: 26611 0	C: 03546 0
22,3260	I: 72441 0	C: 02611 0	C: 26603 0	C: 03540 0	I: 72441 0	C: 02611 0	C: 26601 1	C: 03540 0
22,3270	I: 53435 0	C: 03546 0	C: 26617 0	C: 03562 0	I: 72441 0	C: 02617 0	C: 36605 1	C: 01023 1
22,3300	I: 43175 0	C: 00001 0	C: 01352 1	C: 45314 0	C: 27540 0	C: 00007 0	C: 03546 0	I: 77616 0
22,3310	I: 43175 0	C: 00001 0	C: 01352 1	C: 45304 1	C: 27554 0	C: 00007 0	C: 03562 0	I: 77616 0
22,3320	I: 53754 1	C: 03746 1	C: 57176 0	I: 63350 1	C: 03745 1	I: 63257 1	C: 57176 0	I: 77616 0
22,3330	I: 53754 1	C: 03746 1	C: 57576 1	I: 77616 0	04553 0	04572 0	05547 1	C: 00244 0
22,3340	06006 1	I: 77624 1	C: 11217 0	I: 71214 0	C: 01067 1	C: 02463 1	C: 34041 0	C: 27170 1
22,3350	I: 43145 0	C: 15336 0	C: 03466 0	C: 16734 0	C: 05547 1	C: 26732 0	C: 00001 0	I: 45115 0
22,3360	C: 00007 0	C: 45320 1	C: 26746 0	I: 77626 0	C: 41120 1	C: 25002 1	I: 77615 0	C: 02463 1
22,3370	C: 03413 1	I: 77776 1	35026 0	05535 1	06006 1	I: 77624 1	C: 73027 0	I: 45175 0

OCTAL LISTING FOR PARAGRAPH # 133, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,3400	C: 15336 0	C: 24005 1	I: 77624 1	C: 73027 0	I: 77650 1	C: 45377 0	I: 41575 0	C: 2541 0
22,3410	I: 63256 0	C: 02611 0	I: 53435 0	I: 76561 1	C: 03462 1	C: 02445 0	I: 40055 0	C: 3504 0
22,3420	C: 45421 1	C: 37474 1	C: 45320 1	C: 26746 0	I: 77614 1	C: 03466 0	C: 26657 1	C: 5545 0
22,3430	C: 36732 1	C: 25002 1	I: 72142 0	C: 03745 1	C: 37472 1	C: 45204 0	I: 77624 1	C: 45330 0
22,3440	C: 17460 0	C: 03754 1	I: 52054 1	C: 45445 0	C: 47161 1	I: 77745 1	C: 02754 0	I: 50025 0
22,3450	C: 33563 1	C: 47161 1	I: 45145 0	C: 00041 1	C: 45330 0	I: 60201 1	C: 00003 1	C: 00047 1
22,3460	I: 50315 0	C: 02541 0	C: 03474 0	I: 56246 1	C: 00003 1	I: 45257 0	C: 20201 0	C: 33557 0
22,3470	I: 71240 1	C: 47161 1	C: 02742 1	I: 45312 0	C: 15326 1	C: 14017 1	C: 03752 1	I: 56342 1
22,3500	I: 41325 0	C: 02742 1	C: 00041 1	I: 77624 1	C: 45330 0	I: 72412 0	I: 41366 1	I: 52414 1
22,3510	C: 04343 1	C: 45512 0	I: 50315 0	C: 02541 0	C: 03474 0	C: 03502 0	I: 77646 0	I: 41301 0
22,3520	C: 00050 1	I: 53660 1	C: 00047 1	C: 20204 0	C: 14015 0	C: 15336 0	C: 00021 1	I: 53575 0
22,3530	C: 00015 0	C: 26732 0	C: 02541 0	I: 75315 1	C: 03474 0	C: 03502 0	I: 45076 1	C: 45320 1
22,3540	C: 26746 0	I: 77614 1	C: 03426 1	C: 47145 1	C: 77776 1	C: 62460 1	C: 17777 0	C: 37776 0
22,3550	I: 77776 1	35037 0	05535 1	34535 0	05535 1	06006 1	I: 77650 1	C: 02356 0
22,3560	30102 1	74076 0	00006 1	65205 0	74753 0	00006 1	15205 1	30034 0
22,3570	05061 0	55640 0	30034 0	05060 1	55645 0	34620 1	00006 1	20032 1
22,3600	40000 0	05060 1	55644 1	00006 1	71645 0	55641 1	34620 1	00006 1
22,3610	20032 1	40000 0	05061 0	55642 1	00006 1	71645 0	40000 0	55643 0
22,3620	15205 1	00004 0	30037 0	54154 0	30040 0	54157 0	30041 1	00003 1
22,3630	54161 0	34772 1	54155 1	54160 1	54162 0	16470 0	07226 0	16030 0
22,3640	03661 0	34772 1	54155 1	16027 0	03661 0	52162 0	52155 1	03661 0
22,3650	54156 1	52160 1	52155 1	03661 0	54155 1	30161 1	54154 0	34770 0
22,3660	16027 0	52155 1	20001 1	10000 0	64770 0	13667 1	40000 0	54154 0
22,3670	00002 0	50000 1	34751 0	26154 0	00002 0	54142 1	50130 0	10000 0
22,3700	64770 0	13705 1	64770 0	64770 0	40000 0	60142 0	10000 0	64770 0
22,3710	13712 1	40000 0	54142 1	13717 1	50000 1	34751 0	60142 0	50130 0
22,3720	54000 0	00002 0	50120 1	30046 0	04636 0	C: 17244 0	16030 0	C: 02713 0
22,3730	C: 02554 1	33727 0	54003 0	53716 1	53722 0	53716 1	53720 1	53730 0
22,3740	53720 1	53726 1	53732 1	53726 1	16030 0	33730 0	54003 0	53557 0
22,3750	53563 1	53557 0	53561 0	53571 1	53561 0	53567 0	53573 0	53567 0
22,3760	16030 0	00006 1	34750 1	52155 1	10000 0	34772 1	16026 1	13770 0
22,3770	00006 1	44750 0	16024 0	C: 03773 1	C: 03774 0	CKSM 03746 1	@	@

OCTAL LISTING FOR PARAGRAPH # 134, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2000	I: 47133 0	C: 00006 1	C: 51754 0	I: 41434 1	C: 46027 0	I: 72556 1	I: 66606 1	C: 00004 0
23,2010	I: 41434 1	C: 51754 0	I: 41346 0	C: 00003 1	C: 14041 1	I: 41356 1	I: 77626 0	C: 63734 1
23,2020	I: 77746 1	C: 24045 0	C: 00041 1	I: 76521 0	C: 06300 1	C: 00041 1	I: 77616 0	32321 0
23,2030	26154 0	34754 0	07256 1	06030 1	I: 77220 1	C: 00034 0	C: 02766 1	I: 77624 1
23,2040	C: 47633 1	I: 76521 0	C: 06256 0	C: 26766 1	C: 15334 1	C: 26555 0	C: 15332 1	C: 26563 0
23,2050	C: 15330 0	C: 36571 1	C: 46076 1	I: 47020 0	C: 00034 0	C: 45731 0	I: 64375 1	C: 02714 1
23,2060	C: 06256 0	I: 77772 0	C: 26555 0	C: 02722 1	I: 76521 0	C: 06256 0	C: 26563 0	C: 02730 1
23,2070	I: 76521 0	C: 06256 0	C: 02571 0	I: 47034 0	C: 45731 0	C: 45745 0	I: 47375 0	C: 02571 0
23,2100	C: 02766 1	I: 77600 1	C: 46103 1	I: 40056 0	C: 46145 0	C: 00027 1	I: 57441 1	C: 02555 0
23,2110	C: 24023 0	C: 00027 1	I: 77641 1	C: 02563 0	C: 34021 0	C: 47311 1	I: 77634 0	C: 45640 1
23,2120	C: 26774 1	C: 02766 1	I: 77600 1	C: 46124 1	I: 72441 0	C: 02571 0	I: 77726 1	I: 62440 0
23,2130	C: 46142 1	I: 45200 1	C: 46142 1	C: 06327 1	I: 77634 0	C: 45640 1	C: 02776 0	I: 77614 1
23,2140	C: 01630 0	C: 00034 0	I: 77614 1	C: 01430 1	C: 00034 0	I: 77745 1	C: 06323 0	C: 16774 1
23,2150	C: 06325 0	C: 02776 0	I: 77614 1	C: 01630 0	C: 00034 0	I: 44301 0	C: 00160 0	C: 15344 0
23,2160	I: 77776 1	07171 1	C: 00002 0	C: 00000 1	C: 00000 1	C: 01001 1	C: 14636 1	C: 00325 0
23,2170	C: 07310 1	C: 00541 1	C: 16735 1	34772 1	54156 1	00006 1	32212 1	52155 1
23,2200	52160 1	40000 0	07256 1	52156 1	52155 1	52160 1	20155 1	06006 1
23,2210	I: 77616 0	C: 00542 1	C: 34414 1	I: 47375 0	C: 01712 1	C: 03452 1	C: 03460 0	I: 77635 1
23,2220	C: 01712 1	C: 17466 0	C: 03606 1	I: 56204 1	C: 57544 0	C: 06254 1	I: 41400 0	C: 46243 0
23,2230	I: 45346 1	C: 15334 1	I: 65361 0	C: 03466 0	I: 74356 1	C: 03460 0	I: 76455 1	I: 53455 0
23,2240	C: 03452 1	C: 03474 0	I: 77616 0	I: 75345 1	C: 06254 1	C: 03606 1	I: 77621 1	C: 03606 1
23,2250	C: 03606 1	I: 77650 1	C: 46223 0	C: 01015 1	C: 34732 0	C: 15373 1	C: 11346 0	C: 00000 1
23,2260	C: 00000 1	C: 67313 1	C: 65307 0	C: 00000 1	C: 00000 1	C: 20000 0	C: 00000 1	C: 00000 1
23,2270	C: 00000 1	C: 10464 0	C: 12470 1	C: 00000 1	C: 00000 1	C: 15373 1	C: 11346 0	C: 15373 1
23,2300	C: 11346 0	C: 00000 1	C: 00000 1	C: 10464 0	C: 12470 1	C: 00000 1	C: 00000 1	C: 20000 0
23,2310	C: 00000 1	C: 00000 1	C: 00000 1	C: 67313 1	C: 65307 0	C: 00000 1	C: 00000 1	C: 15373 1
23,2320	C: 11346 0	C: 07020 1	C: 60000 1	C: 00000 1	C: 61740 0	C: 77777 0	C: 07020 1	C: 00000 1
23,2330	06006 1	I: 45014 0	C: 00716 1	C: 46551 1	C: 50064 0	I: 77776 1	34765 1	05233 0
23,2340	C: 02514 0	C: 46104 0	00003 1	32372 0	54003 0	34772 1	55733 0	35051 0
23,2350	05135 0	C: 02373 1	C: 46064 1	00003 1	36214 0	71733 0	10000 0	02363 0
23,2360	04636 0	C: 01730 1	02354 1	32371 0	04636 0	C: 20576 1	05626 0	05626 0
23,2370	02343 1	C: 04054 1	C: 02334 1	06006 1	I: 45145 0	C: 15336 0	C: 46424 1	C: 16316 1

OCTAL LISTING FOR PARAGRAPH # 135, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2400	C: 01257 0	I: 46142 1	C: 46420 0	I: 77624 1	C: 27161 1	I: 77775 1	C: 00001 0	C: 26320 1
23,2410	C: 00007 0	C: 16326 1	C: 00050 1	I: 45030 0	C: 46457 0	C: 46635 0	I: 77650 1	C: 46461 0
23,2420	I: 77624 1	C: 27145 1	I: 77650 1	C: 46405 1	C: 01255 1	I: 77420 1	C: 00734 1	32446 0
23,2430	04636 0	C: 20576 1	05524 1	02435 1	02427 1	06006 1	I: 53145 1	C: 01255 1
23,2440	C: 46443 0	C: 34041 0	C: 00734 1	I: 52034 1	C: 51751 0	C: 46441 1	C: 01420 0	C: 27533 1
23,2450	C: 07571 0	C: 25004 1	C: 06702 1	C: 00001 0	C: 11530 1	C: 00002 0	C: 31230 1	I: 77624 1
23,2460	C: 46647 0	C: 36314 1	C: 46660 0	I: 46135 1	C: 01215 0	C: 46611 0	I: 45234 0	C: 51751 0
23,2470	C: 02316 1	C: 16316 1	C: 02337 1	I: 77654 0	C: 46504 1	I: 43345 1	C: 02337 1	C: 02316 1
23,2500	C: 02337 1	I: 77776 1	34770 0	02512 0	I: 43345 1	C: 02335 0	C: 02316 1	C: 02335 0
23,2510	I: 77776 1	34767 0	55733 0	05205 0	34764 0	71247 0	10000 0	02525 1
23,2520	37647 0	05121 0	C: 05524 1	C: 04062 1	05314 1	35016 0	05233 0	C: 02514 0
23,2530	C: 46064 1	36214 0	71733 0	50000 1	02535 0	05314 1	02544 0	35016 0
23,2540	54001 1	34772 1	21735 0	05314 1	35016 0	54001 1	34772 1	21737 1
23,2550	05314 1	I: 77776 1	35051 0	05135 0	C: 02567 1	C: 46064 1	00033 1	10067 1
23,2560	05152 1	32371 0	04636 0	C: 20576 1	05626 0	05626 0	02561 1	06006 1
23,2570	I: 52175 0	C: 01030 0	C: 46573 1	C: 26320 1	C: 01036 0	C: 02326 1	I: 45014 0	C: 00315 0
23,2600	C: 46631 1	C: 46647 0	C: 36314 1	C: 46660 0	I: 77776 1	05354 0	C: 00013 0	02622 0
23,2610	06006 1	I: 77624 1	C: 27516 0	I: 45145 0	C: 02335 0	C: 64027 0	I: 46135 1	C: 01215 0
23,2620	C: 46466 1	I: 77776 1	34764 0	71247 0	00006 1	15524 0	04636 0	C: 01730 1
23,2630	02567 1	I: 77624 1	C: 46635 0	I: 77650 1	C: 46602 1	I: 71214 0	C: 04462 0	C: 06450 0
23,2640	C: 14037 0	C: 06454 1	C: 26312 0	C: 02026 1	I: 77646 0	I: 43414 1	C: 01463 1	I: 71214 0
23,2650	C: 04662 1	C: 06452 1	C: 14037 0	C: 06456 0	C: 16312 0	C: 05173 1	I: 43414 1	C: 01663 0
23,2660	I: 44001 0	C: 00001 0	C: 00051 0	I: 77214 0	C: 04742 1	C: 46674 0	C: 02320 1	I: 77752 1
23,2670	C: 26320 1	C: 02326 1	I: 77752 1	C: 02326 1	I: 77624 1	C: 57152 0	I: 77624 1	C: 57220 0
23,2700	I: 77625 0	C: 02314 0	I: 64414 1	C: 04742 1	C: 46705 1	I: 77624 1	C: 46745 0	C: 16343 1
23,2710	C: 00017 1	I: 77625 0	C: 02314 0	C: 00161 1	I: 64414 1	C: 04742 1	C: 46717 1	I: 77624 1
23,2720	C: 46745 0	C: 16345 1	C: 00161 1	I: 51025 1	C: 02312 0	C: 46731 0	I: 52145 0	C: 15336 0
23,2730	C: 46735 1	I: 45145 0	C: 00017 1	C: 57256 1	I: 77676 0	C: 16337 1	C: 02312 0	I: 45015 1
23,2740	C: 02314 0	C: 57261 0	I: 77676 0	C: 36335 1	C: 00051 0	I: 51025 1	C: 06755 0	C: 46752 0
23,2750	I: 43415 0	C: 06755 0	I: 43545 1	C: 06755 0	C: 01065 0	C: 05603 1	I: 77620 0	C: 02310 1
23,2760	I: 53575 0	C: 03531 0	C: 14033 1	C: 00045 0	C: 25136 1	C: 01102 0	I: 53435 0	C: 00033 1
23,2770	C: 37502 1	C: 22327 1	I: 77775 1	C: 03502 0	C: 01102 0	I: 72441 0	C: 01072 0	I: 45326 1

OCTAL LISTING FOR PARAGRAPH # 136, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,3000	C: 15326 1	I: 41301 0	C: 00047 1	C: 07016 1	I: 53605 1	C: 01136 1	C: 21576 0	C: 27524 1
23,3010	C: 15336 0	C: 03510 0	C: 03516 0	I: 77650 1	C: 02310 1	C: 31103 1	C: 36652 0	I: 47220 0
23,3020	C: 02310 1	C: 00001 0	I: 77624 1	C: 36057 0	I: 76505 0	C: 01734 0	I: 77650 1	C: 02310 1
23,3030	I: 67214 1	C: 05312 1	C: 50104 1	C: 02551 1	I: 52054 1	C: 47037 0	C: 47133 0	I: 77614 1
23,3040	C: 05354 0	C: 47046 0	I: 52014 0	C: 05347 1	C: 47133 0	C: 71001 0	I: 71201 1	C: 00001 0
23,3050	C: 03413 1	I: 71214 0	C: 05356 1	C: 47055 1	C: 02461 0	I: 67206 1	C: 02372 0	I: 67206 1
23,3060	C: 02373 1	I: 67206 1	C: 02374 0	I: 67206 1	C: 02375 1	I: 67206 1	C: 02376 1	I: 67206 1
23,3070	C: 02377 0	I: 71206 0	C: 01062 1	I: 45225 0	C: 00003 1	C: 03736 0	I: 71240 1	C: 47133 0
23,3100	C: 03734 1	I: 43225 0	C: 01062 1	C: 00005 1	I: 71240 1	C: 50114 0	C: 01062 1	I: 51025 1
23,3110	C: 00001 0	C: 50120 1	I: 77615 0	C: 00015 0	I: 50015 0	C: 00007 0	C: 50120 1	I: 43345 1
23,3120	C: 00001 0	C: 07137 0	I: 43225 0	C: 00015 0	C: 00011 1	I: 45225 0	C: 03736 0	C: 00013 0
23,3130	I: 43040 1	C: 47133 0	C: 05073 0	I: 52014 0	C: 01671 0	C: 70776 0	C: 00001 0	C: 00002 0
23,3140	C: 00000 1	C: 00003 1	C: 00000 1	C: 00000 1	C: 13560 0	C: 36657 0	C: 25002 1	I: 43206 1
23,3150	C: 02463 1	C: 16351 1	C: 03502 0	I: 77644 1	C: 47165 0	I: 45345 1	C: 03472 0	I: 52006 0
23,3160	C: 47165 0	I: 71201 1	C: 00001 0	C: 15336 0	I: 77606 1	I: 72545 0	C: 03472 0	I: 77615 0
23,3170	C: 02463 1	C: 16351 1	C: 03766 0	I: 45342 0	C: 07140 0	I: 77654 0	C: 47233 0	I: 41345 0
23,3200	C: 03766 0	C: 03472 0	I: 45261 0	C: 20217 1	I: 77615 0	C: 02463 1	C: 02461 0	I: 77 21 1
23,3210	C: 03663 1	C: 00005 1	I: 40240 0	C: 63566 1	C: 00001 0	I: 63375 0	C: 03474 0	C: 02541 0
23,3220	I: 77624 1	C: 63606 1	C: 26453 1	C: 00007 0	C: 26533 0	C: 03512 1	I: 63201 1	C: 000 1 0
23,3230	C: 03756 0	I: 77650 1	C: 34012 0	I: 43345 1	C: 03472 0	C: 02351 1	C: 36351 0	C: 47177 0
23,3240	I: 71220 1	C: 00051 0	C: 02714 1	I: 65325 0	C: 15336 0	C: 02720 0	I: 55476 1	I: 77656 1
23,3250	C: 14027 1	C: 00027 1	I: 77742 0	C: 14023 0	C: 00033 1	I: 77742 0	C: 34021 0	C: 47311 1
23,3260	C: 16762 0	C: 02716 0	I: 77742 0	C: 14023 0	C: 00027 1	I: 65205 0	C: 02720 0	C: 00033 1
23,3270	I: 45205 1	C: 02714 1	I: 77626 0	C: 43756 1	C: 47311 1	C: 26764 0	C: 00027 1	I: 77641 1
23,3300	C: 02730 1	C: 24021 1	C: 00027 1	I: 77641 1	C: 02722 1	C: 34023 1	C: 47311 1	C: 36760 0
23,3310	C: 00051 0	I: 51545 1	C: 00023 0	I: 50025 0	C: 07525 1	C: 47324 1	I: 72545 0	C: 00021 1
23,3320	I: 75326 1	C: 00023 0	C: 00025 0	I: 77616 0	I: 72545 0	C: 00023 0	I: 77736 0	C: 14025 0
23,3330	C: 00021 1	I: 77640 0	C: 47335 1	I: 43545 1	C: 00025 0	I: 75345 1	C: 15334 1	C: 00023 0
23,3340	I: 77625 0	C: 00025 0	C: 00025 0	I: 77616 0	I: 77601 0	C: 00001 0	I: 47375 0	C: 02714 1
23,3350	C: 02700 1	I: 41456 0	I: 44041 1	C: 02730 1	C: 00051 0	C: 24021 1	C: 00001 0	I: 77641 1
23,3360	C: 02722 1	C: 34023 1	C: 47311 1	C: 26760 1	C: 00001 0	I: 50235 0	C: 02714 1	C: 02700 1
23,3370	I: 77752 1	C: 24021 1	C: 02700 1	I: 77641 1	C: 02714 1	C: 34023 1	C: 47311 1	C: 02764 0

OCTAL LISTING FOR PARAGRAPH # 137, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
23,3400   I: 45246 0   C: 07527 0   I: 77644 1   C: 47422 0   I: 50375 0   C: 02706 1   C: 00001 0   C: 24 21 1
23,3410   C: 02672 0   I: 45441 1   C: 43754 0   C: 47311 1   C: 26762 0   C: 02760 1   I: 77634 0   C: 45644 0
23,3420   C: 35310 0   C: 00051 0   I: 77776 1      05671 1   C: 00401 1      05547 1   C: 00056 1      6006 1
23,3430   I: 77650 1   C: 47404 1   I: 66370 0   C: 02743 0   C: 00051 0   C: 02727 1   I: 77601 0   C: 00001 0

23,3440   I: 46773 0   C: 02752 0   C: 02760 1   I: 77656 1   C: 06760 0   I: 77773 1   C: 02752 0   I: 76433 1
23,3450   C: 02760 1   C: 06766 0   I: 77700 0   C: 47440 1   I: 66160 0   C: 00006 1   C: 00036 1   I: 66370 0
23,3460   C: 00022 1   C: 00051 0   C: 00006 1   I: 66374 1   C: 00006 1   C: 00052 0   C: 00002 0   I: 76720 0
23,3470   C: 00036 1   C: 00001 0   I: 62757 0   C: 75033 0   C: 00007 0   I: 77757 1   C: 75025 1   C: 30 31 0

23,3500   C: 00015 0   I: 53357 0   C: 75017 0   I: 76455 1   C: 00031 0   I: 53520 0   C: 00036 1   C: 6736 0
23,3510   I: 77700 0   C: 47512 1   I: 77704 1   C: 47467 1   I: 77775 1   C: 02714 1   C: 26736 1   C: 2722 1
23,3520   C: 26744 1   C: 02730 1   C: 02752 0   I: 77616 0   C: 05520 0   C: 26075 1   C: 05252 1   C: 25253 1
23,3530   I: 77776 1      03554 0      06006 1   I: 77616 0      30032 0      55175 1      30033 1      55171 0

23,3540      30034 0      55173 1      00006 1      22142 0      34766 1      76211 1      54143 0      5 143 1
23,3550      31171 1      52155 1      52127 1      04733 1   C: 51754 0      00006 1      30155 0      5 143 1
23,3560      53172 0      04733 1   C: 01514 0      52155 1      5 143 1      53150 0      00006 1      5 143 1
23,3570      31172 1      04733 1   C: 01526 1      52127 1      52155 1      50143 1      53142 0      1 143 0

23,3600      13545 1      00142 0      00004 0      00006 1      22061 0      34766 1      76211 1      54 62 1
23,3610      50062 0      31171 1      05061 0      00006 1      74753 0      50062 0      53142 0      50062 0
23,3620      31171 1      05060 1      00006 1      74753 0      50062 0      53150 0      10062 1      136 6 0
23,3630      30061 0      00003 1      00000 1   I: 77776 1      07466 1      46214 1      03651 0      6006 1

23,3640   I: 43575 1   C: 00123 1   I: 77776 1      03542 1      07466 1      36214 0      13636 0   I: 77776 1
23,3650      13644 0      54142 1      00006 1      22145 1      10142 1      40142 1      66214 0      00006 1
23,3660      50000 1      33740 1      52144 1      34770 0      54130 1      00006 1      50143 1      4 123 0
23,3670      13672 0      52131 0      52155 1      33736 0      60143 1      54116 0      07056 0      1 142 1

23,3700      52155 1      13704 0      00006 1      40155 1      52134 0      36211 0      26116 0      00006 1
23,3710      50130 0      50143 1      30123 1      52155 1      07056 0      52155 1      20134 0      52134 0
23,3720      20001 1      50130 0      50143 1      52123 0      52131 0      10000 0      13671 0      00006 1
23,3730      26142 1      10142 1      13654 1      00145 1      13654 1      00145 1   C: 01141 1   C: 00004 0

23,3740   C: 00002 0   C: 00000 1   C: 00004 0   I: 41345 0   C: 03212 0   C: 01150 1   I: 41325 0   C: 03216 1
23,3750   C: 01142 1   I: 77621 1   I: 77671 1   C: 01152 0   C: 03204 1   I: 72405 0   C: 01144 1   I: 77621 1
23,3760   C: 03214 0   C: 17206 0   C: 03212 0   I: 65205 0   C: 01142 1   C: 03216 1   I: 43205 1   C: 01150 1
23,3770   I: 77752 1   C: 03210 1   I: 77616 0   C: 03773 1   C: 03774 0   CKSM 65343 0      @            @
```

OCTAL LISTING FOR PARAGRAPH # 140, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
24,2000      06006 1   I: 45145 0   C: 03413 1   C: 46424 1   I: 77624 1   C: 27202 1   I: 63375 0   C: 00007 0
24,2010  C: 00001 0   I: 63256 0   I: 77626 0   C: 75457 0   I: 53435 0   I: 77626 0   C: 61451 0   C: 00015 0
24,2020  C: 34041 0   C: 27170 1   I: 63375 0   C: 00007 0   C: 00001 0   C: 00007 0   I: 63256 0   I: 77626 0
24,2030  C: 77762 1   I: 53435 0   I: 77626 0   C: 51443 0   C: 00007 0   I: 72441 0   C: 02326 1   C: 26312 0

24,2040  C: 00015 0   I: 72441 0   C: 02326 1   C: 26314 0   C: 02320 1   I: 72441 0   C: 02334 1   C: 02316 1
24,2050  I: 77776 1       32103 1       04636 0   C: 20576 1       15524 0       15524 0       06006 1   I: 77624 1
24,2060  C: 46425 0   I: 77650 1   C: 50004 0   C: 01420 0   I: 77420 1   C: 00734 1       00006 1       34770 0
24,2070      53256 0       32102 0       04636 0   C: 20576 1       05524 1       02077 0       02071 0       06006 1

24,2100  I: 77650 1   C: 00734 1   C: 01014 0   C: 01540 1   I: 43014 0   C: 05313 0   C: 71001 0   C: 05354 0
24,2110  C: 50114 0   I: 77614 1   C: 05355 1   C: 71001 0   I: 52131 0   C: 02551 1   C: 00001 0   C: 47133 0
24,2120  I: 52014 0   C: 05273 1   C: 71001 0   I: 77745 1   C: 00013 0   I: 76561 1   I: 53455 0   C: 03540 0
24,2130  I: 53515 0   C: 03554 0   I: 53515 0   C: 03562 0   I: 63235 0   C: 00007 0   C: 00007 0   I: 50235 0

24,2140  C: 00001 0   I: 77626 0   C: 53762 1   I: 72441 0   I: 75326 1   C: 00015 0   I: 41542 1   I: 71214 0
24,2150  C: 05701 1   C: 50206 0   C: 00001 0   I: 65225 1   C: 03466 0   C: 03462 1   I: 60225 1   C: 03470 1
24,2160  C: 00047 1   I: 65265 0   C: 00003 1   C: 03462 1   C: 03470 1   I: 43014 0   C: 05742 0   C: 20323 1
24,2170  C: 05743 1   C: 20323 1   I: 41345 0   C: 00003 1   C: 03466 0   I: 71244 0   C: 20330 0   C: 33561 0

24,2200  I: 77765 0   C: 03464 1   C: 03464 1   I: 43014 0   C: 05462 1   C: 05663 1   I: 77745 1   C: 00001 0
24,2210  C: 17466 0   C: 03462 1   C: 37470 0   C: 20316 1       06006 1   I: 67214 1   C: 00664 0   C: 03425 1
24,2220  I: 71214 0   C: 01347 0   C: 50224 0   C: 15336 0   C: 17703 0   C: 11532 0   C: 17727 0   C: 03413 1
24,2230  C: 17450 0   C: 11530 1   C: 03460 0   I: 77414 0   C: 05265 0       04655 0   C: 73566 0       04636 0

24,2240  C: 03731 1       06006 1   I: 77214 0   C: 01070 1   C: 15336 0   C: 03705 0   I: 77614 1   C: 01347 0
24,2250  C: 34065 0   I: 51575 1   C: 03646 0   C: 27654 0   C: 03640 0   C: 03576 0   I: 53435 0   C: 03632 0
24,2260  C: 27713 1   C: 03632 0   C: 03570 0   I: 65236 0   C: 00045 0   I: 56275 1   C: 17051 0   I: 41205 0
24,2270  C: 03654 0   C: 03076 0   I: 77671 1   C: 03727 0   C: 24017 1   C: 03646 0   I: 74241 0   C: 03713 1

24,2300  C: 03713 1   I: 41552 0   I: 65245 1   C: 03646 0   C: 00017 1   I: 63356 1   C: 00007 0   I: 53435 0
24,2310  C: 03713 1   I: 45561 1   C: 50056 1   I: 65256 0   C: 00017 1   I: 74346 0   I: 74255 0   C: 03721 0
24,2320  C: 00045 0   I: 53352 0   I: 77626 0   C: 74056 1   I: 77656 1   C: 27713 1   C: 03721 0   I: 45006 0
24,2330  C: 11200 0   I: 64375 1   C: 03713 1   C: 01734 0   I: 40372 0   C: 00001 0   C: 17357 0   C: 15336 0

24,2340  I: 41414 0   C: 00704 1   C: 34157 0   I: 41335 1   C: 03025 0   C: 11542 1   I: 43352 1   C: 11544 1
24,2350  I: 71406 0   I: 73525 1   I: 67206 1   C: 03024 1   I: 72405 0   C: 11542 1   I: 41415 1   C: 11546 0
24,2360  I: 65346 0   I: 41556 1   C: 14323 0   C: 00007 0   I: 72405 0   C: 00005 1   I: 65276 1   C: 00007 0
24,2370  I: 72405 0   C: 00003 1   I: 77666 1   C: 14307 0   C: 00323 0   I: 72405 0   C: 00005 1   I: 41325 0
```

OCTAL LISTING FOR PARAGRAPH # 141, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2400	C: 00323 0	C: 00003 1	I: 57552 1	I: 77666 1	C: 14323 0	I: 77666 1	C: 14315 0	C: 00323
24,2410	I: 65325 0	C: 00315 0	C: 00307 0	I: 77666 1	C: 27351 0	C: 03713 1	I: 53515 0	C: 03632 0
24,2420	I: 57435 1	C: 00001 0	I: 41456 0	I: 77624 1	C: 61702 0	I: 57435 1	C: 00001 0	I: 63372 1
24,2430	C: 00307 0	I: 76505 0	C: 00001 0	C: 24307 0	C: 00315 0	I: 76505 0	C: 00001 0	C: 24315 0
24,2440	C: 00323 0	I: 76505 0	C: 00001 0	C: 00323 0	I: 77414 0	C: 01073 1	03202 1	5561 0
24,2450	C: 00124 0	04636 0	C: 56074 1	05402 1	C: 00014 1	44770 1	55724 0	06006 1
24,2460	I: 77614 1	C: 00704 1	C: 51626 1	I: 51575 1	C: 03721 0	C: 17763 0	C: 15336 0	C: 17426 1
24,2470	C: 11560 1	C: 01062 1	I: 77776 1	33517 1	04636 0	C: 21067 0	13403 1	12560 1
24,2500	44770 1	55444 0	34772 1	55446 1	34770 0	05233 0	C: 02366 0	C: 40066 0
24,2510	11444 0	33523 0	12514 1	33525 0	04636 0	C: 01731 0	33514 1	54777 1
24,2520	05362 0	C: 00026 0	C: 00234 1	04606 0	06006 1	I: 45345 1	C: 03413 1	C: 03460 0
24,2530	C: 00041 1	I: 77624 1	C: 27576 0	02542 0	00006 1	31105 1	53413 1	00006 1
24,2540	33530 1	21413 1	00006 1	30155 0	53673 0	00006 1	43525 1	21673 0
24,2550	00006 1	31673 1	05332 0	C: 02565 0	C: 50067 0	05402 1	C: 20214 1	15205 1
24,2560	34770 0	12501 0	04636 0	C: 20715 0	15205 1	33525 0	05223 1	C: 02602 1
24,2570	34772 1	54777 1	35053 1	05121 0	C: 02562 1	C: 50067 0	44342 1	04126 0
24,2600	C: 00004 0	05314 1	31214 1	74763 0	00006 1	12631 0	44765 0	70076 1
24,2610	54076 1	30075 0	74756 0	10000 0	13642 0	33514 1	54777 1	33522 1
24,2620	05223 1	C: 02634 1	46211 1	04126 0	C: 00004 0	11166 0	15314 0	04655 0
24,2630	C: 76607 1	33513 0	54777 1	12625 0	33525 0	05233 0	C: 02651 1	C: 50066 1
24,2640	44760 0	54777 1	05362 0	C: 40074 0	C: 00033 1	05134 1	C: 02534 1	C: 34067 1
24,2650	15314 0	40103 1	74754 1	26103 1	30103 0	74755 0	00006 1	15314 0
24,2660	33514 1	54777 1	05402 1	C: 00274 0	30032 0	55447 0	00006 1	30025 0
24,2670	53022 1	40101 0	74762 1	26101 0	34754 0	00006 1	05011 1	40106 1
24,2700	74757 1	26106 1	34760 1	70076 1	10000 0	12773 1	40102 0	74754 1
24,2710	26102 0	44076 0	70102 0	54102 0	00006 1	33550 1	52113 0	46214 1
24,2720	04126 0	C: 00004 0	05255 0	C: 00050 1	44770 1	55635 1	34772 1	55644 1
24,2730	44076 0	70102 0	64752 0	54102 0	36214 0	54001 1	40000 0	53170 1
24,2740	00006 1	41571 1	53665 1	44773 1	04126 0	C: 00004 0	34750 1	54030 0
24,2750	00006 1	33562 0	52113 0	05255 0	C: 00240 1	40102 0	74754 1	10000 0
24,2760	02764 0	40076 1	74756 0	26076 1	34772 1	00006 1	01005 0	00006 1
24,2770	34772 1	53164 1	15314 0	44754 1	70102 0	54102 0	04606 0	00006 1

OCTAL LISTING FOR PARAGRAPH # 142, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3000	31430 1	53413 1	00006 1	30025 0	21413 1	05362 0	C: 40053 0	C: 07014 0	
24,3010	C: 77777 0	C: 03016 0	C: 50066 1	31430 1	05223 1	C: 03023 0	44760 0	70076 1	
24,3020	54076 1	04611 0	12711 0	04611 0	03045 0	05255 0	C: 00372 1	03217 0	
24,3030	04714 1	C: 42042 1	04714 1	C: 13313 1	03161 1	05362 0	C: 00003 1	C: 00354 0	
24,3040	34664 1	05121 0	C: 03174 0	C: 50066 1	15314 0	00004 0	00006 1	30025 0	
24,3050	53022 1	44762 1	70101 0	54101 0	44754 1	00006 1	03011 1	34753 1	
24,3060	00006 1	05012 1	31635 0	64770 0	00006 1	13101 0	40102 0	74076 0	
24,3070	00006 1	63101 1	31633 0	00006 1	13101 0	31601 1	55423 1	31603 0	
24,3100	55424 0	00002 0	I: 77775 1	C: 15336 0	C: 03126 1	I: 77776 1	34750 1	55446 1	
24,3110	04606 0	00004 0	00006 1	31413 0	52155 1	00006 1	40025 1	20155 1	
24,3120	07224 1	30155 0	00006 1	63125 1	13126 0	34770 0	55430 0	05223 1	
24,3130	C: 03023 0	05362 0	C: 40053 0	C: 10035 0	05561 0	C: 00042 1	13614 0	I: 77776 1	
24,3140	05671 1	C: 01407 0	13614 0	I: 77614 1	C: 01344 0	C: 51603 0	I: 77214 0	C: 00711 0	
24,3150	C: 51603 0	C: 15336 0	C: 03126 1	I: 77776 1	44772 0	55633 1	54777 1	13134 0	
24,3160	00004 0	43520 1	00006 1	03012 1	44770 1	55323 0	34772 1	54777 1	
24,3170	44756 0	70103 1	54103 1	00002 0	33515 0	04636 0	C: 20716 0	13403 1	
24,3200	13441 1	13174 1	00004 0	30032 0	55572 1	00006 1	30034 0	53574 1	
24,3210	35007 0	55655 1	44765 0	71465 0	55465 0	00002 0	00004 0	33521 1	
24,3220	55655 1	41465 0	74765 0	27465 0	00002 0	34756 1	70103 1	10000 0	
24,3230	13234 0	05402 1	C: 00006 1	05314 1	00006 1	30025 0	53661 0	00006 1	
24,3240	41413 1	21661 0	35016 0	05223 1	C: 03225 1	10777 1	13251 0	13261 0	
24,3250	13251 0	43511 0	60777 0	00006 1	13264 0	37651 1	05121 0	C: 03276 1	
24,3260	C: 50066 1	40025 1	55271 0	15314 0	37651 1	05135 0	C: 03271 0	C: 50066 1	
24,3270	13261 0	06006 1	I: 77624 1	C: 51651 1	I: 77776 1	13306 0	30032 0	55175 1	
24,3300	30033 1	55171 0	30034 0	55173 1	04636 0	C: 47602 0	00004 0	10777 1	
24,3310	13466 1	15205 1	13427 1	33514 1	04636 0	C: 20727 1	13363 0	13407 0	
24,3320	05402 1	C: 00534 0	33514 1	54777 1	04606 0	44124 0	55412 0	04611 0	
24,3330	03045 0	33526 0	04636 0	C: 01731 0	34770 0	05233 0	C: 02355 0	C: 40066 0	
24,3340	04714 1	C: 42042 1	05362 0	C: 00026 0	C: 05024 1	C: 50777 0	05561 0	C: 00154 1	
24,3350	05547 1	C: 00153 0	44760 0	54777 1	05362 0	C: 40114 1	C: 00033 1	05134 1	
24,3360	C: 02534 1	C: 34067 1	15205 1	05402 1	C: 00076 0	34772 1	54777 1	03045 0	
24,3370	33526 0	04636 0	C: 01731 0	00004 0	04714 1	C: 42042 1	05362 0	C: 00006 1	

OCTAL LISTING FOR PARAGRAPH # 143, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
24,3400   C: 05024 1   C: 50777 0      03160 0      00006 1      33554 0      53062 0      14103 0      05402 1
24,3410   C: 00134 1      33514 1      54777 1      05547 1   C: 00030 1      05547 1   C: 00042 1      33517 1
24,3420      04636 0   C: 01731 0      05561 0   C: 00030 1      05402 1   C: 00004 0      15205 1      33514 1
24,3430      04636 0   C: 20727 1      13376 1      13471 1      05362 0   C: 00006 1   C: 05024 1   C: 50777 0

24,3440      03160 0      00006 1      33556 1      53062 0      35017 1      04636 0   C: 01731 0      03202 1
24,3450      00003 1      05402 1   C: 05024 1   C: 57777 1      33512 1      04636 0   C: 20716 0      13403 1
24,3460      13462 0      13451 0      00006 1      33554 0      53062 0      14105 0      30777 0      04636 0
24,3470   C: 20721 1      00004 0      30103 0      74755 0      10000 0      13506 0      34755 1      26103 1

24,3500      30103 0      74754 1      00006 1      13506 0      05222 0   C: 02664 1      33514 1      54777 1
24,3510      15205 1   C: 01525 1   C: 04125 0   C: 01537 1   C: 01450 1   C: 04050 0   C: 04123 0   C: 00204 1
24,3520   C: 02202 0   C: 00707 1   C: 04700 1   C: 03410 1   C: 00000 1   C: 00764 1   C: 00372 1   C: 00000 1
24,3530   C: 05664 0   C: 02217 1   C: 06650 1   C: 00013 0   C: 06112 0   C: 04000 0   C: 00000 1   C: 00707 1

24,3540   C: 03434 1   C: 21215 1   C: 12215 1   C: 00053 1   C: 07423 0   C: 77636 1   C: 44653 1   C: 03226 1
24,3550   C: 12066 1   C: 03706 0   C: 50067 0   C: 03143 1   C: 76067 1   C: 03576 0   C: 50066 1   C: 02176 0
24,3560   C: 34066 0   C: 02163 1   C: 36066 1      06006 1   I: 71214 0   C: 00464 1   C: 15336 0   C: 03703 0
24,3570   I: 43145 0   C: 11534 0   C: 00700 0   C: 50226 1   I: 52152 0   C: 50226 1      06006 1   I: 77624 1

24,3600   C: 34331 1   I: 77624 1   C: 51651 1   I: 77776 1      33616 0      00006 1      06031 0      73616 1
24,3610      00006 1      13614 0      05547 1   C: 00233 0      04655 0   C: 77143 1   C: 07700 1      34753 1
24,3620      05121 0   C: 03451 1   C: 50066 1      05561 0   C: 00155 0      15314 0   I: 77624 1   C: 51651 1
24,3630   I: 77776 1      00006 1      33556 1      53062 0      33511 1      54777 1      05362 0   C: 40036 0

24,3640   C: 00234 1      12523 0      33512 1      54777 1      33530 1      05223 1   C: 03617 1      44766 0
24,3650      12623 0   I: 40220 0   C: 03730 0   C: 00001 0   I: 41575 0   C: 03721 0   I: 77624 1   C: 57032 1
24,3660   C: 37665 0   C: 03730 0      04636 0   C: 03731 1      06006 1   I: 77624 1   C: 27566 1      30155 0
24,3670      55672 1      05223 1   C: 03676 0      05402 1   C: 40574 0      15205 1      00006 1      33552 0

24,3700      53062 0      05120 1   C: 03730 0   C: 50067 0      44767 1      12623 0      06006 1   I: 77201 1
24,3710   C: 00001 0   C: 03665 1   I: 41455 0   C: 03432 1   C: 37460 1   C: 57032 1   C: 37675 1   C: 70537 1
24,3720   I: 77776 1      05402 1   C: 10035 0      34773 0      05607 0   C: 01457 0   C: 01664 1      03614 1
24,3730      06006 1   I: 77775 1   C: 15336 0   C: 03675 0   C: 03665 1   I: 77776 1      35054 0      05176 1

24,3740      05402 1   C: 05024 1   C: 62777 1      33516 0      04636 0   C: 20743 0      04103 1      04103 1
24,3750      13730 1      00006 1      30025 0      16024 0      10154 0      34772 1      13761 0      13760 1
24,3760      44753 0      54155 1      34772 1      56154 1      00006 1      74753 0      20155 1      16030 0
24,3770   C: 03770 1   C: 03771 0   CKSM 46703 1      @            @            @            @            @
```

OCTAL LISTING FOR PARAGRAPH # 144, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2000	I: 77776 1	42113 1	00004 0	70102 0	62114 1	54102 0	00003 1	06 06 1	
25,2010	I: 77735 0	C: 03011 1	C: 03626 0	I: 77735 0	C: 03010 0	C: 03624 1	I: 77605 1	C: 15324 0	
25,2020	C: 17630 1	C: 15151 0	I: 70405 1	C: 03624 1	C: 17632 0	C: 15200 1	C: 17175 1	C: 15344 0	
25,2030	C: 17614 1	C: 03624 1	I: 57565 0	C: 03327 1	C: 37634 1	C: 52063 0	I: 47375 0	C: 01036 0	
25,2040	C: 01756 1	I: 50256 0	C: 03474 0	C: 03676 0	I: 47076 0	C: 45761 0	C: 17644 1	C: 03624 1	
25,2050	I: 43205 1	C: 15202 0	C: 15204 0	C: 03712 0	I: 66331 0	C: 03646 0	C: 52260 1	C: 03325 0	
25,2060	C: 52115 0	I: 77634 0	C: 53607 0	I: 77220 1	C: 03645 0	C: 03401 1	I: 43014 0	C: 00662 0	
25,2070	C: 01663 0	C: 14747 0	C: 15336 0	C: 14753 0	C: 01044 0	C: 37524 0	C: 26524 0	I: 77656 1	
25,2100	C: 17452 1	C: 12112 0	C: 37606 0	C: 46213 0	I: 72441 0	C: 01756 1	I: 77726 1	C: 37702 0	
25,2110	C: 03645 0	C: 00003 1	C: 01520 1	C: 11774 0	C: 11010 0	I: 77624 1	C: 52125 0	I: 77776 1	
25,2120	05402 1	C: 10035 0	06006 1	I: 77650 1	C: 03645 0	I: 77214 0	C: 03346 0	C: 52133 1	
25,2130	C: 03526 0	I: 52076 1	C: 52136 1	I: 74375 0	C: 01036 0	C: 15232 0	C: 03516 0	I: 44056 1	
25,2140	C: 03373 0	C: 17510 0	C: 00043 0	C: 03622 1	I: 77625 0	C: 15326 1	C: 17654 0	C: 00045 0	
25,2150	C: 27674 1	C: 03516 0	I: 72441 0	C: 01756 1	C: 27700 0	C: 01315 1	I: 41246 1	C: 15234 0	
25,2160	I: 53152 1	C: 55136 0	C: 27640 0	C: 03516 0	I: 53435 0	C: 01756 1	C: 03502 0	I: 71214 0	
25,2170	C: 03346 0	C: 55077 1	C: 15336 0	I: 43225 0	C: 03524 1	C: 01044 0	C: 37606 0	C: 46223 0	
25,2200	I: 40241 1	C: 03502 0	C: 00001 0	C: 27676 0	C: 03474 0	I: 77614 1	C: 03667 0	I: 50235 0	
25,2210	C: 01756 1	C: 03502 0	I: 43044 0	C: 52215 0	C: 03467 1	I: 77775 1	C: 03474 0	I: 45241 1	
25,2220	C: 01756 1	C: 15164 0	I: 43244 1	C: 55141 0	C: 15164 0	I: 65552 0	C: 03702 1	I: 57414 1	
25,2230	C: 03707 1	C: 52232 0	C: 17714 0	C: 03640 0	I: 50025 0	C: 15242 1	C: 52255 1	I: 77214 0	
25,2240	C: 03074 1	C: 03432 1	I: 50206 0	C: 03542 1	I: 63552 0	I: 47515 0	I: 56225 1	C: 00001 0	
25,2250	I: 75400 1	C: 52253 1	C: 03727 0	I: 77650 1	C: 03373 0	I: 52014 0	C: 03274 0	C: 52253 1	
25,2260	I: 43014 0	C: 03312 1	C: 52362 1	C: 03354 0	C: 53524 1	I: 63545 0	C: 03654 0	I: 56205 0	
25,2270	C: 03654 0	C: 15306 0	I: 47015 0	C: 15310 1	C: 54432 0	C: 03720 1	I: 50025 0	C: 15316 1	
25,2300	C: 52304 1	I: 77745 1	C: 15316 1	C: 03720 1	I: 45345 1	C: 03674 1	C: 15304 1	I: 51014 0	
25,2310	C: 03265 0	C: 52316 1	I: 52131 0	C: 03646 0	C: 53316 0	C: 52351 1	I: 41345 0	C: 03654 0	
25,2320	C: 15312 0	I: 77615 0	C: 15314 0	C: 03710 1	I: 40065 0	C: 15270 0	C: 52327 0	C: 17706 0	
25,2330	C: 03624 1	C: 17634 0	C: 03700 0	I: 41471 0	C: 03674 1	I: 41316 0	I: 45271 1	C: 15300 0	
25,2340	C: 15302 1	I: 40015 1	C: 03674 1	C: 52351 1	I: 71240 1	C: 52351 1	C: 03624 1	I: 77676 0	
25,2350	C: 03634 0	I: 77614 1	C: 03052 0	C: 53524 1	I: 45345 1	C: 03720 1	C: 03640 0	I: 52044 0	
25,2360	C: 53524 1	C: 53231 1	I: 43345 1	C: 03700 0	C: 15262 0	I: 45040 1	C: 52354 1	C: 53021 1	
25,2370	I: 77731 1	C: 03646 0	C: 52373 1	I: 77745 1	C: 03640 0	C: 17664 0	C: 03624 1	C: 17647 1	

OCTAL LISTING FOR PARAGRAPH # 145, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2400	C: 03700 0	I: 71240 1	C: 52406 1	C: 03725 1	C: 17647 1	C: 03700 0	I: 43271 1	C: 03647 1
25,2410	C: 03674 1	C: 14326 0	C: 03700 0	I: 56316 0	C: 03647 1	I: 43271 1	C: 15274 1	C: 03640 0
25,2420	I: 41205 0	C: 00326 0	C: 00326 0	I: 77671 1	C: 03622 1	C: 14330 1	C: 03700 0	I: 71244 0
25,2430	C: 52433 1	C: 00330 1	C: 03664 0	I: 51145 0	C: 03634 0	C: 52442 1	I: 45345 1	C: 00326 0
25,2440	C: 15216 0	C: 00326 0	I: 41345 0	C: 00330 1	C: 15274 1	I: 40271 1	C: 00326 0	C: 00001 0
25,2450	I: 56271 0	C: 00326 0	C: 03725 1	C: 03704 1	I: 55221 0	C: 15344 0	C: 00326 0	C: 17616 0
25,2460	C: 03704 1	I: 41225 1	C: 15344 0	C: 03704 1	I: 77671 1	C: 00330 1	C: 03620 0	I: 43205 1
25,2470	C: 03175 1	C: 03704 1	I: 44366 1	C: 15344 0	I: 77605 1	C: 03616 0	C: 03757 1	I: 41221 0
25,2500	C: 00326 0	C: 03725 1	I: 77671 1	C: 03757 1	C: 14027 1	C: 03757 1	I: 50025 0	C: 15206 1
25,2510	C: 53332 0	I: 63545 0	C: 03757 1	C: 17666 1	C: 15334 1	I: 50025 0	C: 03757 1	C: 53225 1
25,2520	C: 17662 0	C: 15334 1	C: 03672 1	I: 50025 0	C: 00326 0	C: 52533 0	I: 77621 1	C: 03662 0
25,2530	C: 17662 0	C: 00326 0	C: 03672 1	I: 45145 0	C: 03672 1	C: 53003 1	C: 03656 1	I: 56261 1
25,2540	C: 20607 1	C: 03175 1	I: 77625 0	C: 15252 0	C: 03660 1	I: 41215 1	C: 31771 1	C: 15256 1
25,2550	I: 41205 0	C: 03662 0	C: 03662 0	I: 56271 0	C: 03656 1	C: 03666 1	I: 50021 1	C: 00027 1
25,2560	C: 52750 1	C: 03761 1	I: 77625 0	C: 00027 1	I: 43205 1	C: 15334 1	C: 00027 1	C: 14027 1
25,2570	C: 03761 1	I: 60516 0	I: 77621 1	C: 15334 1	C: 17670 0	C: 03666 1	I: 41225 1	C: 15334 1
25,2600	C: 03666 1	I: 41205 0	C: 03670 0	C: 03670 0	I: 43312 0	C: 31771 1	I: 65366 1	C: 03666 1
25,2610	I: 41205 0	C: 03670 0	C: 03761 1	I: 67471 1	I: 41552 0	C: 17731 1	C: 03757 1	I: 43205 1
25,2620	C: 15172 1	C: 03712 0	C: 03732 1	I: 63525 0	C: 00326 0	I: 56205 0	C: 03175 1	C: 03666 1
25,2630	I: 45071 0	C: 00330 1	C: 46155 1	I: 56205 0	C: 15210 0	C: 00027 1	C: 03733 0	I: 41325 0
25,2640	C: 15260 1	C: 03700 0	I: 56205 0	C: 03674 1	C: 00330 1	I: 41471 0	C: 03624 1	C: 17734 1
25,2650	C: 15176 0	I: 41225 1	C: 03761 1	C: 15174 1	C: 27735 0	C: 03731 1	C: 17126 1	C: 03735 0
25,2660	I: 43215 0	I: 43215 0	I: 41025 0	C: 03702 1	C: 57544 0	C: 03610 0	I: 45246 0	C: 15224 1
25,2670	I: 43040 1	C: 53032 0	C: 03311 1	C: 52677 0	I: 51145 0	C: 03610 0	C: 53220 1	I: 41345 0
25,2700	C: 03642 1	C: 03610 0	I: 45325 1	C: 03612 1	C: 03610 0	I: 77665 1	I: 77626 0	C: 74135 0
25,2710	I: 50015 0	C: 03725 1	C: 52744 1	I: 77600 1	C: 52740 0	C: 03725 1	I: 77776 1	04606 0
25,2720	35055 1	55270 1	05402 1	C: 00474 0	35055 1	05176 1	33031 0	55645 0
25,2730	06006 1	I: 43145 0	C: 03610 0	C: 03071 1	C: 17612 1	C: 15200 1	C: 37175 0	C: 52373 1
25,2740	I: 77745 1	C: 15344 0	C: 37725 0	C: 53220 1	I: 70545 1	C: 03725 1	I: 52076 1	C: 52706 1
25,2750	I: 41205 0	C: 03757 1	C: 15152 0	I: 41325 0	C: 03725 1	C: 15152 0	I: 43325 1	C: 03660 1
25,2760	C: 15254 0	I: 41205 0	C: 03662 0	C: 15256 1	I: 56271 0	C: 03656 1	C: 03757 1	I: 55221 0
25,2770	I: 77615 0	C: 03757 1	C: 37757 0	C: 53003 1	C: 17175 1	C: 03757 1	I: 77716 1	C: 17666 1

OCTAL LISTING FOR PARAGRAPH # 146, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3000	C: 15336 0	I: 77650 1	C: 52561 1	I: 56342 1	C: 03616 0	I: 72421 0	C: 15334 1	I: 45316 1
25,3010	C: 03704 1	I: 43471 1	C: 03620 0	06006 1	I: 45014 0	C: 03271 0	C: 53021 1	I: 77650 1
25,3020	C: 52373 1	I: 77745 1	C: 15336 0	C: 17612 1	C: 15160 1	C: 17642 1	C: 15154 0	C: 3725 1
25,3030	I: 77616 0	C: 53574 1	I: 77634 0	C: 54440 0	I: 45345 1	C: 03640 0	C: 15222 1	I: 43040 1
25,3040	C: 53042 1	C: 03070 0	I: 45345 1	C: 03674 1	C: 00326 0	I: 71244 0	C: 53257 1	C: 03640 0
25,3050	I: 50025 0	C: 03175 1	C: 53312 1	I: 51145 0	C: 03700 0	C: 53064 0	I: 45345 1	C: 03674 1
25,3060	C: 03757 1	I: 50025 0	C: 15166 1	C: 53332 0	I: 77745 1	C: 03640 0	I: 50025 0	C: 00330 1
25,3070	C: 53074 1	I: 52145 0	C: 03624 1	C: 53523 0	I: 41345 0	C: 03640 0	C: 03620 0	I: 75415 0
25,3100	C: 03704 1	I: 41221 0	C: 15344 0	C: 03616 0	C: 01312 0	I: 41221 0	C: 00326 0	C: 03725 1
25,3110	C: 15310 1	C: 03672 1	I: 50025 0	C: 01312 0	C: 53133 0	I: 41406 0	I: 56205 0	C: 03660 1
25,3120	C: 03662 0	I: 41215 1	C: 31771 1	C: 15256 1	I: 41205 0	I: 77671 1	C: 03656 1	I: 44271 0
25,3130	C: 01312 0	C: 01310 1	C: 01310 1	I: 45345 1	C: 03640 0	C: 15344 0	I: 50004 0	C: 57544 0
25,3140	C: 53151 1	I: 45345 1	C: 03664 0	C: 03175 1	I: 45325 1	C: 03640 0	C: 03175 1	I: 45471 1
25,3150	C: 74163 0	I: 77745 1	C: 03700 0	I: 41225 1	C: 01310 1	C: 03614 1	I: 43271 1	C: 15212 1
25,3160	C: 03674 1	I: 41225 1	C: 01312 0	C: 03614 1	I: 41471 0	C: 15214 1	I: 51400 1	C: 53470 1
25,3170	I: 50025 0	C: 15276 0	C: 53177 0	I: 43205 1	C: 15156 1	C: 15276 0	I: 41565 1	I: 42545 0
25,3200	I: 77615 0	C: 03725 1	I: 41400 0	C: 53470 1	C: 17634 0	C: 03640 0	I: 50025 0	C: 15220 0
25,3210	C: 53524 1	I: 71214 0	C: 03273 1	I: 71244 0	C: 53524 1	C: 15336 0	C: 37634 1	C: 53524 1
25,3220	I: 77745 1	C: 03610 0	C: 17612 1	C: 15200 1	C: 03175 1	I: 47131 1	C: 03646 0	C: 52373 1
25,3230	C: 54505 0	I: 77604 0	C: 57544 0	I: 41345 0	C: 03654 0	C: 03706 0	I: 41325 0	C: 15264 0
25,3240	C: 03710 1	I: 43271 1	C: 03674 1	C: 03700 0	I: 43205 1	C: 15230 1	I: 77725 1	C: 03710 1
25,3250	I: 77621 1	C: 03640 0	I: 43205 1	C: 15226 0	I: 52061 1	C: 20211 1	C: 53202 1	I: 77604 0
25,3260	C: 57544 0	I: 54345 1	C: 03624 1	C: 20611 0	I: 45325 1	C: 03674 1	C: 00326 0	I: 43205 1
25,3270	C: 03624 1	C: 03700 0	I: 43205 1	C: 15230 1	I: 45325 1	C: 00326 0	C: 03674 1	I: 41316 0
25,3300	C: 03624 1	I: 65271 0	C: 15274 1	C: 00326 0	I: 56316 0	C: 03622 1	I: 45265 1	C: 00330 1
25,3310	I: 77650 1	C: 53250 0	I: 66234 1	C: 54473 0	C: 03646 0	C: 53316 0	I: 45345 1	C: 15170 0
25,3320	C: 03640 0	I: 72240 1	C: 53332 0	C: 03316 0	I: 72214 0	C: 03314 1	C: 53330 1	C: 15336 0
25,3330	C: 37316 1	C: 54402 0	I: 47131 1	C: 03646 0	C: 53332 0	C: 54477 1	I: 66214 0	C: 03067 0
25,3340	C: 03646 0	C: 53342 1	I: 45345 1	C: 03674 1	C: 15216 0	I: 77440 1	C: 53611 1	04606 0
25,3350	35775 1	55761 1	41673 0	51761 0	63634 0	10000 0	11761 1	13351 1
25,3360	64770 0	55646 0	51761 0	43634 1	51761 0	63635 1	57646 1	22007 0
25,3370	00006 1	11646 0	55651 0	34773 0	55650 1	34776 0	27761 1	50000 1

OCTAL LISTING FOR PARAGRAPH # 147, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3400	43634 1	51761 0	63635 1	00006 1	71651 0	51761 0	63634 0	51650 0
25,3410	55652 0	11650 1	13374 0	57653 0	61637 1	00006 1	71657 0	52155 1
25,3420	00006 1	41700 0	20001 1	20001 1	20001 1	61655 0	00006 1	71656 1
25,3430	61654 1	20155 1	30154 1	55760 0	06006 1	I: 45242 1	C: 03702 1	I: 43014 0
25,3440	C: 03305 1	C: 53466 0	C: 03747 0	C: 53451 1	I: 43145 0	C: 13770 0	C: 03065 1	C: 37716 0
25,3450	C: 53466 0	C: 03716 1	I: 77676 0	I: 56204 1	C: 57544 0	C: 03653 1	I: 40061 1	C: 20206 1
25,3460	C: 53470 1	I: 40015 1	C: 03626 0	C: 53470 1	C: 37634 1	C: 53474 0	I: 77745 1	C: 13467 0
25,3470	I: 41234 1	C: 45761 0	C: 03624 1	C: 03634 0	I: 45345 1	C: 15162 0	C: 03640 0	I: 43244 1
25,3500	C: 53524 1	C: 15162 0	I: 41240 1	C: 53521 1	C: 15264 0	I: 41325 0	C: 03654 0	C: 15334 1
25,3510	I: 41215 1	C: 03624 1	I: 56325 0	C: 15266 1	C: 03622 1	I: 75415 0	I: 51015 1	C: 03700 0
25,3520	C: 53524 1	I: 77745 1	C: 03624 1	C: 03634 0	I: 77745 1	C: 03634 0	C: 17636 1	C: 03622 1
25,3530	I: 77614 1	C: 03305 1	C: 53564 0	I: 43205 1	C: 03632 0	C: 15244 1	I: 51525 1	C: 03634 0
25,3540	I: 50025 0	C: 03630 1	C: 53551 0	I: 75345 1	C: 03676 0	C: 03644 1	I: 71240 1	C: 53627 1
25,3550	I: 41542 1	I: 75345 1	C: 03676 0	C: 03644 1	I: 77625 0	I: 71240 1	C: 53564 0	C: 03644 1
25,3560	I: 57414 1	C: 03210 1	C: 53564 0	C: 03644 1	I: 56345 0	C: 03636 1	C: 03624 1	I: 65542 1
25,3570	I: 43165 1	C: 03644 1	C: 03270 1	C: 03316 0	I: 77776 1	34754 0	70102 0	00006 1
25,3600	13604 1	31122 1	04636 0	C: 20724 1	00004 0	10067 1	05152 1	04655 0
25,3610	C: 77143 1	I: 77776 1	04606 0	35055 1	05121 0	C: 02511 0	C: 54066 0	05362 0
25,3620	C: 00414 0	C: 10035 0	33626 0	55645 0	06006 1	I: 77650 1	C: 54532 1	I: 75345 1
25,3630	C: 03630 1	C: 03634 0	C: 37636 0	C: 53564 0	C: 00474 0	C: 01235 1	C: 02337 1	C: 03721 0
25,3640	C: 05230 0	C: 06213 1	C: 10550 0	C: 11717 0	C: 13314 0	C: 14736 0	C: 16255 1	C: 16457 0
25,3650	C: 25570 1	C: 77526 0	C: 77360 1	C: 77106 0	C: 76516 1	C: 76071 0	C: 75570 1	C: 74661 0
25,3660	C: 70657 1	C: 66352 0	C: 66352 0	C: 54557 1	C: 40000 0	C: 40000 0	C: 77635 1	C: 77563 1
25,3670	C: 77354 0	C: 76712 1	C: 76066 0	C: 75322 0	C: 73237 0	C: 72104 1	C: 70301 1	C: 65635 1
25,3700	C: 57311 0	C: 50575 0	C: 50575 0	C: 74443 1	C: 74333 1	C: 74433 0	C: 74763 0	C: 75432 0
25,3710	C: 75735 1	C: 76200 1	C: 75735 1	C: 75140 0	C: 74075 0	C: 73312 0	C: 73732 0	C: 73732 0
25,3720	C: 00026 0	C: 00077 1	C: 00217 0	C: 00431 1	C: 00712 0	C: 01136 1	C: 02015 1	C: 02374 0
25,3730	C: 03123 1	C: 04051 1	C: 05767 1	C: 07476 0	C: 11324 1	C: 76272 1	C: 75472 1	C: 74604 0
25,3740	C: 74210 1	C: 74052 0	C: 73735 1	C: 73217 1	C: 73013 1	C: 73155 1	C: 74151 1	C: 76703 1
25,3750	C: 77575 0	C: 77575 0	C: 00112 0	C: 00204 1	C: 00407 1	C: 01113 0	C: 02161 0	C: 03260 0
25,3760	C: 03717 0	C: 05411 0	C: 10057 1	C: 13476 0	C: 20324 0	C: 21677 1	C: 21677 1	C: 16631 1
25,3770	C: 06755 0	C: 03771 0	C: 03772 0	CKSM 77311 1	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 150, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2000	22016 0	00006 1	22012 1	41501 0	74766 0	27501 0	04714 1	C: 42425 1
26,2010	34760 1	00006 1	05012 1	00006 1	34541 0	52113 0	37661 1	54030 0
26,2020	15323 1	I: 45020 1	C: 03657 0	C: 45174 1	I: 77624 1	C: 45330 0	I: 77624 1	C: 46745 0
26,2030	C: 16357 1	C: 00005 1	I: 77624 1	C: 45330 0	I: 77624 1	C: 46745 0	C: 36355 1	C: 03657 0
26,2040	I: 77601 0	C: 00001 0	I: 41575 0	C: 15330 0	I: 41434 1	C: 51751 0	C: 36347 1	C: 55345 0
26,2050	C: 16766 1	C: 02347 0	C: 34041 0	C: 27170 1	I: 47375 0	C: 00007 0	C: 00001 0	C: 24031 0
26,2060	C: 00001 0	I: 57456 1	I: 41401 1	C: 00001 0	I: 54335 0	C: 03752 1	C: 20214 1	I: 41342 1
26,2070	C: 14135 0	C: 36347 1	C: 54105 1	I: 53575 0	C: 00031 0	C: 16766 1	C: 14133 0	I: 77625 0
26,2100	C: 02347 0	C: 36347 1	C: 54105 1	C: 36766 0	C: 31120 0	I: 73545 1	C: 02347 0	I: 47315 0
26,2110	C: 02766 1	C: 00001 0	I: 72561 0	I: 50315 0	C: 02766 1	C: 00001 0	I: 72561 0	C: 02766 1
26,2120	I: 71525 0	C: 02347 0	I: 51315 1	C: 00015 0	C: 00001 0	I: 76561 1	I: 53255 0	I: 40256 1
26,2130	C: 00001 0	I: 43406 1	C: 05252 1	C: 25251 0	C: 01414 1	C: 06044 1	I: 52170 0	C: 54163 1
26,2140	C: 54146 0	I: 52170 0	C: 54201 0	C: 54146 0	I: 77770 1	C: 54212 1	I: 54201 0	C: 00001 0
26,2150	C: 20617 0	I: 57571 0	C: 01707 0	I: 57571 0	C: 02034 1	I: 66261 1	C: 20221 1	C: 00051 0
26,2160	C: 00006 1	I: 77650 1	C: 00046 0	I: 41206 0	C: 02147 1	I: 71406 0	I: 65361 0	C: 02133 1
26,2170	I: 63356 1	C: 02133 1	I: 53406 0	I: 53435 0	C: 02141 1	I: 76435 1	I: 53361 0	I: 77772 0
26,2200	C: 14003 1	I: 63370 0	C: 00066 1	C: 02037 1	I: 52761 0	C: 00001 0	C: 02133 1	I: 72500 1
26,2210	C: 54204 0	I: 77616 0	I: 65370 0	C: 00060 1	C: 14233 0	I: 74206 0	C: 02037 1	I: 77761 1
26,2220	C: 00001 0	C: 14005 1	I: 41425 1	C: 31771 1	I: 53357 0	C: 02125 0	C: 00005 1	I: 72500 1
26,2230	C: 54217 1	I: 77616 0	C: 22000 1	C: 00000 1	34753 1	55247 0	44770 1	55726 1
26,2240	02546 1	35034 0	05540 0	02247 1	05402 1	C: 00014 1	05205 0	22007 0
26,2250	11726 1	34753 1	12253 0	53716 1	34753 1	55247 0	06006 1	I: 77745 1
26,2260	C: 01044 0	C: 37651 1	C: 52063 0	I: 43175 0	C: 01030 0	C: 03274 0	C: 02321 1	I: 77656 1
26,2270	C: 26334 1	C: 01036 0	C: 02326 1	I: 53435 0	C: 02334 1	C: 03502 0	I: 45345 1	C: 03651 0
26,2300	C: 01044 0	I: 45040 1	C: 54257 0	C: 54652 1	05527 1	35033 1	05535 1	32425 0
26,2310	04636 0	C: 20743 0	04103 1	02315 1	02254 0	05344 1	C: 00076 0	34770 0
26,2320	54332 1	02546 1	06006 1	I: 47131 1	C: 03325 0	C: 54402 0	C: 41703 0	00006 1
26,2330	32431 0	53062 0	32545 1	04636 0	C: 21147 0	04103 1	02341 0	02332 1
26,2340	02244 1	04655 0	C: 41624 1	35034 0	04636 0	C: 20743 0	02343 1	02351 1
26,2350	02343 1	05402 1	C: 04024 0	11726 1	34753 1	12356 1	55715 1	31411 1
26,2360	22007 0	53604 0	34770 0	55727 0	35025 0	55122 0	05547 1	C: 00134 1
26,2370	41700 0	74770 1	00006 1	12422 0	02406 1	35052 0	05121 0	C: 02406 1

OCTAL LISTING FOR PARAGRAPH # 151, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2400	C: 54066 0	05314 1	I: 52131 0	C: 00053 1	C: 53574 1	C: 20412 1	05344 1	C: 00077 1
26,2410	32427 1	55724 0	32426 0	55122 0	44770 1	55727 0	05402 1	C: 00004 0
26,2420	04636 0	C: 20715 0	05402 1	C: 00004 0	05205 0	C: 04077 0	C: 01500 0	C: 52000 0
26,2430	C: 03404 1	C: 76067 1	05344 1	C: 00100 0	32437 0	55122 0	06030 1	C: 01512 0
26,2440	05344 1	C: 00101 1	35052 0	05121 0	C: 02456 1	C: 54062 1	05362 0	C: 00554 0
26,2450	C: 10035 0	06006 1	I: 47131 1	C: 03646 0	C: 53034 0	C: 52120 0	05561 0	C: 00134 1
26,2460	32472 1	04636 0	C: 21101 1	02460 1	02467 0	02460 1	02244 1	05547 1
26,2470	C: 00134 1	02422 1	C: 04105 1	05344 1	C: 00102 1	35025 0	02502 1	05344 1
26,2500	C: 00103 0	32510 1	55122 0	05547 1	C: 00134 1	05402 1	C: 00004 0	06030 1
26,2510	C: 01502 1	32544 0	04636 0	C: 20743 0	02517 0	02517 0	02511 0	00004 0
26,2520	34767 0	64770 0	40000 0	70102 0	54102 0	00003 1	00006 1	32644 0
26,2530	53062 0	14103 0	I: 43175 0	C: 01030 0	C: 00662 0	C: 16152 0	C: 01044 0	I: 45014 0
26,2540	C: 01663 0	C: 26453 1	I: 77634 0	C: 53607 0	C: 04103 1	C: 00041 1	00006 1	23773 0
26,2550	04636 0	C: 03731 1	06006 1	I: 45014 0	C: 00716 1	C: 54605 0	C: 27566 1	30155 0
26,2560	55774 0	05233 0	C: 02567 1	C: 54067 1	05402 1	C: 40434 0	05205 0	35052 0
26,2570	05135 0	C: 02604 1	C: 54066 0	00006 1	32644 0	53062 0	05362 0	C: 00454 1
26,2600	C: 00175 1	04606 0	04655 0	C: 76607 1	06006 1	I: 77204 1	C: 57544 0	C: 01036 0
26,2610	I: 64235 1	C: 01030 0	C: 01734 0	I: 71256 0	C: 00160 0	I: 43240 0	C: 54623 1	C: 14646 0
26,2620	I: 47004 0	C: 54642 0	C: 54627 0	I: 43276 0	C: 14646 0	I: 77404 1	C: 54632 1	05671 1
26,2630	C: 01426 0	02634 1	05671 1	C: 01427 1	35023 0	04636 0	C: 20710 0	32647 0
26,2640	04636 0	C: 01731 0	01773 0	C: 03143 1	C: 76067 1	C: 22111 0	C: 17335 1	C: 01750 1
26,2650	C: 00000 1	C: 13560 0	I: 45345 1	C: 02020 1	C: 15006 0	I: 71244 0	C: 55002 0	C: 31757 0
26,2660	I: 77624 1	C: 57151 0	I: 45145 0	C: 15024 0	C: 57261 0	I: 77624 1	C: 57052 1	I: 77624 1
26,2670	C: 55033 1	I: 45015 1	C: 02020 1	C: 57261 0	C: 03733 0	I: 57415 0	C: 03651 0	C: 03735 0
26,2700	I: 77615 0	C: 01044 0	C: 37727 1	C: 57052 1	I: 77624 1	C: 55033 1	I: 77624 1	C: 11744 0
26,2710	I: 77624 1	C: 11731 1	I: 77624 1	C: 11731 1	C: 37714 1	C: 55054 0	I: 77605 1	I: 43265 1
26,2720	C: 15032 1	C: 00001 0	C: 17725 1	C: 02240 0	I: 77615 0	C: 06456 0	C: 34023 1	C: 55051 0
26,2730	I: 45325 1	C: 00001 0	C: 15010 1	I: 63471 0	C: 15012 0	C: 00001 0	I: 43205 1	C: 15014 0
26,2740	I: 41215 1	C: 15016 1	C: 15020 1	I: 77725 1	I: 43271 1	C: 15030 0	C: 31771 1	I: 77665 1
26,2750	I: 51015 1	C: 15022 0	C: 54755 1	I: 77745 1	C: 15336 0	C: 17722 0	C: 02240 0	I: 45015 1
26,2760	C: 15026 1	C: 57261 0	I: 77624 1	C: 57052 1	I: 77624 1	C: 55033 1	I: 73015 1	C: 15026 1
26,2770	C: 03713 1	C: 34023 1	C: 55051 0	I: 67076 1	C: 00155 0	C: 17761 1	I: 77626 0	C: 74020 0

OCTAL LISTING FOR PARAGRAPH # 152, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3000	I: 77634 0	C: 54304 1	I: 52145 0	C: 06452 1	C: 54660 0	C: 00002 0	C: 26244 1	C: 33335 1
26,3010	C: 05707 1	C: 36365 1	C: 30244 0	C: 77113 1	C: 42770 1	C: 77354 0	C: 65030 1	C: 21450 0
26,3020	C: 00001 0	C: 01750 1	C: 00000 1	C: 00305 1	C: 04541 0	C: 00003 1	C: 27040 0	C: 32525 1
26,3030	C: 12525 0	C: 77777 0	C: 76601 1	I: 47315 0	C: 02334 1	C: 03502 0	I: 76561 1	I: 74315 0
26,3040	C: 02334 1	C: 00017 1	I: 45455 1	C: 74235 0	I: 72441 0	C: 01712 1	C: 02156 1	I: 77650 1
26,3050	C: 26570 1	I: 77657 0	C: 20201 0	C: 00021 1	I: 41345 0	C: 00041 1	C: 00021 1	I: 45325 1
26,3060	C: 00041 1	C: 00021 1	I: 56257 1	C: 20171 1	I: 77625 0	C: 00025 0	I: 41566 1	I: 65271 0
26,3070	C: 00037 0	I: 65205 0	C: 00021 1	C: 00035 1	I: 56366 1	I: 65542 1	I: 77616 0	I: 56345 0
26,3100	C: 03700 0	C: 15320 1	I: 41325 0	C: 03640 0	C: 15322 0	I: 43271 1	C: 03674 1	I: 43205 1
26,3110	C: 03640 0	C: 03640 0	C: 03640 0	I: 71214 0	C: 03307 0	C: 55122 0	C: 03702 1	I: 52005 0
26,3120	C: 15236 1	C: 52173 0	I: 45345 1	C: 03674 1	C: 15326 1	I: 43044 0	C: 55130 0	C: 03066 1
26,3130	I: 41345 0	C: 03702 1	C: 15240 0	I: 52071 0	C: 03674 1	C: 52173 0	I: 52145 0	C: 16425 0
26,3140	C: 52162 0	I: 51425 0	C: 16426 0	I: 75461 0	C: 20216 0	I: 52005 0	C: 15250 1	C: 52226 0
26,3150	C: 02525 1	C: 12525 0	C: 12525 0	C: 04631 1	C: 23146 0	C: 03146 1	C: 14632 0	C: 76314 0
26,3160	C: 71462 1	C: 05075 0	C: 16051 1	C: 07777 1	C: 00000 1	C: 00236 0	C: 36763 0	C: 00204 1
26,3170	C: 11303 1	C: 05260 0	C: 05572 1	C: 12343 0	C: 21616 0	C: 01073 1	C: 31515 1	C: 00172 0
26,3200	C: 03571 1	C: 05136 0	C: 32046 1	C: 75031 1	C: 40775 0	C: 13132 0	C: 33062 0	C: 00160 0
26,3210	C: 05104 1	C: 14631 0	C: 23146 0	C: 74015 0	C: 46560 0	C: 00475 1	C: 35746 1	C: 10262 0
26,3220	C: 02622 0	C: 05441 0	C: 14412 0	C: 00022 1	C: 36641 1	C: 01003 0	C: 06315 0	C: 63073 0
26,3230	C: 73236 1	C: 32047 0	C: 24367 0	C: 37200 1	C: 05636 1	C: 00046 0	C: 13137 0	C: 00017 1
26,3240	C: 30730 0	C: 00040 0	C: 30447 0	C: 00000 1	C: 17565 1	C: 01727 1	C: 20103 1	C: 00121 0
26,3250	C: 17460 0	C: 00400 0	C: 00000 1	C: 01252 0	C: 25253 1	C: 24365 1	C: 30244 0	C: 77152 1
26,3260	C: 51354 1	C: 00336 1	C: 21610 0	C: 00433 0	C: 02775 0	C: 00000 1	C: 20017 0	C: 77765 0
26,3270	C: 70243 0	C: 31463 1	C: 06315 0	C: 00541 1	C: 33575 0	C: 00146 1	C: 14632 0	C: 00052 0
26,3300	C: 30013 0	C: 20411 1	C: 03041 1	C: 20610 1	C: 10513 1	C: 11473 1	C: 02355 0	C: 00203 0
26,3310	C: 02234 0	C: 16237 0	C: 00146 1	C: 01456 1	C: 03450 0	C: 01727 1	C: 01217 1	C: 56232 1
26,3320	C: 72332 0	C: 77000 1	C: 43741 1	C: 36702 1	C: 21727 0	C: 10000 0	C: 00000 1	C: 00000 1
26,3330	C: 00000 1	C: 00000 1	C: 00000 1	C: 20000 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
26,3340	C: 00000 1	C: 00000 1	C: 00000 1	C: 37777 1	C: 37777 1	I: 46020 1	C: 00050 1	C: 55362 0
26,3350	I: 77624 1	C: 55416 1	I: 77775 1	C: 02012 0	I: 53235 0	C: 00001 0	C: 00001 0	I: 52105 1
26,3360	C: 00025 0	C: 55406 0	I: 77624 1	C: 55567 0	I: 76521 0	C: 00025 0	I: 77650 1	C: 55354 0
26,3370	I: 46020 1	C: 00050 1	C: 55412 0	I: 77624 1	C: 55416 1	I: 61375 1	C: 02012 0	C: 00025 0

OCTAL LISTING FOR PARAGRAPH # 153, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3400	I: 77772 0	I: 51235 1	C: 00001 0	C: 00001 0	I: 77721 0	C: 00025 0	I: 40372 0	C: 00001 0
26,3410	I: 77650 1	C: 00050 1	I: 77624 1	C: 55567 0	I: 77650 1	C: 55401 1	I: 40220 0	C: 00051 0
26,3420	C: 00011 1	I: 77770 1	C: 00005 1	I: 65345 0	C: 15647 0	C: 15641 0	I: 45006 0	C: 55543 0
26,3430	I: 71406 0	C: 14041 1	I: 77756 0	C: 14043 0	C: 15645 1	I: 41525 0	C: 15637 1	I: 45170 0
26,3440	C: 00004 0	C: 55543 0	C: 14027 1	C: 15643 1	I: 41525 0	C: 15635 0	I: 45170 0	C: 00005 1
26,3450	C: 55543 0	I: 71406 0	I: 77606 1	C: 00025 0	I: 76405 1	C: 00041 1	C: 14035 1	I: 76405 1
26,3460	C: 00043 0	C: 14037 0	I: 41556 1	I: 77676 0	C: 14033 1	C: 00027 1	C: 14007 0	I: 76405 1
26,3470	C: 00041 1	C: 14027 1	C: 00011 1	I: 76405 1	C: 00043 0	C: 14031 0	C: 15336 0	I: 57525 1
26,3500	C: 00043 0	I: 63325 0	C: 00041 1	C: 00033 1	I: 63361 0	C: 15633 0	C: 00011 1	I: 53361 0
26,3510	C: 15631 1	I: 77772 0	C: 24041 1	I: 63361 0	C: 15633 0	C: 00033 1	I: 52361 1	C: 15631 1
26,3520	I: 65372 1	C: 00007 0	I: 74346 0	C: 00011 1	I: 73525 1	C: 00007 0	I: 52361 1	C: 00025 0
26,3530	I: 77772 0	C: 14033 1	C: 00007 0	I: 74356 1	I: 71525 0	C: 00007 0	I: 53361 0	C: 00025 0
26,3540	I: 57572 0	C: 34025 1	C: 00051 0	I: 54345 1	C: 00007 0	C: 20617 0	I: 72371 1	C: 01707 0
26,3550	C: 00155 0	C: 14017 1	C: 00020 0	I: 77605 1	I: 43257 0	C: 20206 1	I: 67206 1	C: 00017 1
26,3560	I: 41261 1	C: 20212 1	C: 00013 0	I: 43257 0	C: 20213 0	I: 43400 1	C: 55565 1	I: 40220 0
26,3570	C: 00051 0	C: 00011 1	I: 77770 1	C: 00000 1	I: 65345 0	C: 15653 0	C: 15651 1	I: 45006 0
26,3600	C: 55543 0	I: 41401 1	C: 00023 0	I: 65346 0	C: 00023 0	I: 65356 1	C: 15336 0	I: 73525 1
26,3610	C: 00023 0	I: 65276 1	C: 00023 0	I: 63346 0	C: 15336 0	I: 41525 0	C: 15334 1	I: 71201 1
26,3620	C: 00017 1	C: 15336 0	I: 65325 0	C: 01712 1	C: 01714 1	I: 55476 1	I: 77650 1	C: 00051 0
26,3630	C: 17775 1	C: 02052 1	C: 00333 1	C: 10374 0	C: 77665 1	C: 42175 1	C: 22211 0	C: 00636 1
26,3640	C: 77777 0	C: 77767 1	C: 34076 1	C: 30363 1	C: 24760 0	C: 00133 0	C: 02052 1	C: 35250 0
26,3650	C: 37116 0	C: 32631 1	C: 30576 0	C: 10326 1	05547 1	C: 00054 0	00004 0	00006 1
26,3660	30025 0	53007 0	03715 1	03656 1	52155 1	53011 1	00004 0	04636 0
26,3670	C: 17121 0	05561 0	C: 00007 0	05561 0	C: 00010 0	05561 0	C: 00176 1	34756 1
26,3700	00006 1	05013 0	05402 1	C: 07024 0	C: 20000 0	C: 03735 0	C: 54062 1	35011 1
26,3710	04636 0	C: 21067 0	13707 0	13707 0	13707 0	00006 1	22156 0	04511 0
26,3720	00003 1	52155 1	34764 0	54001 1	34772 1	20155 1	44342 1	70155 1
26,3730	56155 0	74342 1	10000 0	24156 0	00156 0	44756 0	00006 1	03013 0
26,3740	00004 0	34772 1	54001 1	52025 1	03715 1	03740 1	00006 1	41011 1
26,3750	20155 1	34757 0	07256 1	07224 1	10154 0	03762 1	03762 1	03760 0
26,3760	34757 0	26154 0	00006 1	31007 1	20155 1	07226 0	52155 1	20025 1
26,3770	05561 0	C: 00054 0	04103 1	C: 03773 1	C: 03774 0	CKSM 51074 0	@	@

OCTAL LISTING FOR PARAGRAPH # 154, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2000	06006 1	I: 77201 1	C: 00001 0	C: 15336 0	I: 77614 1	C: 05305 1	C: 56042 1	I: 77214 0
27,2010	C: 05354 0	C: 56044 1	C: 03554 0	C: 26561 1	C: 03540 0	C: 26553 0	C: 03546 0	C: 26567 1
27,2020	C: 03562 0	C: 02575 1	I: 77776 1	05402 1	C: 04024 0	06006 1	I: 77775 1	C: 02567 1
27,2030	C: 27562 0	C: 02561 1	C: 27540 0	C: 02553 0	C: 27554 0	C: 02575 1	C: 37546 1	C: 74000 1
27,2040	I: 77624 1	C: 72561 0	C: 37540 1	C: 10733 1	I: 71214 0	C: 01352 1	C: 56066 1	C: 03450 0
27,2050	I: 77624 1	C: 76560 0	I: 77624 1	C: 56674 1	I: 77624 1	C: 32050 0	I: 64375 1	C: 03667 0
27,2060	C: 00001 0	I: 77772 0	C: 17540 0	C: 02603 0	I: 77650 1	C: 56072 1	I: 57575 1	C: 03405 0
27,2070	C: 17540 0	C: 02605 0	C: 37542 0	C: 10733 1	04665 0	55004 0	06006 1	I: 45014 0
27,2100	C: 02711 1	C: 56104 1	C: 56225 1	C: 01310 1	I: 77776 1	35031 0	04636 0	C: 21154 1
27,2110	02215 0	02115 0	12150 0	02152 0	05205 0	06006 1	I: 45014 0	C: 02711 1
27,2120	C: 56123 1	C: 56225 1	C: 01310 1	I: 77776 1	37673 1	05654 0	12127 0	67671 0
27,2130	00006 1	12133 0	12105 0	35031 0	04636 0	C: 20710 0	02152 0	04655 0
27,2140	C: 44000 1	06006 1	I: 43014 0	C: 05350 1	C: 56104 1	C: 00752 1	C: 56104 1	I: 77776 1
27,2150	31004 1	04660 0	40100 1	74755 0	10000 0	00002 0	30002 0	54156 1
27,2160	46214 1	60133 0	55257 1	05402 1	C: 00071 1	34762 0	05516 0	00156 0
27,2170	34764 0	70075 1	00006 1	12213 1	05547 1	C: 00077 1	30104 1	74760 0
27,2200	10000 0	02210 0	05547 1	C: 00024 1	34772 1	55323 0	05547 1	C: 00037 0
27,2210	35053 1	05176 1	01257 0	04655 0	C: 74416 1	31214 1	00006 1	12150 0
27,2220	30100 0	74755 0	00006 1	14103 0	04546 1	I: 40020 1	C: 03310 0	C: 56230 0
27,2230	I: 47164 1	C: 03320 0	C: 44370 0	C: 34032 1	C: 44377 1	I: 61375 1	C: 03357 0	C: 03321 1
27,2240	I: 77656 1	C: 00035 1	I: 53435 0	C: 03351 0	I: 57400 1	C: 56355 1	C: 17343 0	C: 00045 0
27,2250	I: 50025 0	C: 16426 0	C: 56355 1	I: 50375 0	C: 03351 0	C: 00035 1	I: 65552 0	I: 77624 1
27,2260	C: 44522 1	I: 75160 1	C: 03320 0	C: 03425 1	I: 77624 1	C: 44304 0	I: 51545 1	C: 00007 0
27,2270	I: 50025 0	C: 16413 0	C: 56345 0	I: 51545 1	C: 03351 0	I: 51025 1	C: 16415 0	C: 56345 0
27,2300	I: 77775 1	I: 77626 0	C: 50442 0	I: 77626 0	C: 50450 0	I: 77626 0	C: 50456 0	C: 03327 1
27,2310	I: 57444 1	C: 56312 1	I: 50035 1	C: 03351 0	C: 56321 1	I: 57575 1	C: 03351 0	C: 37343 1
27,2320	C: 56324 1	I: 77775 1	C: 03351 0	C: 03343 0	I: 51545 1	C: 03351 0	I: 51025 1	C: 16417 1
27,2330	C: 56334 0	I: 52145 0	C: 16423 0	C: 56336 1	I: 77745 1	C: 16421 1	I: 77624 1	C: 44522 1
27,2340	I: 75160 1	C: 03320 0	C: 03425 1	I: 77624 1	C: 44304 0	I: 45160 1	C: 00000 1	C: 44647 1
27,2350	I: 77634 0	C: 45644 0	I: 52001 1	C: 00001 0	C: 03310 0	I: 50375 0	C: 00035 1	C: 03351 0
27,2360	I: 72240 1	C: 56365 1	C: 00032 0	I: 77650 1	C: 56352 0	I: 47375 0	C: 03327 1	C: 15334 1
27,2370	I: 47256 0	C: 03351 0	I: 40056 0	C: 56407 1	C: 17343 0	C: 00045 0	I: 50025 0	C: 16426 0

OCTAL LISTING FOR PARAGRAPH # 155, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2400	C: 56407 1	I: 77775 1	C: 03343 0	C: 17343 0	C: 15334 1	I: 77650 1	C: 56257 1	I: 52175 0
27,2410	C: 15334 1	C: 56403 0	C: 15555 0	C: 35172 0	C: 14113 1	C: 36326 0	C: 07701 0	C: 35703 0
27,2420	C: 04343 1	C: 21616 0	C: 03070 0	C: 34344 0	C: 00000 1	C: 00001 0	C: 00001 1	35025 0
27,2430	04636 0	C: 20743 0	15524 0	12435 0	12427 0	05547 1	C: 00124 0	04636 0
27,2440	C: 56074 1	15524 0	C: 20000 0	C: 00000 1	I: 53575 0	I: 72441 0	C: 01742 1	I: 51136 1
27,2450	C: 56454 1	I: 43215 0	C: 16443 0	C: 16443 0	C: 03626 0	I: 77616 0	C: 00052 0	C: 36307 0
27,2460	C: 00052 0	C: 36307 0	I: 45020 1	C: 02310 1	C: 27516 0	I: 43145 0	C: 01082 1	C: 01472 1
27,2470	C: 00041 1	I: 43014 0	C: 01673 1	C: 01676 1	I: 43014 0	C: 01474 1	C: 01635 0	C: 02310 1
27,2500	I: 43014 0	C: 00350 1	C: 31263 1	C: 01742 1	C: 31263 1	I: 50135 0	C: 03375 0	C: 56525 0
27,2510	I: 43014 0	C: 00710 1	C: 01006 0	C: 00752 1	C: 31263 1	I: 77776 1	05402 1	C: 00132 1
27,2520	37650 0	05176 1	12526 0	I: 77620 0	C: 01006 0	I: 77776 1	35020 0	04636 0
27,2530	C: 01731 0	06006 1	I: 77650 1	C: 56500 1	C: 00045 0	C: 01217 1	00006 1	04007 1
27,2540	54016 1	00006 1	22012 1	40076 1	74757 1	00006 1	15323 1	34762 0
27,2550	70075 1	00006 1	12574 1	40100 1	74755 0	00006 1	12574 1	30046 0
27,2560	55703 0	34767 0	00006 1	02033 0	00006 1	12576 0	55113 1	37650 0
27,2570	05135 0	C: 03420 1	C: 70067 1	05323 0	34772 1	02566 0	37650 0	05135 0
27,2600	C: 02742 1	C: 70067 1	05323 0	I: 77774 0	C: 00000 1	I: 43414 1	C: 04303 0	C: 56610 0
27,2610	I: 43514 0	C: 77775 1	I: 66370 0	C: 00044 1	C: 00051 0	C: 00006 1	I: 77775 1	C: 15336 0
27,2620	C: 06445 1	C: 06533 1	I: 67300 0	C: 56620 0	C: 00001 0	C: 02401 0	C: 02411 1	C: 02421 1
27,2630	I: 77735 0	C: 00002 0	C: 02511 0	C: 02521 0	C: 02531 1	I: 77616 0	C: 05057 0	C: 23015 1
27,2640	C: 07702 0	C: 00034 0	C: 20206 1	C: 06315 0	C: 01616 1	C: 37651 1	C: 16721 1	C: 31463 1
27,2650	C: 06315 0	C: 20000 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
27,2660	C: 00000 1	C: 17676 0	C: 20113 0	C: 75766 1	C: 45544 0	C: 00000 1	C: 00000 1	C: 02011 0
27,2670	C: 32233 1	C: 17676 0	C: 20113 0	C: 00001 0	I: 77220 1	C: 02360 0	C: 02453 1	I: 53406 0
27,2700	C: 27546 0	C: 02625 1	I: 50256 0	C: 03546 0	I: 72406 0	C: 16734 0	I: 65316 0	C: 15326 1
27,2710	I: 45302 1	I: 72566 1	I: 57515 1	I: 77635 1	C: 02625 1	I: 65241 0	C: 02611 0	I: 45565 0
27,2720	C: 51045 1	C: 02625 1	I: 45115 0	C: 02617 0	C: 45320 1	C: 26746 0	I: 77614 1	C: 03666 1
27,2730	C: 36657 0	C: 25002 1	I: 53754 1	C: 03746 1	C: 57576 1	C: 00023 0	I: 76441 1	C: 03546 0
27,2740	I: 51515 1	I: 63257 1	C: 57576 1	C: 02453 1	I: 65246 1	I: 77625 0	C: 00003 1	C: 16633 0
27,2750	C: 02744 1	I: 65301 0	C: 00047 1	C: 00041 1	I: 77624 1	C: 45330 0	I: 56362 0	I: 41457 1
27,2760	C: 20174 1	I: 65225 1	C: 02633 0	I: 56302 0	C: 00005 1	I: 75406 1	I: 41275 1	C: 00007 0
27,2770	C: 00001 0	I: 65272 0	C: 00003 1	I: 65301 0	C: 00047 1	C: 03750 0	I: 56342 1	I: 65257 1

OCTAL LISTING FOR PARAGRAPH # 156, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3000	C: 20174 1	C: 00005 1	I: 65301 0	C: 00050 1	C: 03750 0	I: 56342 1	I: 44257 1	C: 57604 1
27,3010	I: 63525 0	C: 00011 1	I: 75421 1	I: 47315 0	C: 02611 0	C: 03546 0	I: 74256 0	C: 00013 0
27,3020	I: 74315 0	C: 03546 0	C: 00011 1	I: 76455 1	I: 77626 0	C: 74231 1	I: 77651 0	C: 02533 0
27,3030	C: 37667 1	C: 02360 0	I: 45020 1	C: 03657 0	C: 47530 1	I: 77775 1	I: 45121 1	C: 01734 0
27,3040	C: 47633 1	I: 74321 1	C: 05014 1	C: 17047 1	I: 52072 0	C: 03657 0	C: 24000 1	C: 00000 1
27,3050	C: 00024 1	C: 13714 1	I: 70545 1	C: 00043 0	I: 41215 1	C: 15334 1	C: 00041 1	I: 55205 0
27,3060	C: 00021 1	C: 00045 0	I: 44246 1	C: 15334 1	C: 00017 1	I: 57516 1	I: 75415 0	C: 15326 1
27,3070	I: 43565 0	C: 00045 0	06006 1	I: 53135 0	C: 01502 1	C: 57141 1	I: 77775 1	C: 01503 0
27,3100	C: 25535 0	C: 01511 0	I: 77624 1	C: 23435 1	I: 51535 0	C: 01502 1	I: 53025 0	C: 17150 0
27,3110	C: 57115 0	I: 43174 1	C: 00000 1	C: 00223 1	C: 57120 0	I: 43174 1	C: 00002 0	C: 00063 1
27,3120	I: 50135 0	C: 01502 1	C: 57130 1	I: 77624 1	C: 26761 0	I: 52014 0	C: 01671 0	C: 57132 0
27,3130	I: 77624 1	C: 27034 0	I: 77414 0	C: 02676 1	34772 1	00006 1	01077 0	55501 0
27,3140	06006 1	I: 77624 1	C: 27525 0	I: 77776 1	05402 1	C: 04026 1	03706 0	C: 00002 0
27,3150	C: 00000 1	C: 00037 0	I: 53575 0	C: 02320 1	I: 77725 1	C: 00045 0	C: 00015 0	I: 77701 1
27,3160	C: 00047 1	C: 24041 1	C: 02326 1	I: 77761 1	C: 00037 0	C: 02362 1	I: 47361 0	C: 00041 1
27,3170	I: 47572 1	C: 14035 1	C: 15326 1	I: 63271 0	C: 00041 1	C: 02362 1	I: 57436 1	C: 00025 0
27,3200	I: 43257 0	C: 20573 1	I: 77626 0	C: 77744 0	I: 41457 1	C: 20173 0	I: 75446 0	I: 77701 1
27,3210	C: 00050 1	C: 00031 0	I: 75316 1	I: 55254 1	C: 57216 0	C: 15326 1	C: 00027 1	I: 77616 0
27,3220	I: 41345 0	C: 00033 1	C: 00035 1	I: 57457 0	C: 20571 0	I: 51415 0	C: 31771 1	I: 43366 0
27,3230	C: 15326 1	I: 55206 0	C: 00035 1	I: 53657 0	C: 20601 1	C: 20572 0	C: 14017 1	I: 41005 1
27,3240	C: 00027 1	C: 57544 0	I: 53654 0	C: 57252 0	C: 57603 0	I: 40057 1	C: 57576 1	C: 57252 0
27,3250	I: 77644 1	C: 57254 0	I: 77745 1	C: 15344 0	C: 00021 1	I: 77616 0	I: 77614 1	C: 03436 0
27,3260	C: 57263 1	I: 77614 1	C: 03676 0	C: 00023 0	I: 77657 0	C: 20201 0	C: 00021 1	I: 44205 0
27,3270	C: 00033 1	C: 15326 1	I: 41206 0	C: 00021 1	I: 53725 1	C: 00035 1	C: 20573 1	I: 43276 0
27,3300	I: 77657 0	C: 20601 1	I: 71214 0	C: 03756 0	C: 57306 0	C: 15336 0	I: 75440 0	C: 57441 1
27,3310	I: 41076 0	C: 57544 0	C: 24045 0	C: 02362 1	I: 52441 1	C: 02320 1	C: 00017 1	I: 44240 1
27,3320	C: 57341 0	C: 00045 0	C: 14043 0	C: 00033 1	I: 44205 0	C: 00041 1	I: 51406 1	I: 40015 1
27,3330	C: 31763 1	C: 57352 1	I: 65345 0	C: 15336 0	I: 57545 1	C: 00033 1	I: 71240 1	C: 57446 0
27,3340	I: 77616 0	I: 77745 1	I: 45345 1	C: 00023 0	C: 00015 0	C: 14043 0	C: 00045 0	I: 52015 1
27,3350	C: 00017 1	C: 57326 1	I: 65215 1	C: 31765 1	C: 00043 0	I: 53605 1	C: 00031 0	C: 57201 0
27,3360	I: 77671 1	I: 40145 0	C: 00043 0	C: 57444 1	I: 45471 1	C: 77732 1	I: 63406 0	I: 41206 0
27,3370	C: 00035 1	I: 75261 0	C: 20206 1	C: 00045 0	C: 14045 0	I: 41206 0	C: 00033 1	I: 77657 0

OCTAL LISTING FOR PARAGRAPH # 157, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3400	C: 20201 0	C: 00043 0	I: 41234 1	C: 57526 1	I: 44302 0	C: 00023 0	I: 41215 1	C: 00015 0
27,3410	I: 51042 0	C: 57432 0	I: 75206 1	C: 00017 1	I: 71244 0	C: 57436 1	C: 00027 1	I: 51076 1
27,3420	C: 57436 1	I: 77676 0	I: 56205 0	C: 31761 0	C: 00031 0	I: 53657 0	C: 57602 1	C: 57602 1
27,3430	I: 43257 0	C: 57576 1	I: 40005 0	C: 00037 0	C: 57442 1	I: 77616 0	I: 77745 1	I: 77651 1
27,3440	C: 57432 0	I: 77745 1	I: 43545 1	C: 15344 0	I: 77712 0	I: 41465 0	I: 45345 1	C: 00045 0
27,3450	C: 00017 1	C: 14013 0	I: 77626 0	C: 77732 1	I: 53605 1	C: 00027 1	C: 57576 1	I: 41206 0
27,3460	C: 00045 0	I: 41057 0	C: 57576 1	C: 45761 0	C: 00043 0	I: 41234 1	C: 57526 1	C: 00043 0
27,3470	I: 45242 1	C: 31767 0	I: 41405 0	I: 41345 0	C: 00045 0	C: 00015 0	I: 43312 0	C: 00017 1
27,3500	C: 14045 0	C: 00035 1	I: 53605 1	C: 00027 1	C: 57575 1	I: 53765 0	C: 00045 0	C: 57576 1
27,3510	C: 14045 0	C: 00027 1	I: 41366 1	C: 31761 0	I: 77615 0	I: 45257 0	C: 57577 0	C: 00013 0
27,3520	I: 53605 1	C: 00027 1	C: 57601 1	I: 52057 1	C: 57602 1	C: 57432 0	07171 1	C: 00004 0
27,3530	C: 12525 0	C: 12525 0	C: 71463 0	C: 57703 1	C: 04423 0	C: 17645 0	C: 74604 0	C: 43667 1
27,3540	C: 01626 1	C: 37256 1	C: 77404 1	C: 52071 0	06030 1	06006 1	I: 77624 1	C: 27516 0
27,3550	I: 77776 1	05402 1	C: 04026 1	05547 1	C: 00230 0	00004 0	50302 0	13560 0
27,3560	13722 1	13626 1	13660 0	00006 1	22330 1	34772 1	22007 0	52025 1
27,3570	52327 0	34773 0	54001 1	40000 0	53170 1	00004 0	34772 1	22007 0
27,3600	54156 1	52315 1	52155 1	00006 1	30327 1	20155 1	00006 1	13616 1
27,3610	34772 1	52327 0	20025 1	05402 1	C: 04026 1	00330 1	07226 0	52155 1
27,3620	20025 1	05402 1	C: 04026 1	00004 0	50330 1	00001 0	30305 1	54003 0
27,3630	74350 1	54330 0	67700 1	60300 1	00006 1	13643 1	74760 0	10000 0
27,3640	13656 0	37700 1	60300 1	54154 0	50000 1	30306 1	54001 1	30154 1
27,3650	60330 1	50000 1	23400 1	10154 0	13643 1	13705 1	04362 1	13705 1
27,3660	34770 0	70300 0	10000 0	13665 0	13656 0	44767 1	60300 1	54154 0
27,3670	50000 1	30305 1	22000 1	10154 0	54154 0	50000 1	30305 1	54003 0
27,3700	74350 1	50000 1	23400 1	10154 0	13667 1	03072 1	30301 0	05347 1
27,3710	44770 1	61214 1	10000 0	10000 0	34767 0	54332 1	04415 0	04636 0
27,3720	C: 12556 1	05524 1	00006 1	40305 0	52315 1	03563 1	03656 1	00006 1
27,3730	40305 0	52317 0	00006 1	40305 0	52321 0	05402 1	C: 04026 1	34772 1
27,3740	22007 0	52317 0	21571 1	34772 1	22007 0	52321 0	21643 0	34772 1
27,3750	22007 0	52305 0	21710 1	27706 0	05402 1	C: 04026 1	03705 0	00006 1
27,3760	30305 1	52315 1	03563 1	04362 1	03706 0	C: 03765 0	C: 03766 0	CKSM 53634 0
27,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 160, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2000	06006 1	I: 47014 1	C: 00076 0	C: 76000 0	32152 0	05540 0	12012 1	34773 0	
30,2010	05516 0	05205 0	52751 0	53544 1	06006 1	I: 65375 0	C: 15330 0	C: 0354 0	
30,2020	C: 03542 1	I: 43125 0	C: 15336 0	C: 00076 0	C: 03546 0	I: 43014 0	C: 01663 0	C: 4343 1	
30,2030	C: 60034 0	I: 71214 0	C: 01463 1	C: 20150 1	I: 77624 1	C: 55345 0	I: 41406 0	I: 53435 0	
30,2040	C: 03605 1	C: 27552 0	I: 53435 0	C: 03552 0	C: 27560 1	C: 03605 1	I: 53435 0	C: 03613 0	
30,2050	I: 41406 0	I: 53435 0	C: 03605 1	C: 27566 1	I: 63241 0	C: 00001 0	I: 45565 0	C: 50203 0	
30,2060	C: 03605 1	I: 70414 1	C: 04343 1	C: 60064 0	C: 16152 0	C: 03542 1	I: 45014 0	C: 00662 0	
30,2070	C: 26453 1	I: 45345 1	C: 03544 1	C: 00751 1	I: 51406 1	I: 50025 0	C: 20142 1	C: 60122 0	
30,2100	I: 77600 1	C: 60102 1	I: 40015 1	C: 20144 1	C: 60122 0	I: 71214 0	C: 00256 0	C: 40272 1	
30,2110	I: 43244 1	C: 60113 1	C: 15344 0	I: 45214 1	C: 04343 1	C: 40212 1	C: 15344 0	I: 52125 0	
30,2120	C: 20150 1	C: 40214 1	I: 77776 1	53542 1	53251 1	32151 0	04636 0	C: 20743 0	
30,2130	04103 1	02133 1	02004 1	32152 0	04636 0	C: 20743 0	04103 1	041 3 1	
30,2140	02000 0	C: 00000 1	C: 16441 1	C: 00000 1	C: 35101 1	C: 21042 1	C: 04211 1	C: 17747 0	
30,2150	C: 02563 0	C: 01442 1	C: 01453 1	04636 0	C: 03731 1	06006 1	I: 43014 0	C: 04346 1	
30,2160	C: 60162 1	C: 00472 0	I: 47014 1	C: 00270 1	C: 51751 0	C: 34041 0	C: 27170 1	I: 47375 0	
30,2170	C: 00007 0	C: 00001 0	I: 50256 0	C: 01742 1	I: 77646 0	I: 65552 0	C: 03626 0	I: 77776 1	
30,2200	32257 0	05540 0	02206 1	36214 0	05516 0	05205 0	45051 1	71751 1	
30,2210	55751 1	05362 0	C: 00004 0	C: 05022 1	C: 13000 0	05547 1	C: 00025 0	05547 1	
30,2220	C: 00026 0	06006 1	I: 43014 0	C: 01663 0	C: 01664 1	I: 43014 0	C: 00462 1	C: 4343 1	
30,2230	C: 60240 1	I: 77614 1	C: 01463 1	I: 45145 0	C: 23513 1	C: 60332 0	I: 77650 1	C: 60242 0	
30,2240	I: 77624 1	C: 60304 0	I: 77624 1	C: 31005 0	I: 45135 1	C: 23514 0	C: 60332 0	I: 66214 0	
30,2250	C: 01464 0	C: 03746 1	C: 00001 0	I: 77531 0	C: 03751 1	C: 03537 0	02466 1	C: 01455 1	
30,2260	I: 77634 0	C: 51751 0	C: 24007 0	C: 02026 1	C: 14001 0	C: 15334 1	I: 77624 1	C: 55345 0	
30,2270	I: 77742 0	C: 02152 0	I: 77634 0	C: 51751 0	I: 77624 1	C: 26453 1	I: 77650 1	C: 03667 0	
30,2300	I: 77624 1	C: 60304 0	I: 77650 1	C: 03667 0	I: 77420 1	C: 03670 0	35036 1	05535 1	
30,2310	06006 1	I: 51545 1	C: 00747 0	I: 50021 1	C: 15326 1	C: 60323 0	I: 51545 1	C: 02351 1	
30,2320	I: 51021 0	C: 15326 1	C: 60326 0	I: 77776 1	04362 1	02306 0	I: 77624 1	C: 62371 0	
30,2330	I: 77650 1	C: 03670 0	C: 03746 1	I: 77420 1	C: 03667 0	31745 0	05540 0	02343 1	
30,2340	34773 0	05516 0	05205 0	31751 0	75051 1	00006 1	74763 0	55744 0	
30,2350	44773 1	61744 1	00006 1	62355 0	02367 1	05561 0	C: 00141 0	31751 0	
30,2360	77673 0	00006 1	62367 1	55743 1	44753 0	61743 0	10000 0	04362 1	
30,2370	02335 0	02373 1	02417 1	05547 1	C: 00141 0	47677 1	71751 1	55743 1	

OCTAL LISTING FOR PARAGRAPH # 161, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2400	44770 1	61743 0	00006 1	62417 1	31746 0	00006 1	12367 0	34764 0
30,2410	65004 0	71743 1	40000 0	65004 0	00006 1	12427 0	02367 1	00006 1
30,2420	I: 67214 1	C: 03347 1	C: 03667 0	C: 03744 0	I: 52030 0	C: 60300 1	C: 60260 0	06006 1
30,2430	I: 45014 0	C: 04065 0	C: 31007 1	I: 77650 1	C: 60244 0	I: 45020 1	C: 01006 0	C: 56462 1
30,2440	I: 43014 0	C: 00747 0	C: 60444 0	C: 01674 0	I: 77624 1	C: 27236 0	I: 77624 1	C: 22327 1
30,2450	I: 77624 1	C: 56462 1	I: 43014 0	C: 02756 1	C: 60456 0	C: 01476 0	I: 43014 0	C: 00707 1
30,2460	C: 60462 1	C: 01674 0	I: 77624 1	C: 27236 0	I: 77650 1	C: 01006 0	05362 0	C: 00004 0
30,2470	C: 05022 1	C: 13000 0	06006 1	I: 45001 1	C: 00001 0	C: 56603 1	I: 45134 0	C: 03673 0
30,2500	C: 56462 1	I: 43014 0	C: 01751 0	C: 60506 1	C: 01436 1	C: 60513 0	I: 71214 0	C: 02676 1
30,2510	C: 02005 0	C: 34001 1	C: 56612 1	I: 77370 0	C: 00022 1	C: 15336 0	I: 77731 1	C: 00051 0
30,2520	C: 00006 1	C: 06467 1	C: 06555 1	C: 06577 1	C: 06621 1	C: 06643 0	I: 43100 1	C: 60521 1
30,2530	C: 02666 0	I: 77624 1	C: 62357 1	C: 34041 0	C: 27236 0	I: 45154 0	C: 03673 0	C: 71327 1
30,2540	I: 45140 0	C: 03750 0	C: 47017 1	C: 01072 0	I: 41535 1	C: 03746 1	I: 45335 0	C: 03745 1
30,2550	I: 43030 0	C: 61042 0	C: 02706 1	C: 61050 0	I: 77624 1	C: 22327 1	I: 77614 1	C: 01471 1
30,2560	I: 43014 0	C: 02466 1	C: 01062 1	I: 77614 1	C: 03307 0	C: 61204 0	I: 53575 0	C: 01046 1
30,2570	C: 36152 1	C: 26654 1	I: 77624 1	C: 61331 1	I: 70414 1	C: 04343 1	C: 60577 1	C: 02555 0
30,2600	I: 72441 0	C: 01072 0	C: 24037 0	C: 15336 0	I: 41401 1	C: 00001 0	I: 65206 0	C: 15334 1
30,2610	I: 77702 1	C: 00005 1	C: 00011 1	C: 24015 0	C: 01072 0	C: 24023 0	C: 02555 0	I: 77624 1
30,2620	C: 62340 1	I: 66370 0	C: 00022 1	C: 00051 0	C: 00006 1	I: 70573 1	C: 03524 1	I: 77741 0
30,2630	C: 00037 0	I: 45445 0	C: 70253 1	I: 76100 1	C: 60625 0	C: 00044 1	I: 64373 1	C: 02445 0
30,2640	C: 03502 0	I: 77732 1	C: 06621 1	I: 71300 1	C: 60636 1	C: 00041 1	I: 60414 0	C: 04343 1
30,2650	C: 60651 0	I: 57101 0	C: 00050 1	C: 00047 1	I: 41316 0	C: 24024 1	I: 76142 1	C: 00022 1
30,2660	C: 00041 1	I: 64373 1	C: 03524 1	C: 03502 0	I: 53761 1	C: 00041 1	C: 57212 1	C: 05136 0
30,2670	I: 77300 1	C: 60661 0	C: 01072 0	C: 34023 1	C: 62340 1	I: 50545 0	C: 02240 0	I: 63471 0
30,2700	C: 00037 0	I: 76005 0	C: 02010 1	C: 00022 1	C: 00041 1	I: 74373 0	C: 03524 1	C: 00041 1
30,2710	I: 77653 1	C: 01136 1	C: 05136 0	I: 40100 1	C: 60705 0	C: 60716 1	I: 50145 1	C: 01134 0
30,2720	C: 60741 0	I: 53166 0	C: 60741 0	I: 77742 0	C: 16625 1	C: 01132 0	I: 40071 0	C: 02625 1
30,2730	C: 60733 0	I: 77702 1	C: 02623 1	I: 56345 0	C: 01130 1	C: 02625 1	I: 40102 0	C: 60741 0
30,2740	C: 02621 0	I: 63545 0	C: 02623 1	I: 44312 1	C: 01124 1	I: 75440 0	C: 60763 0	I: 70454 0
30,2750	C: 60763 0	C: 16631 1	C: 02621 0	I: 62405 1	C: 02623 1	I: 56221 0	C: 01122 1	C: 02631 1
30,2760	I: 60400 0	C: 60763 0	C: 02627 0	I: 63545 0	C: 02627 0	I: 63525 0	C: 02621 0	I: 62415 0
30,2770	I: 50021 1	C: 01114 1	C: 60775 1	I: 70566 0	C: 02635 0	I: 77624 1	C: 62357 1	C: 03672 1

OCTAL LISTING FOR PARAGRAPH # 162, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3000	I: 77776 1	05402 1	C: 04022 0	41745 1	61747 1	00006 1	63222 0	31745 0
30,3010	64770 0	55135 0	31750 1	64774 1	55136 0	05402 1	C: 04022 0	31135 1
30,3020	55745 1	31136 1	55750 0	06006 1	I: 77624 1	C: 56462 1	I: 43014 0	C: 02746 0
30,3030	C: 61035 0	C: 01476 0	I: 77614 1	C: 01435 1	C: 60531 0	I: 43014 0	C: 01751 0	C: 60531 0
30,3040	C: 01436 1	C: 60531 0	I: 77624 1	C: 62357 1	C: 27670 0	C: 01072 0	C: 35054 0	C: 61000 0
30,3050	I: 77775 1	C: 01701 0	C: 14001 0	C: 03672 1	C: 00007 0	I: 45135 1	C: 03674 1	C: 55370 0
30,3060	I: 45006 0	C: 62357 1	C: 00007 0	I: 45135 1	C: 03674 1	C: 55345 0	C: 01701 0	I: 40014 0
30,3070	C: 02464 0	C: 61072 0	I: 77651 0	C: 01046 1	C: 03531 0	I: 47256 0	C: 01072 0	I: 40056 0
30,3100	C: 60775 1	C: 01102 0	I: 43345 1	C: 24024 1	C: 24026 0	C: 27526 0	C: 03531 0	I: 60246 1
30,3110	C: 00047 1	I: 41316 0	C: 03526 0	I: 56070 0	C: 00046 0	C: 03673 0	I: 53670 0	C: 03673 0
30,3120	C: 20601 1	I: 77751 1	C: 00155 0	C: 37526 1	C: 46756 1	I: 57575 1	C: 03502 0	C: 37516 1
30,3130	C: 75260 1	I: 77624 1	C: 22327 1	I: 45014 0	C: 01242 1	C: 61164 0	C: 22327 1	I: 51575 1
30,3140	C: 01114 1	I: 53750 0	C: 03673 0	C: 20601 1	C: 27502 0	C: 01122 1	I: 53646 0	C: 20601 1
30,3150	C: 03504 0	I: 77776 1	35030 1	04636 0	C: 21101 1	04103 1	03163 0	03321 1
30,3160	34766 1	05516 0	05205 0	06006 1	I: 77624 1	C: 75472 1	I: 45154 0	C: 03673 0
30,3170	C: 71327 1	I: 45014 0	C: 02744 1	C: 60775 1	C: 22327 1	I: 77214 0	C: 02664 1	C: 01701 0
30,3200	I: 77651 0	C: 01046 1	C: 37531 1	C: 61102 0	I: 77735 0	C: 02007 1	C: 02621 0	C: 02631 1
30,3210	C: 36641 1	C: 62357 1	I: 77624 1	C: 26524 0	I: 43175 0	C: 02152 0	C: 04343 1	C: 61066 0
30,3220	I: 52152 0	C: 61066 0	06006 1	I: 46135 1	C: 03745 1	C: 61256 1	I: 67206 1	C: 03750 0
30,3230	I: 77625 0	I: 45040 1	C: 61256 1	C: 22327 1	I: 77745 1	C: 03670 0	C: 34041 0	C: 27145 1
30,3240	I: 77775 1	C: 00017 1	C: 25046 1	C: 01054 1	C: 25072 0	C: 01701 0	I: 43046 1	C: 04343 1
30,3250	C: 61252 0	I: 77702 1	C: 36240 1	C: 61331 1	I: 77650 1	C: 61261 0	I: 77624 1	C: 62357 1
30,3260	C: 03670 0	I: 43175 0	C: 01701 0	C: 04343 1	C: 61266 1	I: 77742 0	C: 16152 0	C: 03670 0
30,3270	I: 77624 1	C: 26453 1	I: 77624 1	C: 62363 0	I: 77776 1	35036 1	04636 0	C: 20743 0
30,3300	03324 1	03315 0	06006 1	I: 77745 1	C: 03670 0	C: 24007 0	C: 01701 0	C: 00001 0
30,3310	I: 45135 1	C: 15334 1	C: 55370 0	C: 02026 1	I: 77776 1	06006 1	I: 77624 1	C: 61363 0
30,3320	I: 77776 1	05402 1	C: 04022 0	02206 1	06006 1	I: 77624 1	C: 61363 0	I: 77776 1
30,3330	04103 1	I: 77201 1	C: 00001 0	C: 01046 1	I: 50256 0	C: 01072 0	I: 57552 1	I: 63406 0
30,3340	I: 65221 0	C: 15326 1	C: 02240 0	I: 62414 1	C: 04343 1	C: 61346 1	I: 56362 0	C: 00045 0
30,3350	I: 45316 1	I: 44366 1	I: 77605 1	C: 00045 0	C: 00041 1	I: 77761 1	C: 01072 0	I: 53352 0
30,3360	C: 01046 1	C: 01701 0	I: 77616 0	I: 40220 0	C: 01053 0	C: 00001 0	I: 41575 0	C: 15336 0
30,3370	I: 41406 0	I: 77731 1	C: 00017 1	C: 00072 1	I: 66150 0	C: 00016 0	C: 00012 1	I: 77624 1

OCTAL LISTING FOR PARAGRAPH # 163, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3400	C: 61613 1	I: 77750 0	C: 00010 0	C: 06641 1	I: 66110 1	C: 00002 0	C: 00010 0	I: 46135 1
30,3410	C: 00013 0	C: 61426 0	I: 77625 0	C: 24022 1	C: 00013 0	I: 46025 1	C: 24020 0	C: 61422 1
30,3420	I: 77650 1	C: 61377 0	I: 52131 0	C: 00013 0	C: 00004 0	C: 61377 0	I: 46135 1	C: 00017 1
30,3430	C: 61445 0	I: 77625 0	C: 24022 1	C: 00017 1	I: 46025 1	C: 24020 0	C: 61441 1	I: 77650 1
30,3440	C: 61374 0	I: 52131 0	C: 00017 1	C: 00004 0	C: 61374 0	I: 77624 1	C: 22327 1	I: 77331 0
30,3450	C: 00017 1	C: 00072 1	C: 15336 0	C: 00011 1	I: 66370 0	C: 00154 1	C: 00051 0	C: 00006 1
30,3460	C: 06555 1	I: 77700 0	C: 61460 1	I: 66150 0	C: 00016 0	C: 00012 1	I: 77624 1	C: 61613 1
30,3470	I: 43750 1	C: 00010 0	C: 02641 0	I: 66110 1	C: 00002 0	C: 00010 0	I: 54140 0	C: 00012 1
30,3500	C: 00014 1	I: 71244 0	C: 61504 1	C: 15336 0	I: 77766 0	C: 06401 1	C: 14001 0	C: 00017 1
30,3510	I: 77630 1	C: 61577 0	I: 46135 1	C: 00013 0	C: 61555 0	I: 77625 0	C: 24022 1	C: 00013 0
30,3520	I: 46025 1	C: 24020 0	C: 61525 1	I: 77650 1	C: 61530 0	I: 77731 1	C: 00013 0	C: 00004 0
30,3530	I: 77624 1	C: 61613 1	I: 43750 1	C: 00010 0	C: 02641 0	I: 62071 0	C: 00001 0	C: 00002 0
30,3540	I: 70130 1	C: 00010 0	C: 00012 1	I: 40060 0	C: 00014 1	C: 61550 0	I: 77650 1	C: 61552 1
30,3550	I: 77745 1	C: 15336 0	C: 06401 1	I: 77650 1	C: 61512 0	I: 62150 1	C: 00014 1	C: 00006 1
30,3560	I: 67330 0	C: 00014 1	C: 00017 1	I: 77625 0	C: 24022 1	C: 00017 1	I: 46025 1	C: 24020 0
30,3570	C: 61573 1	I: 77650 1	C: 61463 1	I: 52131 0	C: 00017 1	C: 00004 0	C: 61463 1	I: 77624 1
30,3600	C: 22327 1	I: 66370 0	C: 00066 1	C: 00051 0	C: 00006 1	I: 77775 1	C: 15336 0	C: 06643 0
30,3610	I: 52100 1	C: 61607 1	C: 01053 0	I: 40131 0	C: 00007 0	C: 00377 1	C: 61617 0	I: 71140 1
30,3620	C: 00012 1	C: 00016 0	I: 41545 0	C: 15336 0	I: 56743 1	C: 02401 0	C: 75376 1	I: 41415 1
30,3630	I: 62000 0	C: 61645 1	C: 77771 0	I: 67314 0	C: 77771 0	C: 00007 0	I: 70430 1	C: 61643 1
30,3640	C: 00007 0	I: 77650 1	C: 61624 0	I: 77745 1	I: 77616 0	I: 77614 1	C: 01631 1	C: 61643 1
30,3650	I: 45020 1	C: 03730 0	C: 27145 1	I: 66134 1	C: 03746 1	C: 03745 1	I: 40375 1	C: 00001 0
30,3660	C: 00001 0	C: 03632 0	C: 27570 0	C: 00007 0	C: 03640 0	C: 03576 0	I: 65335 1	C: 15336 0
30,3670	C: 11536 1	I: 71214 0	C: 03705 0	C: 61675 1	C: 11540 0	I: 45006 0	C: 22000 1	I: 52001 1
30,3700	C: 00001 0	C: 03730 0	I: 46145 0	C: 00045 0	C: 61707 0	I: 43575 1	C: 00007 0	I: 53575 0
30,3710	C: 03632 0	I: 53515 0	C: 03640 0	I: 53322 1	I: 53435 0	C: 03713 1	I: 77676 0	C: 00007 0
30,3720	I: 77616 0	I: 67214 1	C: 01310 1	C: 61736 1	C: 03326 0	I: 74301 0	C: 00047 1	C: 03705 0
30,3730	I: 53257 1	C: 20563 0	C: 03646 0	I: 77651 0	C: 03327 1	C: 03721 0	I: 77776 1	34754 0
30,3740	05135 0	C: 02400 1	C: 34066 0	05362 0	C: 00051 0	C: 10035 0	06006 1	I: 77775 1
30,3750	C: 01030 0	C: 27570 0	C: 01036 0	C: 17576 0	C: 01044 0	C: 03474 0	I: 77621 1	C: 03656 1
30,3760	C: 27423 1	C: 15336 0	C: 17327 1	C: 15336 0	C: 03325 0	I: 77650 1	C: 34360 0	C: 03767 1
30,3770	C: 03770 1	CKSM 46001 1	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 164, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2000	35045 0	05135 0	C: 02031 1	C: 62064 1	04636 0	C: 01730 1	31247 1	74755 0
31,2010	00006 1	12004 0	30105 0	74765 0	00006 1	12020 0	32135 1	02021 0
31,2020	32136 1	04636 0	C: 20576 1	05626 0	05626 0	12012 1	06006 1	I: 77650 1
31,2030	C: 62177 1	06006 1	I: 77650 1	C: 62146 0	I: 52375 1	C: 00001 0	C: 02320 1	I: 51406 1
31,2040	C: 02312 0	I: 77301 0	C: 00047 1	I: 77762 1	I: 53457 1	C: 20201 0	I: 52315 1	C: 00007 0
31,2050	C: 02326 1	I: 77641 1	I: 77752 1	C: 36314 1	C: 47530 1	I: 77624 1	C: 62317 0	I: 53575 0
31,2060	C: 02320 1	I: 77715 1	C: 15334 1	I: 77214 0	C: 04713 0	C: 62067 1	C: 00015 0	I: 77624 1
31,2070	C: 47647 1	I: 41505 1	C: 01734 0	I: 72431 1	C: 00001 0	I: 53445 1	C: 00007 0	I: 47315 0
31,2100	C: 02320 1	C: 02326 1	I: 47256 0	C: 02320 1	I: 63241 0	C: 00015 0	I: 50372 1	C: 00007 0
31,2110	I: 72565 1	C: 00015 0	I: 77726 1	C: 26316 1	C: 02320 1	I: 51041 0	C: 00007 0	C: 62124 1
31,2120	I: 44345 0	C: 02316 1	C: 15344 0	C: 02316 1	I: 77776 1	34764 0	71247 0	00006 1
31,2130	12137 1	41247 0	74755 0	27247 0	12026 0	C: 04066 0	C: 04065 0	05354 0
31,2140	C: 00117 0	15524 0	05527 1	05561 0	C: 00226 1	14103 0	I: 43034 1	C: 51751 0
31,2150	C: 03751 1	C: 62154 0	I: 77624 1	C: 62301 1	C: 02334 1	C: 34041 0	C: 27161 1	I: 77775 1
31,2160	C: 00017 1	C: 26224 1	C: 00025 0	C: 02240 0	I: 71214 0	C: 03711 0	C: 62034 1	C: 00015 0
31,2170	C: 34041 0	C: 27145 1	I: 77775 1	C: 00017 1	C: 26254 0	C: 00025 0	C: 02262 0	I: 47014 1
31,2200	C: 03711 0	C: 62264 0	C: 51751 0	C: 34041 0	C: 27516 0	I: 43175 0	C: 02254 0	C: 00263 0
31,2210	C: 25535 0	C: 02262 0	C: 15543 1	C: 02334 1	I: 43014 0	C: 04343 1	C: 62220 0	C: 00063 1
31,2220	I: 77614 1	C: 01673 1	I: 43014 0	C: 04307 1	C: 62226 0	C: 01473 0	C: 35517 1	C: 27211 0
31,2230	I: 77775 1	C: 00001 0	C: 26320 1	C: 00007 0	C: 16326 1	C: 00015 0	I: 45014 0	C: 04307 1
31,2240	C: 62275 0	C: 27516 0	I: 77614 1	C: 01473 0	C: 00041 1	I: 43175 0	C: 02224 1	C: 00263 0
31,2250	C: 25535 0	C: 02240 0	C: 15543 1	C: 02334 1	I: 43014 0	C: 04343 1	C: 62260 1	C: 00063 1
31,2260	C: 35517 1	C: 27211 0	I: 77650 1	C: 62034 1	I: 77624 1	C: 62301 1	I: 45014 0	C: 04307 1
31,2270	C: 62275 0	C: 27516 0	I: 52014 0	C: 01673 1	C: 62244 1	C: 34041 0	C: 27161 1	I: 77650 1
31,2300	C: 62034 1	I: 77620 0	C: 00000 1	I: 52175 0	C: 01030 0	C: 62306 0	C: 36320 0	C: 62310 1
31,2310	I: 52175 0	C: 01036 0	C: 62313 1	C: 16326 1	C: 01044 0	I: 77650 1	C: 00000 1	I: 77776 1
31,2320	30036 1	50120 1	54011 0	30035 1	50120 1	54013 1	30120 1	66211 0
31,2330	40000 0	50120 1	54046 1	06006 1	I: 77624 1	C: 46000 0	C: 34015 1	C: 62057 1
31,2340	C: 00031 0	I: 77131 1	C: 00052 0	C: 00002 0	C: 00006 1	I: 77770 1	C: 00022 1	I: 73775 0
31,2350	C: 00031 0	C: 77746 1	C: 07524 0	I: 61110 0	C: 77771 0	C: 62347 0	I: 77616 0	I: 70740 0
31,2360	C: 03750 0	C: 00001 0	I: 77616 0	I: 70545 1	C: 00751 1	C: 16351 1	C: 00753 0	C: 02353 0
31,2370	I: 77616 0	I: 72545 0	C: 02351 1	C: 14751 1	C: 02353 0	C: 00753 0	I: 77616 0	04636 0

OCTAL LISTING FOR PARAGRAPH # 165, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2400	C: 03731 1	06006 1	I: 71214 0	C: 05667 0	C: 15336 0	C: 03740 1	C: 03742 0	I: 77776 1
31,2410	32443 0	04636 0	C: 21101 1	05524 1	12421 0	02410 0	34766 1	05516 0
31,2420	05205 0	06006 1	I: 43234 0	C: 51751 0	C: 07144 1	C: 36307 0	C: 73171 1	I: 77776 1
31,2430	35031 0	04636 0	C: 20743 0	05524 1	02436 1	02421 1	05561 0	C: 00124 0
31,2440	04636 0	C: 56074 1	15524 0	C: 01516 1	05561 0	C: 00010 0	05362 0	C: 00004 0
31,2450	C: 00012 1	35052 0	55262 1	05561 0	C: 00131 1	06006 1	I: 45014 0	C: 01702 0
31,2460	C: 62466 1	C: 76167 0	I: 77624 1	C: 31571 0	I: 77650 1	C: 62567 1	I: 45014 0	C: 04665 0
31,2470	C: 76167 0	I: 45135 1	C: 23513 1	C: 63355 1	I: 77634 0	C: 51751 0	C: 35062 0	C: 63002 0
31,2500	C: 03642 1	I: 77776 1	33514 1	04636 0	C: 21067 0	04103 1	02510 1	02552 1
31,2510	06006 1	I: 53575 0	C: 03642 1	C: 36706 0	C: 62614 0	I: 53435 0	C: 02706 1	C: 02700 1
31,2520	I: 53435 0	C: 02706 1	C: 02672 0	I: 76131 0	C: 00051 0	C: 00006 1	C: 00022 1	I: 61373 1
31,2530	C: 06322 1	C: 02672 0	I: 77656 1	C: 06736 0	I: 76100 1	C: 62527 0	C: 00022 1	I: 77773 1
31,2540	C: 01756 1	C: 06714 0	I: 45100 1	C: 62537 1	C: 47344 1	I: 45014 0	C: 02471 1	C: 62765 1
31,2550	I: 77650 1	C: 62556 0	06006 1	I: 45175 0	C: 03642 1	C: 62756 1	I: 77624 1	C: 22327 1
31,2560	I: 43014 0	C: 00666 1	C: 04464 0	I: 77624 1	C: 31005 0	I: 77614 1	C: 04664 1	I: 77776 1
31,2570	00004 0	00006 1	31723 0	53062 0	31727 1	57754 0	00003 1	36211 0
31,2600	05607 0	C: 01722 1	C: 01674 0	06006 1	I: 45014 0	C: 04465 1	C: 22327 1	I: 45135 1
31,2610	C: 23514 0	C: 63355 1	I: 77624 1	C: 63002 0	I: 63256 0	C: 00043 0	C: 24037 0	C: 03634 0
31,2620	I: 54361 1	C: 23475 0	C: 20620 1	I: 77655 1	I: 77656 1	C: 27642 1	C: 03634 0	I: 52342 0
31,2630	C: 02141 1	I: 54361 1	C: 23475 0	C: 20616 1	I: 53455 0	C: 02617 0	I: 77614 1	C: 04745 0
31,2640	C: 62515 1	C: 03650 1	I: 72441 0	C: 03642 1	I: 74315 0	C: 03642 1	I: 51372 0	C: 03650 1
31,2650	I: 77656 1	C: 27502 0	C: 15336 0	C: 03510 0	C: 17516 0	C: 00001 0	I: 57526 1	I: 77525 0
31,2660	C: 15336 0	33505 1	54001 1	31754 0	00006 1	20001 1	54154 0	06006 1
31,2670	I: 67206 1	C: 01025 1	I: 77621 1	I: 43242 1	I: 41215 1	C: 23505 0	C: 00041 1	I: 52405 1
31,2700	C: 07016 1	I: 62414 1	C: 04343 1	C: 62704 0	C: 17524 1	C: 00037 0	I: 47005 1	C: 23511 0
31,2710	C: 45657 1	I: 43171 1	C: 23506 0	C: 02666 0	C: 37526 1	C: 75260 1	I: 77624 1	C: 22327 1
31,2720	I: 51575 1	C: 01122 1	I: 60414 0	C: 04343 1	C: 62725 0	C: 27504 0	C: 01114 1	I: 77646 0
31,2730	I: 60414 0	C: 04343 1	C: 62733 1	C: 03502 0	I: 77776 1	35030 1	04636 0	C: 21101 1
31,2740	04103 1	02750 1	04103 1	34766 1	05516 0	05402 1	C: 00012 1	05205 0
31,2750	06006 1	I: 45014 0	C: 00467 1	C: 75472 1	I: 77776 1	04103 1	I: 53521 1	C: 01734 0
31,2760	C: 27557 0	C: 23517 0	C: 03351 0	I: 77614 1	C: 02671 0	I: 77420 1	C: 02657 1	33524 1
31,2770	54373 1	05402 1	C: 00012 1	04611 0	04636 0	C: 56074 1	04606 0	06006 1

OCTAL LISTING FOR PARAGRAPH # 166, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3000	I: 77650 1	C: 02657 1	I: 77620 0	C: 01006 0	I: 71214 0	C: 01711 1	C: 63012 1	C: 03001 0
31,3010	C: 34001 1	C: 56612 1	I: 77624 1	C: 56462 1	I: 43014 0	C: 01451 0	C: 63020 0	C: 01476 0
31,3020	I: 77624 1	C: 27236 0	I: 77776 1	05402 1	C: 04022 0	06006 1	I: 77014 1	C: 04343 1
31,3030	C: 63040 0	C: 77775 1	I: 77614 1	C: 01743 0	C: 63044 1	I: 52014 0	C: 00265 0	C: 63046 0
31,3040	I: 43174 1	C: 00000 1	C: 01743 0	C: 63035 1	I: 77614 1	C: 00065 1	I: 44575 0	C: 01573 1
31,3050	I: 53257 1	C: 57176 0	C: 01607 1	I: 77657 0	C: 57176 0	C: 27626 0	C: 01601 1	I: 53702 1
31,3060	C: 57176 0	I: 53655 1	C: 01615 1	C: 57176 0	C: 03634 0	I: 77614 1	C: 00345 0	C: 63101 1
31,3070	I: 45145 0	C: 01062 1	C: 54141 1	I: 57414 1	C: 04303 0	C: 63076 0	I: 77655 1	C: 03626 0
31,3100	C: 03626 0	I: 67201 0	C: 00001 0	C: 03752 1	I: 43030 0	C: 63114 0	C: 00462 1	I: 45145 0
31,3110	C: 01062 1	C: 26524 0	I: 77650 1	C: 63337 0	I: 65345 0	C: 01712 1	C: 01714 1	I: 63325 0
31,3120	C: 15344 0	C: 02617 0	I: 53435 0	C: 03626 0	C: 27620 0	I: 53435 0	C: 03620 0	C: 27604 0
31,3130	C: 03620 0	I: 53435 0	C: 03604 0	C: 03612 1	I: 50214 0	C: 01703 1	C: 63324 1	C: 00001 0
31,3140	C: 26156 1	C: 03626 0	I: 41246 1	C: 03376 0	I: 43276 0	C: 01346 1	C: 34772 1	C: 26570 1
31,3150	I: 65215 1	C: 00772 0	C: 23477 1	I: 41415 1	C: 00772 0	I: 64375 1	C: 03626 0	C: 03604 0
31,3160	I: 63372 1	C: 02617 0	I: 76521 0	C: 03604 0	I: 77725 1	C: 00003 1	C: 14043 0	C: 00005 1
31,3170	I: 77624 1	C: 63344 1	I: 63457 1	C: 20611 0	C: 14037 0	C: 00001 0	C: 14043 0	C: 00007 0
31,3200	I: 77624 1	C: 63344 1	I: 63457 1	C: 20611 0	I: 41415 1	C: 00037 0	I: 75425 0	C: 23503 0
31,3210	I: 77725 1	C: 00021 1	C: 14043 0	C: 00005 1	I: 77624 1	C: 63344 1	I: 65257 1	C: 20622 0
31,3220	C: 00007 0	I: 77624 1	C: 63344 1	I: 65257 1	C: 20622 0	C: 00023 0	I: 77624 1	C: 63344 1
31,3230	I: 77657 0	C: 20611 0	C: 14035 1	C: 00001 0	C: 14043 0	C: 00003 1	I: 77624 1	C: 63344 1
31,3240	I: 41257 1	C: 20601 1	C: 00035 1	I: 72405 0	C: 00007 0	I: 77725 1	C: 00003 1	C: 14043 0
31,3250	C: 00001 0	I: 77624 1	C: 63344 1	I: 41257 1	C: 20601 1	C: 00035 1	I: 72405 0	C: 00005 1
31,3260	I: 43325 1	C: 00025 0	C: 00031 0	I: 45325 1	C: 00027 1	C: 00033 1	I: 40206 1	C: 00021 1
31,3270	I: 45345 1	C: 00025 0	C: 00031 0	I: 43325 1	C: 00027 1	C: 00033 1	I: 41525 0	C: 15336 0
31,3300	C: 24041 1	C: 00035 1	I: 53451 1	C: 00005 1	I: 63241 0	C: 00013 0	C: 00021 1	I: 53451 1
31,3310	C: 00005 1	I: 41441 0	C: 00013 0	I: 50021 1	C: 00027 1	C: 63330 1	I: 77614 1	C: 00304 0
31,3320	C: 63333 1	I: 52175 0	C: 00035 1	C: 63335 1	I: 41545 0	C: 23501 1	I: 52006 0	C: 63155 0
31,3330	I: 77614 1	C: 00304 0	C: 63321 1	I: 77775 1	C: 00021 1	I: 76505 0	C: 03604 0	I: 40251 0
31,3340	C: 03626 0	C: 00001 0	I: 77650 1	C: 01006 0	I: 70501 1	C: 00047 1	C: 14045 0	C: 00043 0
31,3350	I: 55301 0	C: 00051 0	C: 00045 0	I: 43460 1	C: 00050 1	C: 03744 0	I: 77420 1	C: 01006 0
31,3360	31743 0	05535 1	05547 1	C: 00060 1	31751 0	00006 1	13375 1	31752 0
31,3370	00006 1	13373 1	03445 1	31751 0	03400 0	31752 0	00006 1	13445 0

OCTAL LISTING FOR PARAGRAPH # 167, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3400	73526 1	65221 0	00006 1	13410 0	65221 0	00006 1	13412 1	03445 1
31,3410	05561 0	C: 00060 1	05547 1	C: 00004 0	31752 0	00006 1	13427 1	73527 0
31,3420	66171 0	00006 1	13433 1	66171 0	00006 1	13435 1	03445 1	06006 1
31,3430	I: 77624 1	C: 60304 0	I: 77776 1	05561 0	C: 00004 0	31140 0	00006 1	13464 0
31,3440	00006 1	63445 1	63525 0	00006 1	63447 0	04362 1	03360 1	06006 1
31,3450	I: 41535 1	C: 01141 1	I: 41335 1	C: 23516 1	I: 66150 0	C: 00155 0	C: 00302 0	I: 77624 1
31,3460	C: 30000 1	C: 02617 0	I: 77650 1	C: 01006 0	35035 1	05535 1	06006 1	I: 74375 0
31,3470	C: 03705 0	C: 23531 1	I: 52056 0	C: 63461 1	C: 26305 0	C: 05432 1	C: 00302 0	C: 24533 1
31,3500	C: 00065 1	C: 01265 1	C: 00000 1	C: 02000 0	C: 01604 1	C: 00000 1	C: 01505 0	C: 14100 0
31,3510	C: 00012 1	C: 27462 1	C: 01306 0	C: 01307 1	C: 00202 1	C: 00006 1	C: 10464 0	C: 12467 1
31,3520	C: 00000 1	C: 00000 1	C: 15373 1	C: 11346 0	C: 62776 0	C: 77732 1	C: 00700 0	C: 00070 0
31,3530	C: 22363 1	C: 11623 0	06006 1	I: 77650 1	C: 62474 1	I: 50023 0	C: 33553 1	C: 63566 1
31,3540	I: 71374 1	C: 00003 1	C: 03472 0	I: 50023 0	C: 33553 1	C: 63566 1	I: 45345 1	C: 02461 0
31,3550	C: 02463 1	C: 02547 0	I: 45374 0	C: 00004 0	C: 36161 1	I: 77040 0	C: 63566 1	C: 00005 1
31,3560	I: 45345 1	C: 03663 1	C: 02461 0	I: 51025 1	C: 36161 1	C: 11463 0	I: 43014 0	C: 05702 1
31,3570	C: 11411 0	C: 05743 1	C: 11411 0	I: 71334 0	C: 03664 0	C: 15336 0	I: 43014 0	C: 05660 1
31,3600	C: 05461 1	I: 43014 0	C: 05662 0	C: 05663 1	C: 37764 0	C: 15704 0	I: 65325 0	C: 02463 1
31,3610	C: 02461 0	I: 41525 0	C: 33143 1	I: 77650 1	C: 72740 1	I: 65325 0	C: 02461 0	C: 03663 1
31,3620	I: 41525 0	C: 33143 1	I: 77650 1	C: 72740 1	I: 45020 1	C: 03547 1	C: 27516 0	I: 43175 0
31,3630	C: 03640 0	C: 01473 0	I: 77650 1	C: 63660 1	I: 45020 1	C: 03547 1	C: 27516 0	I: 77214 0
31,3640	C: 01673 1	C: 03656 1	C: 25535 0	C: 03710 1	C: 15543 1	C: 03552 0	C: 01517 0	I: 77615 0
31,3650	I: 77650 1	C: 63666 1	I: 45020 1	C: 03547 1	C: 27516 0	I: 43175 0	C: 03640 0	C: 01673 1
31,3660	C: 25535 0	C: 03700 0	C: 15543 1	C: 03716 1	C: 15517 0	C: 03552 0	C: 00041 1	I: 45014 0
31,3670	C: 00263 0	C: 27211 0	I: 77775 1	C: 00001 0	C: 03656 1	I: 70125 0	C: 00015 0	C: 03550 1
31,3700	C: 27552 0	C: 00007 0	C: 03710 1	I: 77650 1	C: 03547 1	I: 51575 1	C: 02707 0	C: 24045 0
31,3710	C: 02715 0	I: 41446 1	I: 50025 0	C: 00045 0	C: 63717 0	I: 45545 1	C: 77732 1	I: 51575 1
31,3720	C: 02723 0	I: 45206 1	C: 00045 0	I: 71240 1	C: 63730 0	I: 77626 0	C: 43732 0	C: 63730 0
31,3730	I: 66145 1	C: 00045 0	C: 00044 1	I: 62101 0	C: 00047 1	C: 00002 0	I: 53775 1	C: 02707 0
31,3740	C: 20201 0	C: 26707 0	C: 02715 0	I: 77657 0	C: 20201 0	C: 26715 0	C: 02723 0	I: 66057 0
31,3750	C: 20201 0	C: 00045 0	C: 02723 0	I: 54150 1	C: 02214 1	C: 00045 0	I: 77660 1	C: 00045 0
31,3760	I: 70130 1	C: 02214 1	C: 00045 0	I: 40270 0	C: 00044 1	C: 00003 1	I: 77650 1	C: 75416 0
31,3770	C: 03770 1	C: 03771 0	CKSM 21553 1	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 170, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2000	I: 65345 0	C: 26663 0	C: 02403 1	I: 57546 1	I: 73525 1	C: 02403 1	I: 74266 0	C: 26224 1
32,2010	C: 02405 1	I: 77634 0	C: 51751 0	C: 26443 0	C: 26663 0	C: 02650 0	I: 77616 0	C: 00064 0
32,2020	C: 00000 1	C: 00002 0	C: 00000 1	C: 10306 0	C: 36750 0	C: 00253 0	C: 31436 1	C: 00011 1
32,2030	I: 45244 1	C: 64077 0	C: 16425 0	I: 45000 0	C: 64077 0	C: 55054 0	I: 45006 0	C: 57052 1
32,2040	I: 77624 1	C: 64105 1	I: 65525 0	C: 00017 1	I: 77615 0	C: 00005 1	C: 26341 0	C: 03401 1
32,2050	C: 14747 0	C: 15336 0	C: 14753 0	C: 01044 0	I: 71214 0	C: 03711 0	C: 64060 0	C: 02316 1
32,2060	I: 43225 0	C: 00011 1	I: 45014 0	C: 00662 0	C: 26524 0	I: 63256 0	C: 02320 1	I: 50256 0
32,2070	I: 65552 0	I: 77621 1	C: 02341 0	C: 36347 1	C: 27525 0	I: 77624 1	C: 46616 1	I: 65345 0
32,2100	C: 15334 1	C: 15336 0	I: 77606 1	C: 34011 0	C: 64046 1	I: 77775 1	C: 24266 0	C: 14045 0
32,2110	C: 00001 0	I: 50025 0	C: 24260 0	C: 64140 0	I: 65060 1	C: 00050 1	C: 00046 0	I: 45324 0
32,2120	C: 00050 1	C: 24246 1	I: 65040 0	C: 64140 0	C: 00050 1	I: 50025 0	C: 24256 0	C: 64140 0
32,2130	I: 65124 0	C: 00050 1	C: 00046 0	I: 50025 0	C: 24242 0	C: 64140 0	I: 77730 0	C: 00050 1
32,2140	I: 52110 0	C: 00001 0	C: 64145 0	I: 77730 0	C: 00050 1	I: 44745 1	C: 00001 0	C: 24255 0
32,2150	I: 42603 1	C: 24241 0	C: 24225 1	I: 60125 1	C: 00003 1	C: 64143 0	I: 55225 1	I: 40006 0
32,2160	C: 64203 1	I: 45240 0	C: 64203 1	C: 24210 1	I: 77644 1	C: 64203 1	I: 45345 1	C: 00001 0
32,2170	C: 24266 0	I: 71244 0	C: 64200 1	C: 24262 1	I: 77671 1	C: 00001 0	I: 43405 1	C: 00005 1
32,2200	I: 52145 0	C: 24264 1	C: 64176 0	I: 65345 0	C: 24210 1	I: 77650 1	C: 64166 1	C: 02755 1
32,2210	C: 01307 1	C: 00013 0	C: 22652 0	C: 00005 1	C: 01642 0	C: 00005 1	C: 01642 0	C: 77556 1
32,2220	C: 53522 1	C: 00055 1	C: 20266 1	C: 00155 0	C: 07202 0	C: 00000 1	C: 00000 1	C: 77730 0
32,2230	C: 71525 0	C: 00000 1	C: 00000 1	C: 04445 0	C: 10102 0	C: 03726 1	C: 31201 0	C: 01040 1
32,2240	C: 26313 1	C: 00234 1	C: 01660 0	C: 25254 0	C: 01014 0	C: 02222 1	C: 15646 1	C: 22223 1
32,2250	C: 16457 0	C: 25254 0	C: 01014 0	C: 30304 0	C: 23351 1	C: 03030 1	C: 22335 1	C: 20001 1
32,2260	C: 00611 1	C: 00033 1	C: 05763 0	C: 00053 1	C: 36200 0	C: 23637 1	C: 27636 1	C: 00012 1
32,2270	C: 00010 0	C: 00006 1	I: 77776 1	30154 1	05770 1	35023 0	04636 0	C: 20743 0
32,2300	14103 0	12275 1	04655 0	C: 74476 1	I: 43020 1	C: 03547 1	C: 03666 1	I: 67164 0
32,2310	C: 20000 0	C: 02756 1	I: 45140 0	C: 03550 1	C: 25607 1	C: 27710 1	I: 77626 0	C: 60121 0
32,2320	C: 00037 0	C: 37724 1	C: 03547 1	I: 77220 1	C: 03752 1	C: 03710 1	I: 65256 0	C: 00045 0
32,2330	C: 17757 1	C: 03552 0	I: 77625 0	C: 03413 1	C: 26641 0	C: 03656 1	I: 50256 0	I: 77752 1
32,2340	I: 44326 0	C: 15326 1	C: 27761 1	C: 03700 0	I: 41451 1	C: 03672 1	I: 57441 1	C: 03554 0
32,2350	I: 41515 0	I: 63345 0	C: 15330 0	I: 55441 0	C: 03562 0	I: 77772 0	C: 17405 0	C: 03405 0
32,2360	I: 57414 1	C: 02741 1	C: 64364 1	C: 03405 0	I: 51575 1	C: 03405 0	C: 27763 0	C: 03656 1
32,2370	C: 02657 1	I: 45246 0	C: 33620 0	C: 26760 1	C: 03710 1	C: 36746 1	C: 64304 1	I: 53575 0

OCTAL LISTING FOR PARAGRAPH # 171, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2400	C: 03656 1	I: 53515 0	C: 03710 1	I: 72441 0	I: 65336 1	C: 00045 0	I: 51525 1	I: 45006 0
32,2410	C: 64105 1	I: 43215 0	C: 03724 0	C: 03552 0	C: 00003 1	I: 53135 0	C: 03013 0	C: 64421 1
32,2420	C: 00005 1	I: 73545 1	C: 00005 1	C: 17403 0	I: 77746 1	C: 03401 1	I: 53575 0	C: 03656 1
32,2430	I: 41406 0	I: 53515 0	C: 03710 1	I: 47315 0	I: 53435 0	I: 63361 0	C: 03403 0	I: 53361 0
32,2440	C: 03401 1	I: 43014 0	C: 00662 0	C: 01663 0	C: 16152 0	I: 77624 1	C: 26453 1	I: 77745 1
32,2450	C: 00747 0	C: 17401 1	C: 00751 1	C: 37403 1	C: 03752 1	I: 71220 1	C: 03752 1	C: 03413 1
32,2460	C: 34041 0	C: 27145 1	I: 67175 0	C: 00001 0	C: 03745 1	C: 27640 0	C: 00007 0	C: 17672 1
32,2470	C: 00015 0	C: 03716 1	I: 53135 0	C: 03746 1	C: 64500 0	I: 52135 1	C: 33631 0	C: 64272 1
32,2500	I: 53575 0	C: 03640 0	C: 17554 0	C: 00045 0	C: 27646 0	C: 03672 1	I: 77656 1	C: 03562 0
32,2510	I: 72441 0	C: 03554 0	C: 03747 0	I: 45246 0	C: 33644 1	I: 71240 1	C: 64525 1	C: 15326 1
32,2520	I: 41525 0	C: 15330 0	I: 41466 0	I: 77650 1	C: 64531 1	I: 47375 0	C: 03554 0	C: 03562 0
32,2530	I: 77606 1	I: 71214 0	C: 02661 1	I: 51006 0	C: 64540 1	I: 57575 1	I: 43006 0	C: 02461 0
32,2540	I: 77775 1	I: 53435 0	C: 03554 0	C: 03562 0	I: 77650 1	C: 03752 1	I: 71220 1	C: 03752 1
32,2550	C: 33606 1	C: 17730 0	C: 03636 1	C: 03664 0	I: 77745 1	C: 15344 0	C: 17650 1	C: 33604 0
32,2560	C: 37546 1	C: 63652 0	I: 77624 1	C: 37727 1	I: 77745 1	C: 02742 1	C: 14033 1	C: 02744 1
32,2570	C: 14035 1	C: 00041 1	C: 14031 0	C: 03770 1	I: 77661 0	C: 20206 1	C: 03724 0	I: 43276 0
32,2600	C: 03726 1	I: 45246 0	C: 33652 0	I: 50000 1	C: 64606 0	C: 64775 0	I: 50145 1	C: 03546 0
32,2610	C: 64614 0	I: 52135 1	C: 33630 1	C: 65100 0	I: 53145 1	C: 03730 0	C: 64654 1	I: 62545 1
32,2620	C: 00033 1	I: 72405 0	C: 03744 0	I: 71206 0	C: 00035 1	I: 41212 0	C: 00001 0	I: 50021 1
32,2630	C: 31771 1	C: 64644 0	I: 75512 0	I: 44205 0	C: 03751 1	C: 31767 0	I: 65301 0	C: 00047 1
32,2640	I: 56342 1	I: 52057 1	C: 20200 1	C: 64662 1	I: 60345 0	C: 00035 1	C: 00047 1	I: 53665 1
32,2650	C: 15334 1	C: 20173 0	I: 77650 1	C: 64662 1	I: 60345 0	C: 00031 0	C: 00047 1	I: 53665 1
32,2660	C: 03664 0	C: 20200 1	I: 41401 1	C: 00001 0	I: 57425 0	C: 15334 1	C: 03755 0	I: 71240 1
32,2670	C: 64701 0	C: 03724 0	I: 71240 1	C: 64677 0	C: 03755 0	I: 77676 0	C: 03755 0	I: 77745 1
32,2700	C: 03755 0	I: 45246 0	C: 33654 0	I: 71240 1	C: 64775 0	I: 72405 0	C: 00031 0	I: 77606 1
32,2710	I: 43345 1	C: 03546 0	C: 33600 1	C: 03546 0	I: 43175 0	C: 03656 1	C: 03466 0	C: 26657 1
32,2720	C: 03710 1	I: 77765 0	C: 03755 0	C: 16746 0	C: 15334 1	I: 57565 0	C: 03755 0	I: 71354 0
32,2730	C: 00154 1	I: 67140 0	C: 03550 1	C: 02756 1	C: 36760 0	C: 25607 1	I: 75345 1	C: 00037 0
32,2740	C: 03755 0	I: 60325 0	C: 03650 1	C: 00047 1	I: 53665 1	C: 00001 0	C: 20176 0	I: 50006 1
32,2750	C: 64755 1	I: 65345 0	C: 15344 0	I: 77650 1	C: 64757 0	I: 65345 0	C: 33610 0	I: 45271 1
32,2760	C: 00003 1	C: 31767 0	I: 71240 1	C: 64767 0	I: 77605 1	C: 03650 1	C: 00001 0	I: 41545 0
32,2770	C: 00001 0	C: 37650 0	C: 63634 0	I: 77650 1	C: 64562 1	I: 45345 1	C: 00031 0	C: 03664 0

OCTAL LISTING FOR PARAGRAPH # 172, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3000	I: 51406 1	I: 50025 0	C: 33656 1	C: 35022 1	I: 53145 1	C: 03730 0	C: 64611 0	I: 53025 0
32,3010	C: 33606 1	C: 65044 1	I: 45345 1	C: 03670 0	C: 00031 0	I: 55301 0	C: 00050 1	C: 03666 1
32,3020	I: 41457 1	C: 57600 0	I: 40015 1	C: 15334 1	C: 65031 0	I: 45246 0	C: 15334 1	I: 77640 0
32,3030	C: 65034 0	I: 57545 1	C: 15344 0	I: 77725 1	I: 41345 0	I: 77712 0	C: 03666 1	I: 77615 0
32,3040	C: 03636 1	C: 03636 1	I: 77650 1	C: 65063 1	I: 63545 0	C: 03664 0	I: 70501 1	C: 00047 1
32,3050	I: 60325 0	C: 00031 0	C: 00050 1	I: 55260 0	C: 00047 1	I: 77657 0	C: 20600 0	C: 03636 1
32,3060	I: 77625 0	C: 03664 0	C: 03666 1	I: 77745 1	C: 00031 0	C: 17670 0	C: 03730 0	I: 77625 0
32,3070	C: 33600 1	C: 37730 1	C: 65102 1	I: 52030 0	C: 64554 1	C: 65100 0	I: 77745 1	C: 15330 0
32,3100	I: 77650 1	C: 03752 1	I: 71220 1	C: 00041 1	C: 03636 1	I: 45240 0	C: 65112 0	C: 03646 0
32,3110	I: 77640 0	C: 65115 1	I: 77776 1	05726 1	C: 20610 1	I: 43001 1	C: 00001 0	C: 00272 0
32,3120	I: 60345 0	C: 03636 1	C: 00047 1	I: 60325 0	C: 03646 0	C: 00051 0	C: 00013 0	I: 56342 1
32,3130	I: 65260 0	C: 00050 1	C: 03726 1	I: 77716 1	I: 43342 0	C: 15334 1	C: 03744 0	I: 77605 1
32,3140	C: 00001 0	C: 00035 1	I: 53605 1	C: 00001 0	C: 20172 1	I: 45257 0	C: 20172 1	C: 33574 1
32,3150	I: 65234 1	C: 45657 1	C: 15334 1	I: 57457 0	C: 20601 1	I: 41215 1	C: 00001 0	C: 03646 0
32,3160	I: 47057 0	C: 20172 1	C: 45657 1	I: 77725 1	C: 33674 1	I: 70501 1	C: 00050 1	I: 56264 1
32,3170	C: 00050 1	C: 00013 0	I: 65257 1	C: 57170 0	C: 03652 0	I: 41406 0	I: 77624 1	C: 65741 0
32,3200	I: 41476 1	I: 40476 0	I: 41525 0	C: 03654 0	I: 45006 0	C: 65741 0	I: 50125 1	C: 03730 0
32,3210	C: 65213 1	I: 77650 1	C: 65225 1	I: 77745 1	C: 03632 0	I: 52054 1	C: 65220 1	C: 65321 1
32,3220	I: 50145 1	C: 03747 0	C: 65321 1	I: 77650 1	C: 65327 1	I: 47145 1	C: 33574 1	C: 45657 1
32,3230	I: 65276 1	C: 15344 0	I: 45257 0	C: 20601 1	C: 00001 0	I: 53605 1	C: 00035 1	C: 20172 1
32,3240	I: 76257 0	C: 20172 1	I: 65234 1	C: 45657 1	C: 03722 0	C: 00001 0	I: 77751 1	I: 53040 0
32,3250	C: 65255 0	C: 65255 0	I: 52061 1	C: 20210 0	C: 65266 0	I: 50145 1	C: 03751 1	C: 65277 0
32,3260	I: 77676 0	C: 17751 1	C: 33606 1	C: 03730 0	I: 77650 1	C: 65277 0	I: 47166 0	C: 45765 1
32,3270	I: 50125 1	C: 03751 1	C: 65305 1	I: 45545 1	C: 77760 0	I: 77676 0	C: 00013 0	I: 53145 1
32,3300	C: 03722 0	C: 65321 1	I: 52040 1	C: 65321 1	C: 65327 1	I: 53145 1	C: 03722 0	C: 65316 0
32,3310	I: 71240 1	C: 65316 0	I: 77626 0	C: 77764 1	I: 77650 1	C: 65327 1	I: 57545 1	I: 77626 0
32,3320	C: 77760 0	I: 77745 1	C: 00013 0	C: 17722 0	C: 00015 0	I: 52006 0	C: 65334 0	I: 77745 1
32,3330	C: 00017 1	C: 17722 0	C: 00015 0	I: 41476 1	I: 77624 1	C: 65464 1	I: 53145 1	C: 03632 0
32,3340	C: 65462 1	I: 50025 0	C: 03706 0	C: 65346 0	I: 77650 1	C: 65401 1	I: 50145 1	C: 03730 0
32,3350	C: 65353 1	I: 77650 1	C: 65423 1	I: 53145 1	C: 03722 0	C: 65361 0	I: 52040 1	C: 65361 0
32,3360	C: 65460 0	I: 53145 1	C: 03747 0	C: 65460 0	I: 71240 1	C: 65460 0	C: 00017 1	C: 17722 0
32,3370	C: 00015 0	I: 77676 0	C: 34021 0	C: 65464 1	I: 45345 1	C: 03632 0	C: 03706 0	I: 77640 0

OCTAL LISTING FOR PARAGRAPH # 173, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3400	C: 65460 0	I: 71214 0	C: 00072 1	C: 03722 0	I: 77614 1	C: 02742 1	C: 65413 1	C: 14013 0
32,3410	C: 00015 0	I: 77650 1	C: 65416 1	C: 14017 1	C: 00015 0	I: 77676 0	C: 34021 0	C: 65464 1
32,3420	I: 50145 1	C: 03730 0	C: 65460 0	I: 45345 1	C: 03722 0	C: 00001 0	I: 65246 1	C: 00015 0
32,3430	I: 44352 0	I: 71240 1	C: 65460 0	C: 00001 0	C: 03722 0	I: 50025 0	C: 00017 1	C: 65445 1
32,3440	I: 77745 1	C: 00017 1	C: 03722 0	I: 77650 1	C: 65456 0	I: 45345 1	C: 03722 0	C: 00013 0
32,3450	I: 52040 1	C: 65453 0	C: 65456 0	I: 77745 1	C: 00013 0	C: 03722 0	I: 77624 1	C: 65665 1
32,3460	I: 77745 1	C: 15330 0	I: 77650 1	C: 00041 1	I: 77620 0	C: 00037 0	I: 45001 1	C: 00023 0
32,3470	C: 65665 1	I: 45345 1	C: 00017 1	C: 00013 0	I: 77600 1	C: 65515 0	I: 45206 1	C: 33576 0
32,3500	I: 71240 1	C: 65663 1	C: 00023 0	I: 50025 0	C: 00015 0	C: 65511 1	I: 52001 1	C: 00023 0
32,3510	C: 65515 0	I: 77745 1	I: 70565 0	C: 00021 1	C: 00021 1	I: 77745 1	C: 33602 0	C: 03546 0
32,3520	I: 43345 1	C: 03546 0	C: 33600 1	I: 67240 0	C: 65530 1	C: 33630 1	I: 77650 1	C: 65462 1
32,3530	C: 03546 0	I: 65345 0	C: 03722 0	C: 03706 0	I: 43325 1	C: 03722 0	C: 00021 1	C: 37722 1
32,3540	C: 65665 1	I: 71214 0	C: 00312 1	C: 65557 0	C: 03706 0	I: 50025 0	C: 00025 0	C: 65554 0
32,3550	I: 57545 1	C: 00021 1	I: 77742 0	C: 00021 1	I: 52001 1	C: 00023 0	C: 65622 1	I: 45345 1
32,3560	C: 03632 0	C: 03706 0	I: 41525 0	I: 51545 1	C: 00025 0	I: 50025 0	C: 33660 1	C: 65663 1
32,3570	I: 71204 1	C: 57544 0	I: 60221 0	C: 03706 0	C: 00050 1	I: 77725 1	I: 70501 1	C: 00047 1
32,3600	I: 65271 0	I: 41221 0	C: 03722 0	I: 77660 1	C: 00047 1	C: 00021 1	I: 40057 1	C: 20600 0
32,3610	C: 65616 0	C: 00021 1	I: 45246 0	C: 00015 0	I: 77640 0	C: 65622 1	I: 75345 1	C: 00015 0
32,3620	C: 00021 1	C: 00021 1	I: 41345 0	C: 00021 1	C: 33612 1	I: 43352 1	C: 03722 0	C: 00031 0
32,3630	I: 50025 0	C: 00017 1	C: 65641 1	I: 45345 1	C: 00017 1	C: 03722 0	I: 77742 0	C: 34021 0
32,3640	C: 65654 0	I: 45345 1	C: 00031 0	C: 00013 0	I: 52040 1	C: 65647 1	C: 65654 0	I: 45345 1
32,3650	C: 00013 0	C: 03722 0	I: 77742 0	C: 00021 1	I: 51545 1	C: 00021 1	I: 50025 0	C: 33576 0
32,3660	C: 65663 1	I: 77650 1	C: 65520 0	I: 77650 1	C: 00037 0	I: 71220 1	C: 00040 0	C: 03722 0
32,3670	I: 54316 1	C: 20610 1	I: 76276 0	C: 00003 1	I: 41501 0	C: 00047 1	I: 60351 0	C: 00006 1
32,3700	C: 00050 1	I: 70434 0	C: 45765 1	I: 56264 1	C: 00046 0	I: 77657 0	C: 57170 0	C: 03720 1
32,3710	I: 41366 1	C: 00011 1	I: 77701 1	C: 00047 1	C: 14035 1	C: 03722 0	I: 74301 0	C: 00050 1
32,3720	C: 03554 0	I: 74274 0	C: 00046 0	C: 00035 1	I: 63257 1	C: 57207 0	C: 03562 0	I: 53761 1
32,3730	C: 00035 1	C: 20575 1	I: 45455 1	C: 74077 1	I: 51451 0	C: 03672 1	C: 03706 0	I: 77650 1
32,3740	C: 00040 0	I: 71220 1	C: 00024 1	C: 03636 1	I: 44342 1	I: 65301 0	C: 00050 1	I: 70525 1
32,3750	C: 03646 0	I: 56221 0	I: 41257 1	C: 57601 1	C: 00035 1	I: 45257 0	C: 20173 0	C: 33577 1
32,3760	I: 40152 0	C: 65765 0	I: 52040 1	C: 65771 0	C: 65767 1	I: 77745 1	C: 15344 0	I: 52166 1
32,3770	C: 65773 1	I: 77745 1	C: 15330 0	I: 77650 1	C: 00024 1	C: 03775 1	C: 03776 1	CKSM 63037 0

OCTAL LISTING FOR PARAGRAPH # 174, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2000	03212 0	02703 1	04636 0	C: 16627 0	02126 0	34772 1	55421 0	55450 0
33,2010	55451 1	34352 1	55655 1	32221 1	02134 0	34753 1	55713 1	06006 1
33,2020	I: 73545 1	C: 02401 0	C: 02724 1	C: 16734 0	C: 02401 0	I: 77746 1	C: 02726 0	I: 77676 0
33,2030	C: 02732 0	I: 77776 1	05354 0	C: 00003 1	12036 1	13217 1	06006 1	I: 77624 1
33,2040	C: 47344 1	I: 77776 1	04636 0	C: 16724 1	34753 1	70077 0	00006 1	12051 0
33,2050	25421 1	05561 0	C: 00056 1	02126 0	11421 0	02103 1	04636 0	C: 17133 0
33,2060	02126 0	00006 1	31657 1	05332 0	C: 02070 1	C: 66065 1	32073 1	05163 0
33,2070	32073 1	05167 1	05314 1	C: 06227 0	34772 1	55253 0	31514 0	55254 1
33,2100	51423 0	55430 0	02205 1	34756 1	54003 0	01400 1	31512 0	55254 1
33,2110	34772 1	55253 0	02205 1	05561 0	C: 00007 0	44772 0	05347 1	04636 0
33,2120	C: 16073 1	05524 1	I: 43215 0	C: 15344 0	C: 26670 1	I: 77616 0	00006 1	23425 0
33,2130	04636 0	C: 17644 1	02655 0	01425 0	54001 1	12137 1	55655 1	34772 1
33,2140	50001 0	54000 0	24001 0	11655 1	12136 0	00002 0	I: 47020 0	C: 00051 0
33,2150	C: 51751 0	C: 02441 1	I: 51025 1	C: 02443 0	C: 66157 1	I: 77624 1	C: 66122 0	I: 74261 1
33,2160	C: 20212 1	C: 02405 1	I: 53321 1	C: 02672 0	C: 02650 0	C: 16650 0	C: 02441 1	C: 02443 0
33,2170	I: 47170 1	C: 02647 0	C: 45722 1	I: 77650 1	C: 00051 0	00006 1	23426 0	06006 1
33,2200	I: 77624 1	C: 66146 1	I: 77776 1	02126 0	01426 0	00006 1	23425 0	31423 0
33,2210	55255 0	32217 1	04636 0	C: 20743 0	02113 0	01425 0	12207 1	C: 01542 0
33,2220	C: 02757 0	C: 01713 0	C: 01671 0	C: 07623 1	C: 26552 1	04636 0	C: 70115 0	05362 0
33,2230	C: 00075 0	C: 00004 0	00004 0	30025 0	55645 0	34772 1	54037 1	54040 1
33,2240	54041 0	00003 1	32701 0	55655 1	32702 0	02134 0	06006 1	I: 77735 0
33,2250	C: 26663 0	C: 25477 1	C: 26674 0	C: 26455 1	C: 26663 0	C: 01472 1	C: 01315 1	I: 77776 1
33,2260	11643 0	02263 1	02277 1	06006 1	I: 77624 1	C: 64000 0	I: 77776 1	31412 1
33,2270	55646 0	05344 1	C: 00002 0	04636 0	C: 17214 0	03157 1	55412 0	05402 1
33,2300	C: 00135 0	11450 0	02175 0	03162 1	02306 0	05205 0	00006 1	22154 1
33,2310	00004 0	40025 1	61645 1	00006 1	62316 1	64752 0	61644 0	00006 1
33,2320	62324 0	05223 1	C: 02350 0	00154 1	34766 1	02321 0	34125 0	54154 0
33,2330	50154 1	31460 1	50154 1	55577 1	10154 0	12327 1	00002 0	34125 0
33,2340	54154 0	50154 1	31577 0	50154 1	55460 0	10154 0	12340 0	00002 0
33,2350	30025 0	55645 0	31540 1	55631 0	05402 1	C: 00115 1	31631 1	55540 0
33,2360	10000 0	30000 1	55541 1	40000 0	55540 0	34772 1	56037 0	55314 1
33,2370	34772 1	56040 0	55316 0	34772 1	56041 1	55320 0	34351 1	04126 0

OCTAL LISTING FOR PARAGRAPH # 175, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2400	C: 00005 1	37644 0	05135 0	C: 02406 1	C: 66065 1	05314 1	02326 1	05402 1
33,2410	C: 00215 1	12413 1	02337 1	11643 0	02416 0	02421 1	03162 1	04636 0
33,2420	C: 15276 0	06006 1	I: 77745 1	C: 26672 0	C: 24051 0	C: 01315 1	I: 76505 0	C: 02672 0
33,2430	I: 57545 1	C: 00160 0	C: 16533 0	C: 00162 1	C: 02537 1	I: 76001 1	C: 00001 0	C: 00010 0
33,2440	I: 57535 0	C: 02644 0	I: 77640 0	C: 66764 1	I: 50135 0	C: 02542 0	C: 66461 1	I: 72174 0
33,2450	C: 00014 1	C: 02454 0	I: 62143 0	C: 02243 0	C: 77775 1	C: 12555 1	I: 66104 1	C: 66452 1
33,2460	C: 02454 0	I: 77770 1	C: 00010 0	I: 41343 0	C: 02543 1	C: 27427 0	I: 43661 1	C: 21212 0
33,2470	C: 02511 0	C: 06511 1	I: 40725 0	C: 27431 1	C: 02531 1	I: 77732 1	I: 45425 0	C: 71206 0
33,2500	C: 06573 0	I: 77100 0	C: 66463 0	C: 00004 0	I: 56743 1	C: 75314 0	C: 75230 1	C: 12463 0
33,2510	I: 77104 1	C: 66504 0	C: 00010 0	I: 66140 1	C: 02455 1	C: 02455 1	I: 56743 1	C: 02460 1
33,2520	C: 75206 1	I: 77613 0	C: 75266 1	C: 12511 1	I: 42743 1	C: 75304 1	C: 75220 0	C: 12473 1
33,2530	I: 42673 0	C: 75206 1	C: 75256 1	C: 12521 1	I: 40743 0	C: 27434 1	C: 75206 1	I: 42772 0
33,2540	C: 75246 0	C: 12531 0	I: 76104 0	C: 66513 0	C: 00010 0	I: 64743 0	C: 02533 0	C: 02531 1
33,2550	I: 55523 0	C: 02541 0	I: 76521 0	C: 02001 1	I: 77745 1	C: 00155 0	C: 06541 1	I: 77745 1
33,2560	C: 00160 0	C: 06531 0	I: 77745 1	C: 00162 1	C: 06533 1	I: 77700 0	C: 66545 0	I: 76174 1
33,2570	C: 00006 1	C: 00002 0	I: 57343 1	C: 02513 1	C: 27437 1	I: 77722 0	I: 73406 1	I: 56072 1
33,2600	C: 00046 0	C: 10021 0	I: 77745 1	I: 77746 1	C: 10027 0	I: 77704 1	C: 66572 1	I: 77776 1
33,2610	04606 0	01400 1	11412 0	02276 0	11450 0	12617 1	02621 0	30032 0
33,2620	55414 0	06006 1	I: 65345 0	C: 02503 0	C: 02507 1	I: 55525 0	C: 02511 0	I: 74276 1
33,2630	C: 27437 1	I: 74521 1	C: 02672 0	C: 02760 1	I: 77776 1	05402 1	C: 00005 1	32220 0
33,2640	04636 0	C: 17244 0	02126 0	11450 0	02106 1	06006 1	I: 77624 1	C: 64000 0
33,2650	I: 77776 1	02074 0	05671 1	C: 01600 0	02657 1	05671 1	C: 01601 1	05402 1
33,2660	C: 00005 1	02113 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
33,2670	C: 00001 0	C: 00004 0	C: 00002 0	C: 00220 1	C: 77776 1	C: 35730 0	C: 00035 1	C: 10317 0
33,2700	C: 17550 1	C: 00115 1	C: 01453 1	30075 0	74755 0	00006 1	12711 0	05726 1
33,2710	C: 21521 1	34753 1	05176 1	34770 0	55643 0	33211 0	55277 0	34761 0
33,2720	55412 0	35011 1	55644 1	34770 0	55632 0	55657 0	34772 1	55656 1
33,2730	00006 1	31634 1	53636 1	00006 1	31634 1	53640 0	34352 1	55655 1
33,2740	32222 1	02134 0	02744 1	02002 1	00006 1	23425 0	44753 0	55705 0
33,2750	06006 1	I: 41545 0	C: 02636 0	I: 77756 0	C: 02676 1	C: 16702 0	I: 77746 1	C: 02704 0
33,2760	I: 77676 0	C: 02674 0	I: 77776 1	01425 0	I: 44743 1	C: 02543 1	C: 02505 0	I: 42675 0
33,2770	C: 27441 0	C: 02505 0	C: 06505 1	I: 77613 0	C: 02507 1	C: 06507 0	I: 42675 0	C: 27443 1

OCTAL LISTING FOR PARAGRAPH # 176, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3000	C: 02505 0	I: 41475 1	C: 15334 1	I: 67300 0	C: 66764 1	C: 02647 0	I: 71254 1	C: 67020 1
33,3010	C: 02471 1	I: 45425 0	C: 61306 0	I: 77621 1	C: 02473 0	C: 02473 0	I: 77650 1	C: 67042 0
33,3020	I: 43345 1	C: 02467 0	C: 02475 0	C: 16467 0	C: 02475 0	I: 44275 1	C: 27445 1	C: 02473 0
33,3030	C: 16473 0	C: 02501 1	I: 44275 1	C: 27445 1	C: 02471 1	I: 57325 1	C: 02503 0	C: 27447 0
33,3040	I: 45421 1	C: 75306 0	I: 77776 1	11412 0	02276 0	03162 1	11324 1	12277 0
33,3050	06006 1	I: 77775 1	C: 02650 0	C: 16461 0	C: 02443 0	C: 02457 0	I: 77776 1	05402 1
33,3060	C: 00275 1	06006 1	I: 64375 1	C: 02467 0	C: 02672 0	I: 53372 1	C: 02461 0	C: 16650 0
33,3070	C: 02457 0	C: 02443 0	I: 77776 1	02175 0	31646 1	55631 0	05402 1	C: 00155 0
33,3100	06006 1	I: 77775 1	C: 26663 0	C: 02467 0	I: 77776 1	11632 0	03155 0	05402 1
33,3110	C: 00255 0	06006 1	I: 77745 1	C: 02634 1	I: 53025 0	C: 02640 1	C: 67152 0	C: 00001 0
33,3120	I: 43335 0	C: 26671 0	C: 02633 0	C: 16633 0	C: 02634 1	C: 16636 0	C: 00001 0	C: 02654 1
33,3130	I: 77776 1	02744 1	05402 1	C: 00335 1	00006 1	31636 0	53640 0	34762 0
33,3140	55412 0	05402 1	C: 00075 0	33210 1	04636 0	C: 17244 0	04636 0	C: 17644 1
33,3150	02655 0	02227 1	I: 77776 1	34770 0	55632 0	11631 0	55646 0	34322 0
33,3160	55412 0	02277 1	00004 0	41214 0	64774 1	00006 1	13202 0	44772 0
33,3170	00006 1	06030 1	74764 1	10000 0	13203 1	34764 0	70101 0	10000 0
33,3200	13203 1	00003 1	00002 0	37644 0	05176 1	00004 0	04655 0	C: 70000 0
33,3210	C: 02647 0	C: 06200 0	05402 1	C: 00154 1	05344 1	C: 00003 1	02011 0	04636 0
33,3220	C: 16073 1	34770 0	22007 0	23427 1	55252 1	00006 1	51427 1	31433 1
33,3230	53251 1	33252 1	04636 0	C: 20705 1	35032 0	04636 0	C: 20743 0	03370 0
33,3240	03242 0	13231 0	53251 1	51427 1	53433 0	11427 0	13313 1	34767 0
33,3250	54001 1	13223 0	C: 01236 1	06006 1	I: 77170 1	C: 00002 0	C: 00014 1	I: 40331 1
33,3260	C: 00052 0	C: 00006 1	C: 00001 0	I: 60533 1	C: 02436 1	C: 00001 0	I: 77756 0	C: 10023 1
33,3270	I: 77745 1	C: 00001 0	I: 41546 0	I: 47133 0	C: 02435 1	C: 51754 0	C: 00003 1	I: 41356 1
33,3300	C: 00001 0	I: 77752 1	C: 10027 0	I: 71545 0	C: 00003 1	I: 72405 0	I: 76076 1	C: 00000 1
33,3310	C: 10025 1	I: 43504 1	C: 67263 1	34770 0	55140 1	34772 1	03375 0	06006 1
33,3320	I: 77624 1	C: 67254 0	I: 64375 1	C: 00007 0	C: 02672 0	I: 77772 0	C: 26736 1	C: 00015 0
33,3330	I: 76521 0	C: 02672 0	C: 36744 0	C: 67450 1	C: 02414 1	I: 77776 1	34767 0	55140 1
33,3340	36211 0	03375 0	06006 1	I: 77624 1	C: 67450 1	C: 24015 0	C: 02414 1	C: 34007 1
33,3350	C: 47432 1	I: 77624 1	C: 47240 1	I: 77776 1	35040 0	04636 0	C: 20743 0	03370 0
33,3360	13362 1	13354 1	06006 1	I: 53375 0	C: 02760 1	C: 02650 0	C: 02650 0	I: 77776 1
33,3370	05344 1	C: 00002 0	05402 1	C: 00004 0	05205 0	00006 1	23424 1	55431 1

OCTAL LISTING FOR PARAGRAPH # 177, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3400	06006 1	I: 77624 1	C: 67254 0	I: 76740 0	C: 02431 0	C: 00007 0	C: 36766 0	C: 46053 0
33,3410	I: 77776 1	31773 0	55313 0	31775 0	55312 1	34772 1	55323 0	04636 0
33,3420	C: 16000 0	10301 1	03415 1	04636 0	C: 16073 1	01424 1	C: 30341 1	C: 22444 0
33,3430	C: 57223 0	C: 66451 1	C: 05427 0	C: 12577 1	C: 77567 0	C: 44202 1	C: 24276 1	C: 14066 1
33,3440	C: 03146 1	C: 14632 0	C: 00121 0	C: 35341 1	C: 01767 0	C: 31666 0	C: 00004 0	C: 35223 1
33,3450	I: 74020 0	C: 00300 1	C: 03722 0	I: 77650 1	C: 36073 0	35026 0	05535 1	06006 1
33,3460	I: 43345 1	C: 03413 1	C: 27533 1	C: 03464 1	I: 44234 1	C: 51751 0	C: 03413 1	C: 03673 0
33,3470	I: 77776 1	52155 1	05332 0	C: 02311 0	C: 40067 1	05362 0	C: 00153 0	C: 24024 1
33,3500	00006 1	31464 0	53413 1	33536 1	05535 1	06006 1	I: 51575 1	C: 01563 0
33,3510	C: 03723 1	I: 43021 0	C: 02356 0	C: 03464 1	C: 17725 1	C: 27535 1	C: 01062 1	I: 77776 1
33,3520	33537 0	54777 1	34770 0	05233 0	C: 03225 1	C: 50067 0	05362 0	C: 40036 0
33,3530	C: 00004 0	15205 1	C: 00003 1	C: 20640 1	C: 03540 0	C: 66067 0	C: 01416 0	C: 01537 1
33,3540	06006 1	I: 45345 1	C: 03661 0	C: 27667 0	I: 43040 1	C: 67547 0	C: 01064 1	I: 77624 1
33,3550	C: 70537 1	I: 44345 0	C: 03723 1	C: 02356 0	C: 17725 1	C: 03723 1	I: 45214 1	C: 01344 0
33,3560	C: 67605 0	C: 03462 1	I: 41440 1	C: 67605 0	I: 54345 1	C: 03725 1	C: 20612 0	I: 77671 1
33,3570	I: 41200 0	C: 67605 0	C: 27671 1	I: 67206 1	C: 02355 0	I: 44261 1	C: 20617 0	I: 43206 1
33,3600	C: 01044 0	C: 17413 1	I: 50025 0	C: 27665 1	C: 67611 0	I: 77745 1	C: 03723 1	C: 37462 0
33,3610	C: 51603 0	I: 77776 1	00004 0	00006 1	31413 0	52155 1	00006 1	40025 1
33,3620	20155 1	07224 1	30155 0	00006 1	63626 0	13627 0	34770 0	55460 0
33,3630	05223 1	C: 03637 0	05362 0	C: 40614 0	C: 10035 0	04655 0	C: 51134 0	34753 1
33,3640	00006 1	05012 1	00006 1	30025 0	53022 1	05255 0	C: 00372 1	34772 1
33,3650	54777 1	44756 0	70103 1	54103 1	05402 1	C: 05014 1	C: 77777 0	34664 1
33,3660	05121 0	C: 02012 0	C: 74067 0	05314 1	C: 00000 1	C: 00620 0	C: 00000 1	C: 01750 1
33,3670	C: 00006 1	C: 10000 0	I: 57546 1	C: 14017 1	I: 77756 0	C: 14013 0	C: 15336 0	C: 00015 0
33,3700	I: 41335 1	C: 03305 1	C: 03301 0	I: 45261 0	C: 20217 1	C: 15334 1	I: 45215 0	C: 02634 1
33,3710	C: 02401 0	I: 77634 0	C: 70601 1	I: 71406 0	I: 77606 1	I: 72405 0	C: 00017 1	C: 14027 1
33,3720	I: 77676 0	C: 00023 0	I: 72405 0	C: 00013 0	C: 14033 1	I: 41556 1	C: 00031 0	I: 72405 0
33,3730	C: 00017 1	C: 14021 1	I: 77676 0	I: 72405 0	C: 00013 0	C: 24025 0	C: 00013 0	I: 77656 1
33,3740	C: 26714 1	C: 00021 1	I: 77656 1	C: 26722 1	C: 00027 1	I: 77656 1	C: 36730 0	C: 47240 1
33,3750	I: 41575 0	C: 02760 1	I: 45006 0	C: 47530 1	I: 47175 1	C: 00003 1	C: 45644 0	C: 27306 1
33,3760	C: 15336 0	C: 24001 0	C: 01172 1	I: 47034 0	C: 45644 0	C: 70561 1	C: 14013 0	C: 01144 1
33,3770	I: 72405 0	C: 00001 0	I: 60415 1	C: 00005 1	I: 77650 1	C: 70413 0	C: 03776 1	CKSM 32430 1

OCTAL LISTING FOR PARAGRAPH # 200, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2000	35024 1	54003 0	00006 1	32274 1	53162 1	44772 0	22007 0	55126 1
34,2010	53166 0	00006 1	32276 0	53022 1	00006 1	30025 0	53127 0	34772 1
34,2020	22007 0	52025 1	53022 1	53162 1	00004 0	00006 1	31710 0	53132 1
34,2030	31706 1	57130 1	00006 1	31022 0	21132 1	27130 0	05402 1	C: 05023 0
34,2040	C: 22000 1	00004 0	00006 1	31131 0	53707 1	31132 0	57710 0	35046 0
34,2050	54003 0	04714 1	C: 76630 0	05402 1	C: 05023 0	C: 22000 1	35011 1	05233 0
34,2060	C: 02315 1	C: 70066 0	05344 1	C: 00013 0	05547 1	C: 00022 1	36214 0	54332 1
34,2070	04636 0	C: 20715 0	05362 0	C: 40514 0	C: 00073 0	35043 0	54003 0	32277 1
34,2100	55426 1	06006 1	I: 64375 1	C: 02467 0	C: 02672 0	I: 53372 1	C: 02650 0	C: 16650 0
34,2110	C: 01022 0	I: 52131 0	C: 00052 0	C: 66202 1	C: 66151 1	22007 0	30032 0	53760 0
34,2120	22007 0	30033 1	53762 1	22007 0	30034 0	53764 1	06006 1	I: 74575 0
34,2130	C: 02760 1	C: 02760 1	I: 77731 1	C: 03747 0	C: 00000 1	I: 65345 0	C: 01134 0	C: 01136 1
34,2140	I: 55525 0	C: 02403 1	C: 14747 0	C: 15336 0	I: 45014 0	C: 00662 0	C: 26524 0	C: 35071 1
34,2150	C: 70331 1	I: 53476 1	C: 25750 1	C: 01071 0	I: 74235 0	C: 01712 1	C: 30301 0	I: 77712 0
34,2160	C: 25077 0	C: 01750 1	I: 53435 0	C: 01712 1	I: 47206 0	C: 01750 1	I: 65256 0	C: 02634 1
34,2170	I: 74346 0	I: 77626 0	C: 62043 1	C: 02634 1	I: 74356 1	I: 53455 0	C: 01734 0	C: 01734 0
34,2200	I: 53435 0	C: 01750 1	I: 77676 0	C: 01742 1	I: 45345 1	C: 15334 1	C: 02634 1	I: 65215 1
34,2210	C: 02401 0	C: 03301 0	I: 45565 0	C: 74476 1	I: 77414 0	C: 01462 0	05402 1	C: 04023 1
34,2220	00006 1	32303 0	53062 0	37652 1	55277 0	04611 0	00004 0	44772 0
34,2230	55267 1	40025 1	65017 1	10000 0	12237 1	12237 1	34772 1	64770 0
34,2240	05233 0	C: 02652 1	C: 76066 0	05362 0	C: 00003 1	C: 00025 0	04655 0	C: 77154 1
34,2250	00004 0	11166 0	05205 0	11126 1	12260 0	12260 0	12260 0	12011 1
34,2260	41021 1	00006 1	62270 0	10024 0	12017 1	00006 1	31127 1	12022 1
34,2270	00006 1	32276 0	12023 0	C: 77766 0	C: 00011 1	C: 77764 1	C: 00013 0	C: 02225 0
34,2300	C: 71704 1	C: 41735 0	C: 02304 1	C: 70066 0	06006 1	I: 77624 1	C: 70537 1	I: 77776 1
34,2310	05402 1	C: 00035 1	32617 0	04636 0	C: 20721 1	34757 0	05135 0	C: 02342 0
34,2320	C: 70066 0	41501 0	74766 0	27501 0	04714 1	C: 42425 1	34770 0	55714 0
34,2330	05314 1	I: 40220 0	C: 02241 1	C: 00001 0	I: 77745 1	C: 15336 0	C: 14007 0	C: 15334 1
34,2340	C: 34011 0	C: 26531 1	30102 1	74076 0	00006 1	12347 1	05205 0	34757 0
34,2350	00006 1	02030 0	00006 1	12505 1	11714 0	12360 1	12510 0	12510 0
34,2360	41702 1	60025 0	00006 1	62612 0	54154 0	55704 1	61703 1	00006 1
34,2370	62372 0	02612 0	30024 1	00006 1	62376 1	02612 0	31661 1	54001 1

OCTAL LISTING FOR PARAGRAPH # 201, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2400	32616 1	07164 0	34772 1	54163 1	06006 1	I: 54201 0	C: 00001 0	C: 20206 1
34,2410	I: 77606 1	I: 77650 1	C: 67672 0	C: 14021 1	C: 01152 0	I: 41405 0	C: 00001 0	I: 72405 0
34,2420	C: 01154 0	I: 41325 0	C: 01146 0	C: 00003 1	I: 72415 1	I: 77626 0	C: 63755 0	I: 72405 0
34,2430	C: 01146 0	I: 41325 0	C: 01154 0	C: 00003 1	I: 72425 1	I: 77626 0	C: 77754 1	I: 77751 1
34,2440	C: 00021 1	C: 03077 1	I: 77776 1	31714 1	10000 0	02466 1	02474 1	06006 1
34,2450	I: 76351 1	C: 03316 0	C: 03077 1	C: 03077 1	I: 77776 1	31476 0	02620 1	55476 1
34,2460	31477 1	02620 1	55477 0	31500 0	02620 1	55500 1	04636 0	C: 42425 1
34,2470	34125 0	04636 0	C: 01731 0	02342 0	41476 1	55715 1	41477 0	55716 1
34,2500	41500 1	55717 0	44770 1	55714 0	02447 1	31714 1	00006 1	62360 0
34,2510	41501 0	74766 0	27501 0	04636 0	C: 42425 1	36211 0	04636 0	C: 01731 0
34,2520	11714 0	02531 1	02523 1	34770 0	55714 0	44760 0	00006 1	03012 1
34,2530	02466 1	34760 1	00006 1	05012 1	34772 1	55714 0	02466 1	I: 51575 1
34,2540	C: 01036 0	C: 27723 1	C: 01030 0	I: 50256 0	C: 01036 0	I: 77752 1	C: 17741 0	C: 05173 1
34,2550	I: 77214 0	C: 00355 1	C: 70555 0	C: 02026 1	I: 60446 1	I: 77621 1	C: 00045 0	C: 03737 1
34,2560	I: 77616 0	31705 1	00006 1	20154 0	50120 1	54000 0	31706 1	00006 1
34,2570	20155 1	50120 1	54002 1	31707 0	00006 1	20156 1	50120 1	54004 1

34,2600	16030 0	30154 1	00006 1	71701 1	00006 1	66030 1	22007 0	34772 1
34,2610	52155 1	06030 1	06006 1	I: 52001 1	C: 00001 0	C: 67750 1	C: 01673 1	C: 01476 0
34,2620	00006 1	71720 1	20001 1	20001 1	00002 0	37650 0	55262 1	05176 1
34,2630	37700 1	55722 0	06006 1	I: 77634 0	C: 51751 0	C: 01010 1	I: 77624 1	C: 22327 1
34,2640	I: 77624 1	C: 56523 0	I: 77776 1	31722 1	00006 1	12650 1	00006 1	62666 0
34,2650	36211 0	05607 0	C: 01722 1	C: 01061 1	37700 1	55722 0	05547 1	C: 00217 0
34,2660	06006 1	I: 45014 0	C: 04667 1	C: 22327 1	I: 77650 1	C: 70761 0	06006 1	I: 77624 1
34,2670	C: 22327 1	I: 77624 1	C: 56523 0	I: 43014 0	C: 04746 0	C: 70642 0	C: 05346 0	C: 70642 0
34,2700	I: 77634 0	C: 51751 0	I: 45225 0	C: 14651 0	C: 01010 1	I: 77440 1	C: 70642 0	00004 0
34,2710	44777 0	00006 1	03013 0	00006 1	00004 0	54001 1	74342 1	40000 0
34,2720	64763 1	74342 1	55064 0	67701 0	00006 1	62713 0	34322 0	00006 1
34,2730	05013 0	40001 1	55063 1	00003 1	00006 1	30025 0	53062 0	05561 0
34,2740	C: 00043 0	05205 0	05632 0	11703 0	02750 1	03424 0	03406 0	03406 0
34,2750	06006 1	I: 41335 1	C: 03704 1	C: 16535 0	C: 01114 1	I: 71214 0	C: 04467 0	C: 01062 1
34,2760	C: 01010 1	I: 77624 1	C: 60435 0	I: 77624 1	C: 56603 1	I: 45014 0	C: 01671 0	C: 71327 1
34,2770	I: 45014 0	C: 02464 0	C: 71336 1	I: 77614 1	C: 05310 0	C: 47030 1	I: 77614 1	C: 02716 0

OCTAL LISTING FOR PARAGRAPH # 202, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,3000	C: 71017 1	I: 77745 1	C: 15336 0	C: 14772 0	C: 02001 1	C: 34001 1	C: 56612 1	I: 71214 0
34,3010	C: 05267 1	C: 01062 1	C: 03736 0	I: 66214 0	C: 05273 1	C: 02551 1	C: 00001 0	I: 77614 1
34,3020	C: 02476 0	I: 52375 1	C: 01054 1	C: 01046 1	C: 03531 0	I: 43056 0	C: 04707 0	C: 71251 1
34,3030	C: 01130 1	I: 74014 1	C: 02744 1	C: 71047 1	C: 01061 1	I: 77624 1	C: 47017 1	C: 25072 0
34,3040	C: 01130 1	I: 40035 0	C: 01072 0	C: 71044 1	I: 40056 0	C: 71375 0	C: 01102 0	I: 77624 1
34,3050	C: 46756 1	I: 77214 0	C: 00707 1	C: 71057 0	C: 03502 0	I: 77676 0	C: 03502 0	I: 77624 1
34,3060	C: 22327 1	I: 77614 1	C: 01341 0	C: 71302 0	I: 43345 1	C: 16457 0	C: 16461 0	C: 27526 0
34,3070	C: 03531 0	I: 60246 1	C: 00047 1	I: 41316 0	C: 03526 0	I: 45070 1	C: 00046 0	C: 56603 1
34,3100	I: 56070 0	C: 00047 1	C: 00047 1	I: 72257 1	C: 20577 0	C: 00155 0	C: 03526 0	I: 54335 0
34,3110	C: 02400 1	C: 20632 1	I: 47171 0	C: 03526 0	C: 45657 1	C: 03526 0	I: 76214 1	C: 04747 1
34,3120	C: 71127 0	C: 03005 1	I: 72244 0	C: 71127 0	C: 03005 1	I: 77646 0	C: 03526 0	I: 45014 0
34,3130	C: 02666 0	C: 75260 1	I: 77624 1	C: 22327 1	I: 45014 0	C: 02744 1	C: 71176 1	C: 56603 1
34,3140	I: 51575 1	C: 01122 1	I: 77657 0	C: 57176 0	C: 27504 0	C: 01114 1	I: 53646 0	C: 57176 0
34,3150	C: 03502 0	I: 43131 0	C: 03506 1	C: 00002 0	C: 04707 0	C: 71163 0	I: 66214 0	C: 05303 1
34,3160	C: 71375 0	C: 03506 1	C: 00001 0	I: 77735 0	C: 02003 0	I: 45261 0	C: 20613 1	C: 03502 0
34,3170	I: 67240 0	C: 71345 0	C: 02004 1	I: 50025 0	C: 03504 0	C: 71345 0	I: 77624 1	C: 75472 1
34,3200	I: 71214 0	C: 02744 1	C: 71217 0	C: 01062 1	C: 03734 1	I: 67214 1	C: 05272 0	C: 02551 1
34,3210	I: 45254 0	C: 71217 0	C: 07142 1	I: 66240 1	C: 71237 1	C: 02551 1	C: 00000 1	I: 43014 0
34,3220	C: 04707 0	C: 71307 0	C: 02744 1	C: 71315 0	I: 77624 1	C: 56603 1	I: 45014 0	C: 00707 1
34,3230	C: 71323 0	C: 71336 1	I: 77624 1	C: 22327 1	I: 77614 1	C: 02624 0	C: 71021 1	I: 77735 0
34,3240	C: 02551 1	C: 37732 0	C: 22327 1	I: 62150 1	C: 03731 1	C: 00001 0	I: 52130 1	C: 02550 0
34,3250	C: 71217 0	C: 27502 0	C: 15336 0	C: 03510 0	C: 27516 0	C: 03531 0	I: 71256 0	C: 01114 1
34,3260	I: 60414 0	C: 04303 0	C: 71263 0	I: 43025 1	C: 00045 0	C: 02464 0	C: 03524 1	I: 77214 0
34,3270	C: 00747 0	C: 71275 1	C: 03502 0	I: 77676 0	C: 03502 0	I: 77624 1	C: 22327 1	I: 52145 0
34,3300	C: 03003 1	C: 71067 0	I: 43335 0	C: 01350 0	C: 16461 0	I: 77650 1	C: 71067 0	I: 62150 1
34,3310	C: 00771 0	C: 00001 0	I: 52130 1	C: 00771 0	C: 71375 0	I: 62150 1	C: 00772 0	C: 00001 0
34,3320	I: 52130 1	C: 00772 0	C: 71375 0	I: 77624 1	C: 71327 1	I: 77650 1	C: 71232 1	I: 53775 1
34,3330	C: 01573 1	C: 57167 0	I: 77655 1	C: 01607 1	C: 01046 1	I: 77616 0	I: 53775 1	C: 01645 1
34,3340	C: 57167 0	I: 77655 1	C: 01661 1	C: 01054 1	I: 77616 0	I: 77776 1	34772 1	55135 0
34,3350	05402 1	C: 04022 0	37651 1	05121 0	C: 03366 1	C: 70067 1	06006 1	C: 00155 0
34,3360	I: 53135 0	C: 01136 1	C: 71357 0	I: 52040 1	C: 71176 1	C: 71375 0	35030 1	04636 0
34,3370	C: 20753 1	04546 1	44770 1	55135 0	05205 0	I: 77624 1	C: 22327 1	I: 43014 0

OCTAL LISTING FOR PARAGRAPH # 203, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,3400	C: 04670 1	C: 05263 0	I: 52014 0	C: 04707 0	C: 70636 0	C: 70667 1	31703 1	74750 0
34,3410	54154 0	06006 1	I: 41335 1	C: 00155 0	C: 16535 0	I: 52015 1	C: 16535 0	C: 70754 0
34,3420	31113 0	00006 1	13424 1	05644 1	06006 1	I: 77745 1	C: 01062 1	C: 01010 1
34,3430	I: 77650 1	C: 70636 0	I: 40220 0	C: 03704 1	C: 00001 0	I: 77634 0	C: 51751 0	C: 36307 0
34,3440	C: 73171 1	I: 71214 0	C: 05266 0	C: 02307 1	I: 51025 1	C: 33161 1	C: 71451 1	I: 77614 1
34,3450	C: 05066 1	I: 77776 1	05354 0	C: 00033 1	04415 0	11340 0	03560 1	03461 1
34,3460	03461 1	40107 0	74761 1	10000 0	03505 1	34767 0	55611 1	51611 0
34,3470	30032 0	00006 1	51611 0	21307 0	54154 0	06006 1	I: 45246 0	C: 16645 1
34,3500	I: 77444 0	C: 71566 1	11611 1	03466 0	03545 0	31572 0	55175 1	31573 1
34,3510	55171 0	31574 0	55173 1	06006 1	I: 45175 0	C: 03351 0	C: 47642 1	I: 50206 0
34,3520	C: 03357 0	I: 50025 0	C: 16641 0	C: 71566 1	I: 47375 0	C: 00001 0	C: 03357 0	I: 41561 0
34,3530	C: 16644 0	I: 45246 0	C: 16642 0	I: 77240 1	C: 71540 0	I: 74256 0	C: 16642 0	I: 41572 1
34,3540	I: 74375 0	C: 00007 0	C: 16637 1	C: 03212 0	I: 77776 1	37673 1	05654 0	13550 0
34,3550	67671 0	00006 1	13554 1	03560 1	40075 1	74753 0	10000 0	03600 1
34,3560	06006 1	I: 77614 1	C: 00273 1	I: 52135 1	C: 15336 0	C: 03704 1	I: 77614 1	C: 00153 0
34,3570	C: 44001 0	I: 77414 0	C: 01700 1	C: 73166 1	34766 1	00006 1	05011 1	03560 1
34,3600	06006 1	I: 43001 1	C: 00001 0	C: 04346 1	C: 71610 0	I: 53145 1	C: 02307 1	C: 73162 0
34,3610	I: 52375 1	C: 03204 1	C: 03715 1	I: 57456 1	I: 74235 0	C: 03707 1	C: 16646 1	I: 60325 0
34,3620	C: 02307 1	C: 00047 1	I: 60325 0	C: 00045 0	C: 00051 0	I: 70460 1	C: 00050 1	I: 74271 0
34,3630	I: 53721 0	C: 01734 0	C: 20163 1	I: 53214 0	C: 05707 1	C: 71637 0	C: 03212 0	C: 00025 0
34,3640	I: 77761 1	C: 16650 0	C: 37212 1	C: 47530 1	I: 45001 1	C: 00001 0	C: 47743 1	I: 70575 1
34,3650	C: 03204 1	C: 34017 0	C: 47530 1	I: 45175 0	C: 00025 0	C: 47633 1	I: 77721 0	C: 16652 1
34,3660	I: 76561 1	C: 15272 1	I: 77776 1	00004 0	40107 0	74761 1	10000 0	03710 1
34,3670	34767 0	55611 1	60000 1	60120 1	55612 1	51611 0	31307 1	00006 1
34,3700	51611 0	21572 1	00006 1	73755 1	51612 0	20017 0	11611 1	13671 0
34,3710	31572 0	55646 0	31573 1	55650 1	31574 0	55652 0	00006 1	30155 0
34,3720	53526 0	00006 1	30160 0	53530 1	00006 1	30162 1	53532 0	00006 1
34,3730	50120 1	30017 1	53576 0	00006 1	50120 1	30021 1	53600 1	00006 1
34,3740	50120 1	30023 0	53602 0	44770 1	55340 0	00003 1	03560 1	I: 43234 0
34,3750	C: 51751 0	C: 33574 1	I: 52015 1	C: 03317 1	C: 71437 1	C: 00122 0	C: 24775 1	C: 30424 0
34,3760	C: 06220 1	C: 37553 0	C: 37777 1	C: 37700 1	C: 00000 1	C: 00100 0	C: 04000 0	C: 00000 1
34,3770	C: 02000 0	C: 00000 1	C: 03772 0	C: 03773 1	CKSM 45775 0	@	@	@

OCTAL LISTING FOR PARAGRAPH # 204, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2000	04553 0	02003 0	04565 0	04572 0	06006 1	I: 71214 0	C: 05274 0	C: 32205 1
35,2010	C: 17754 1	C: 15336 0	C: 03744 0	C: 03766 0	I: 77776 1	34532 1	05535 1	34533 0
35,2020	05535 1	06006 1	I: 71214 0	C: 01270 0	C: 03663 1	C: 17413 1	C: 03744 0	I: 43054 1
35,2030	C: 72032 0	C: 01070 1	I: 77624 1	C: 11217 0	I: 43145 0	C: 15336 0	C: 03461 1	I: 43014 0
35,2040	C: 01310 1	C: 72043 0	C: 03661 0	C: 02355 0	I: 43345 1	C: 03663 1	C: 02355 0	C: 34041 0
35,2050	C: 45236 1	I: 77624 1	C: 72251 1	I: 77454 1	C: 72065 1	05671 1	C: 00611 1	35023 0
35,2060	04636 0	C: 20743 0	04103 1	02003 0	02055 0	I: 43014 0	C: 03601 0	C: 72044 1
35,2070	C: 01310 1	C: 72100 0	I: 77776 1	34533 0	05535 1	06006 1	I: 77650 1	C: 72120 1
35,2100	I: 77776 1	34532 1	05535 1	06006 1	I: 43014 0	C: 01351 1	C: 72120 1	C: 05350 1
35,2110	C: 72120 1	I: 43145 0	C: 15336 0	C: 01270 0	C: 17744 0	C: 03663 1	C: 37413 0	C: 72034 0
35,2120	I: 71201 1	C: 00001 0	C: 03746 1	C: 14047 1	C: 03754 1	I: 71406 0	C: 16734 0	I: 77756 0
35,2130	C: 26732 0	C: 03554 0	I: 77657 0	C: 57176 0	C: 26657 1	C: 03562 0	I: 43057 1	C: 57176 0
35,2140	C: 03466 0	C: 36746 1	C: 25002 1	I: 77745 1	C: 03663 1	C: 03503 1	I: 77615 0	C: 00037 0
35,2150	C: 37656 0	C: 72561 0	I: 51575 1	C: 03646 0	C: 26635 0	C: 03640 0	I: 51451 0	C: 03620 0
35,2160	C: 26637 1	C: 03540 0	I: 45115 0	C: 03612 1	C: 45174 1	I: 77624 1	C: 45330 0	C: 16641 0
35,2170	C: 03663 1	C: 03413 1	I: 77776 1	34534 1	05535 1	06006 1	I: 77624 1	C: 72774 0
35,2200	I: 77624 1	C: 73027 0	I: 77650 1	C: 72034 0	C: 13434 0	C: 16163 1	04553 0	00006 1
35,2210	31422 1	02215 0	04565 0	00006 1	31424 1	53755 0	04572 0	06006 1
35,2220	I: 77624 1	C: 11217 0	I: 77634 0	C: 51751 0	C: 03665 1	I: 77615 0	C: 02355 0	C: 03413 1
35,2230	C: 03503 1	C: 34041 0	C: 45236 1	I: 77624 1	C: 74000 1	I: 77624 1	C: 72561 0	I: 77624 1
35,2240	C: 72774 0	I: 43014 0	C: 01351 1	C: 72245 1	C: 05067 0	I: 77624 1	C: 73027 0	I: 77650 1
35,2250	C: 72222 0	I: 66220 1	C: 01023 1	C: 03665 1	C: 40000 0	I: 40345 1	C: 33145 1	C: 00001 0
35,2260	C: 27454 1	C: 03540 0	C: 27576 0	C: 03546 0	C: 27570 0	C: 03554 0	C: 27620 0	C: 03562 0
35,2270	C: 03612 1	I: 77624 1	C: 74000 1	I: 63235 0	C: 03540 0	I: 53515 0	C: 03540 0	I: 46315 1
35,2300	I: 51352 1	C: 02625 1	I: 63256 0	I: 63241 0	C: 00001 0	I: 75241 1	C: 02625 1	I: 65552 0
35,2310	I: 50315 0	C: 02625 1	C: 03540 0	I: 71244 0	C: 72317 1	C: 15344 0	I: 41425 1	I: 71214 0
35,2320	C: 03741 0	C: 72546 0	C: 03452 1	C: 14033 1	I: 77625 0	C: 03744 0	C: 03452 1	I: 45246 0
35,2330	C: 33151 1	I: 77640 0	C: 72556 1	I: 70535 0	C: 03665 1	I: 72030 1	C: 01023 1	C: 00154 1
35,2340	I: 77330 1	C: 03664 0	C: 03554 0	I: 65256 0	C: 00045 0	I: 53515 0	C: 03540 0	I: 77725 1
35,2350	I: 41525 0	C: 00045 0	I: 77621 1	C: 00015 0	C: 14037 0	C: 15334 1	I: 41425 1	C: 03744 0
35,2360	I: 50165 0	C: 00037 0	C: 01023 1	I: 71545 0	I: 56205 0	C: 00017 1	C: 00015 0	I: 77676 0
35,2370	C: 00035 1	I: 44246 1	C: 15334 1	I: 77240 1	C: 01023 1	C: 02617 0	I: 53435 0	C: 00007 0

OCTAL LISTING FOR PARAGRAPH # 205, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2400	I: 41241 0	C: 03546 0	C: 00015 0	I: 47315 0	C: 00001 0	C: 03562 0	I: 53435 0	C: 00001 0
35,2410	I: 41241 0	C: 03562 0	C: 00017 1	I: 77621 1	I: 63301 0	C: 00047 1	C: 00007 0	I: 50235 0
35,2420	C: 00001 0	C: 02617 0	I: 50315 0	C: 00001 0	C: 00007 0	I: 65552 0	I: 77765 0	I: 43225 0
35,2430	C: 15334 1	C: 03744 0	I: 65525 0	C: 00035 1	I: 75221 1	C: 15334 1	C: 00037 0	I: 77615 0
35,2440	I: 56205 0	C: 33143 1	I: 77605 1	I: 41257 1	C: 20176 0	I: 51406 1	I: 50025 0	C: 03454 1
35,2450	C: 72454 1	I: 75345 1	C: 03454 1	I: 77606 1	I: 51135 1	C: 03665 1	C: 72464 1	I: 71331 0
35,2460	C: 03665 1	C: 37777 1	I: 77650 1	C: 72522 1	I: 41345 0	C: 03452 1	C: 00033 1	I: 71244 0
35,2470	C: 72500 1	C: 03454 1	I: 77605 1	C: 33147 0	C: 17454 1	I: 70446 0	I: 52076 1	C: 72510 0
35,2500	I: 51545 1	C: 03452 1	I: 51525 1	C: 00033 1	I: 77625 0	I: 71240 1	C: 72513 0	I: 77646 0
35,2510	I: 52165 1	C: 03450 0	C: 72522 1	I: 57545 1	C: 03450 0	I: 70406 1	C: 03450 0	I: 77615 0
35,2520	I: 77650 1	C: 72523 0	C: 03450 0	I: 77615 0	C: 02355 0	C: 02355 0	I: 63375 0	C: 03570 0
35,2530	C: 03576 0	I: 77624 1	C: 72734 1	I: 77624 1	C: 45304 1	I: 63375 0	C: 03612 1	C: 03620 0
35,2540	I: 77624 1	C: 72734 1	I: 77624 1	C: 45314 0	I: 77650 1	C: 72271 0	I: 43345 1	C: 03663 1
35,2550	C: 02355 0	C: 17663 1	I: 77614 1	C: 01310 1	C: 72556 1	C: 03744 0	I: 52145 0	C: 15336 0
35,2560	C: 01023 1	I: 77220 1	C: 02360 0	C: 03562 0	I: 65315 0	C: 03554 0	C: 03503 1	I: 65325 0
35,2570	C: 03656 1	C: 33143 1	I: 46125 0	C: 03766 0	C: 72577 1	I: 65345 0	C: 15336 0	I: 77624 1
35,2600	C: 72740 1	C: 27415 1	C: 00007 0	C: 27640 0	C: 03415 1	I: 63256 0	C: 03540 0	I: 41456 0
35,2610	I: 50235 0	C: 00001 0	C: 02617 0	I: 77715 1	I: 72441 0	C: 00001 0	I: 75326 1	I: 43244 1
35,2620	C: 72622 1	C: 15344 0	C: 16633 0	C: 03656 1	I: 77625 0	C: 03503 1	C: 03423 1	I: 40335 0
35,2630	C: 03766 0	C: 00001 0	I: 63325 0	C: 33156 0	C: 03540 0	C: 27570 0	C: 03546 0	C: 37576 1
35,2640	C: 22000 1	I: 77624 1	C: 72721 0	I: 64375 1	C: 03646 0	C: 00001 0	I: 77772 0	C: 37405 1
35,2650	C: 02360 0	I: 45020 1	C: 01023 1	C: 72721 0	I: 61375 1	C: 03405 0	C: 00001 0	I: 77772 0
35,2660	C: 03646 0	I: 63255 0	C: 03546 0	C: 03540 0	I: 65325 0	C: 03413 1	C: 03656 1	I: 41525 0
35,2670	C: 15344 0	I: 77624 1	C: 72740 1	I: 77775 1	C: 00001 0	C: 03415 1	I: 41575 0	C: 02625 1
35,2700	I: 57435 1	C: 02617 0	I: 41456 0	I: 76435 1	C: 02625 1	I: 77715 1	I: 64315 1	C: 03646 0
35,2710	C: 00001 0	I: 77772 0	C: 36611 1	C: 01023 1	I: 40220 0	C: 01023 1	C: 00001 0	I: 77650 1
35,2720	C: 72676 0	I: 57575 1	C: 02617 0	C: 24007 0	C: 03540 0	I: 57456 1	C: 00015 0	I: 76435 1
35,2730	C: 02617 0	C: 00001 0	I: 43401 0	C: 00023 0	I: 65325 0	C: 15336 0	C: 02355 0	I: 41406 0
35,2740	I: 45020 1	C: 02357 1	C: 27516 0	I: 71214 0	C: 01673 1	I: 43054 1	C: 72750 0	C: 01473 0
35,2750	I: 45545 1	C: 63736 0	I: 73014 0	C: 00063 1	C: 03746 1	I: 43014 0	C: 04303 0	C: 72761 1
35,2760	C: 00263 0	C: 25517 0	I: 77657 0	C: 57176 0	C: 25535 0	I: 77657 0	C: 57176 0	C: 35543 0
35,2770	C: 27211 0	I: 52175 0	C: 00001 0	C: 02357 1	I: 43020 1	C: 02360 0	C: 01311 0	C: 73003 0

OCTAL LISTING FOR PARAGRAPH # 206, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3000	I: 52014 0	C: 00470 1	C: 73005 0	I: 77614 1	C: 05074 1	I: 77775 1	C: 03405 0	C: 03620 0
35,3010	I: 77776 1	34535 0	05535 1	06006 1	I: 52375 1	C: 03405 0	C: 03620 0	I: 53046 0
35,3020	C: 73023 1	I: 77624 1	C: 72651 0	I: 77624 1	C: 72714 0	I: 77650 1	C: 02360 0	I: 71220 1
35,3030	C: 02360 0	C: 33154 1	C: 03626 0	I: 71214 0	C: 01351 1	C: 73055 0	C: 33154 1	I: 77615 0
35,3040	C: 33154 1	C: 03626 0	I: 77414 0	C: 01742 1	C: 73055 0	03137 1	03050 1	03056 1
35,3050	06006 1	I: 41575 0	C: 03646 0	I: 77624 1	C: 56444 0	I: 77776 1	03525 0	31760 1
35,3060	55756 0	04636 0	C: 01730 1	34536 0	04636 0	C: 20743 0	04103 1	03071 1
35,3070	03101 1	40076 1	74763 0	00006 1	13113 0	05402 1	C: 04024 0	05547 1
35,3100	C: 00047 1	05561 0	C: 00155 0	33136 0	54373 1	05402 1	C: 00014 1	06006 1
35,3110	I: 52014 0	C: 00670 0	C: 02356 0	05402 1	C: 04024 0	06006 1	I: 77745 1	C: 03413 1
35,3120	C: 03450 0	I: 43014 0	C: 05316 0	C: 73125 0	C: 05072 1	I: 71214 0	C: 05350 1	C: 73132 0
35,3130	C: 33135 0	C: 02001 1	I: 77776 1	14105 0	C: 00023 0	C: 00144 0	C: 73112 1	37677 0
35,3140	71214 0	15651 1	C: 14441 0	C: 37325 1	C: 00001 0	C: 20650 0	C: 12525 0	C: 12525 0
35,3150	C: 00004 0	C: 21505 1	C: 00002 0	C: 77777 0	C: 61337 1	C: 01252 0	C: 25253 1	C: 01473 0
35,3160	C: 00022 1	C: 20476 0	I: 77775 1	C: 15336 0	C: 34017 0	C: 71662 0	I: 52135 1	C: 16674 0
35,3170	C: 03704 1	I: 71220 1	C: 03705 0	C: 02307 1	C: 34041 0	C: 27170 1	I: 77775 1	C: 00001 0
35,3200	C: 27707 1	C: 00007 0	C: 03715 1	I: 77635 1	C: 03707 1	C: 03357 0	I: 71214 0	C: 04306 0
35,3210	C: 76425 0	C: 02307 1	C: 34041 0	C: 27202 1	I: 77775 1	C: 00007 0	C: 27204 1	C: 00001 0
35,3220	I: 53451 1	C: 03707 1	C: 17707 1	C: 00045 0	C: 26307 1	C: 03707 1	I: 77614 1	C: 05707 1
35,3230	C: 76462 0	I: 76521 0	C: 01734 0	C: 37357 1	C: 74437 1	C: 37351 1	C: 56225 1	C: 01310 1
35,3240	I: 77650 1	C: 03705 0	I: 70454 0	C: 73251 0	I: 77230 0	C: 73254 0	C: 03351 0	I: 77650 1
35,3250	C: 32042 0	I: 52175 0	C: 00003 1	C: 32042 0	I: 52175 0	C: 00011 1	C: 32042 0	I: 77775 1
35,3260	C: 15336 0	C: 17715 1	C: 15336 0	C: 26307 1	C: 03732 1	I: 53561 0	C: 33272 0	I: 77650 1
35,3270	C: 32042 0	C: 22363 1	C: 11623 0	I: 77775 1	C: 00031 0	I: 53361 0	C: 00007 0	C: 03351 0
35,3300	C: 27351 0	C: 00037 0	I: 53361 0	C: 00015 0	C: 03351 0	C: 27351 0	C: 00023 0	I: 77761 1
35,3310	C: 00003 1	C: 27357 0	C: 00031 0	I: 53361 0	C: 00011 1	C: 03357 0	C: 27357 0	C: 00037 0
35,3320	I: 53361 0	C: 00017 1	C: 03357 0	C: 27357 0	C: 00023 0	I: 77761 1	C: 00005 1	C: 24045 0
35,3330	C: 00031 0	I: 53361 0	C: 00013 0	C: 00045 0	C: 24045 0	C: 00037 0	I: 53361 0	C: 00021 1
35,3340	C: 00045 0	I: 77656 1	C: 24001 0	C: 03357 0	I: 77656 1	C: 27357 0	C: 03351 0	I: 77656 1
35,3350	C: 03351 0	I: 53435 0	C: 01742 1	C: 00007 0	I: 77641 1	C: 00001 0	C: 24021 1	C: 00007 0
35,3360	I: 77641 1	C: 03357 0	C: 34023 1	C: 47311 1	C: 24031 0	C: 00007 0	I: 50235 0	C: 03351 0
35,3370	C: 01742 1	I: 77752 1	C: 24021 1	C: 01742 1	I: 77641 1	C: 03351 0	C: 34023 1	C: 47311 1

OCTAL LISTING FOR PARAGRAPH # 207, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3400	C: 00035 1	I: 45246 0	C: 07527 0	I: 77644 1	C: 73425 0	I: 50375 0	C: 01750 1	C: 00007 0
35,3410	C: 24021 1	C: 01734 0	I: 77641 1	C: 00007 0	C: 34023 1	C: 47311 1	C: 00033 1	I: 47175 1
35,3420	C: 00031 0	C: 45644 0	C: 01310 1	I: 77650 1	C: 03705 0	I: 77776 1	05671 1	C: 00401 1
35,3430	06006 1	I: 77650 1	C: 73405 1	05547 1	C: 00027 1	05547 1	C: 00031 0	35026 0
35,3440	05535 1	34535 0	05535 1	05547 1	C: 00045 0	06006 1	I: 71214 0	C: 00670 0
35,3450	C: 03413 1	C: 34041 0	C: 27145 1	I: 67175 0	C: 00007 0	C: 03746 1	C: 27640 0	C: 00001 0
35,3460	C: 03632 0	C: 03540 0	I: 53435 0	C: 03640 0	C: 36617 1	C: 72721 0	I: 61375 1	C: 03405 0
35,3470	C: 00001 0	I: 66172 0	C: 03745 1	C: 03646 0	I: 77646 0	C: 27763 0	C: 03632 0	I: 53315 0
35,3500	C: 03646 0	C: 03640 0	I: 77624 1	C: 54021 0	I: 77776 1	33553 1	05535 1	06006 1
35,3510	I: 77214 0	C: 01742 1	C: 73544 0	C: 03646 0	I: 45006 0	C: 56444 0	I: 77776 1	03525 0
35,3520	34536 0	05535 1	05561 0	C: 00155 0	14103 0	00006 1	23272 1	05547 1
35,3530	C: 00155 0	34772 1	54777 1	34770 0	05233 0	C: 03225 1	C: 50067 0	05362 0
35,3540	C: 40036 0	C: 05024 1	C: 13000 0	01272 1	I: 57545 1	C: 33552 0	C: 03626 0	I: 77634 0
35,3550	C: 73517 0	C: 00000 1	C: 35100 0	C: 01452 0	C: 00004 0	C: 31566 0	C: 00002 0	C: 27311 1
35,3560	C: 00003 1	C: 34661 1	C: 00000 1	C: 06433 0	C: 00000 1	C: 12326 0	03525 0	04655 0
35,3570	C: 50237 1	C: 00002 0	C: 00000 1	C: 00000 1	C: 04000 0	C: 00000 1	C: 00010 0	C: 00000 1
35,3600	C: 00001 0	C: 77777 0	C: 77557 0	C: 77777 0	C: 77760 0	C: 00000 1	C: 00012 1	C: 54631 1
35,3610	C: 63145 1	C: 21463 0	C: 06315 0	C: 77777 0	C: 77766 0	C: 77777 0	C: 77767 1	C: 00000 1
35,3620	C: 35610 0	C: 37405 1	C: 12250 0	C: 33041 1	C: 37714 1	C: 00003 1	C: 13241 1	C: 00605 1
35,3630	C: 00612 1	C: 40214 1	C: 45266 1	C: 73645 1	C: 56536 1	C: 70467 0	C: 71205 0	C: 16525 1
35,3640	C: 12525 0	C: 22525 0	C: 12525 0	C: 17775 1	C: 06676 0	C: 00000 1	C: 00062 0	C: 00020 0
35,3650	C: 14223 1	C: 00000 1	C: 05174 0	C: 00000 1	C: 01654 1	C: 00000 1	C: 00764 1	C: 00000 1
35,3660	C: 00322 1	C: 75725 0	C: 75417 1	C: 00325 0	C: 23740 0	C: 00306 1	C: 06614 1	C: 76027 0
35,3670	C: 70156 1	C: 74517 1	C: 54131 0	C: 30276 1	C: 05001 0	C: 00003 1	C: 27040 0	I: 43020 1
35,3700	C: 02310 1	C: 02716 0	C: 73753 1	I: 77614 1	C: 01711 1	C: 73753 1	I: 45174 1	C: 00002 0
35,3710	C: 27516 0	I: 77014 1	C: 00315 0	C: 73715 0	C: 00000 1	I: 53775 1	C: 01030 0	C: 57176 0
35,3720	C: 01503 0	C: 15535 0	C: 01044 0	C: 25517 0	C: 01036 0	I: 45057 1	C: 57176 0	C: 23434 0
35,3730	I: 77634 0	C: 26774 1	I: 43014 0	C: 04063 0	C: 00315 0	C: 73740 0	I: 77614 1	C: 04263 1
35,3740	I: 71214 0	C: 04307 1	C: 75735 1	C: 01044 0	C: 34041 0	C: 26744 1	I: 45014 0	C: 01674 0
35,3750	C: 27236 0	I: 77650 1	C: 02310 1	I: 45145 0	C: 01044 0	C: 27516 0	I: 43014 0	C: 01476 0
35,3760	C: 04476 0	I: 43014 0	C: 01675 1	C: 01474 1	C: 34041 0	C: 27236 0	I: 77650 1	C: 73706 1
35,3770	C: 03770 1	C: 03771 0	CKSM 51120 0	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 210, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2000	I: 52375 1	C: 03554 0	C: 03540 0	I: 41456 0	C: 26625 1	C: 03540 0	I: 53435 0	C: 03546 0
36,2010	C: 02617 0	I: 77616 0	32015 1	05535 1	14103 0	C: 04137 0	04636 0	C: 03731 1
36,2020	31655 0	55773 1	06006 1	I: 43014 0	C: 00667 0	C: 01460 1	I: 66214 0	C: 00472 0
36,2030	C: 00777 0	C: 00000 1	I: 77414 0	C: 05310 0	C: 74050 1	34124 1	04636 0	C: 21074 1
36,2040	04103 1	12043 0	12035 1	30776 1	76214 1	10000 0	02061 1	06006 1
36,2050	I: 77745 1	C: 34467 0	C: 17740 1	C: 15336 0	C: 03742 0	C: 01353 0	I: 77414 0	C: 05310 0
36,2060	C: 74104 1	32470 0	05535 1	32472 1	05540 0	12075 0	30776 1	74767 1
36,2070	10000 0	05205 0	34773 0	05516 0	05205 0	30776 1	74766 0	00006 1
36,2100	12105 0	05547 1	C: 00254 1	12107 1	I: 77776 1	05561 0	C: 00254 1	30776 1
36,2110	76214 1	10000 0	12220 1	05561 0	C: 00176 1	05547 1	C: 00027 1	05362 0
36,2120	C: 00004 0	C: 05022 1	C: 26000 0	34760 1	70104 0	10000 0	12150 0	06006 1
36,2130	I: 77634 0	C: 51751 0	C: 35062 0	C: 60435 0	I: 77776 1	05547 1	C: 00010 0	37650 0
36,2140	05135 0	C: 02625 1	C: 70067 1	05362 0	C: 00072 1	C: 00111 0	04112 1	12157 1
36,2150	35047 1	05135 0	C: 02711 1	C: 26063 0	05362 0	C: 00052 0	C: 00111 0	35053 1
36,2160	05176 1	34764 0	70075 1	00006 1	12416 1	34754 0	70077 0	00006 1
36,2170	12416 1	34772 1	55774 0	30104 1	74760 0	10000 0	02263 1	05547 1
36,2200	C: 00037 0	04636 0	C: 76333 0	40106 1	74752 1	00006 1	14116 1	05547 1
36,2210	C: 00024 1	06006 1	I: 77624 1	C: 31005 0	I: 77776 1	04636 0	C: 16073 1	12416 1
36,2220	55351 0	05547 1	C: 00176 1	05561 0	C: 00010 0	11351 0	02255 1	32471 1
36,2230	05535 1	11140 1	62475 0	10000 0	12253 0	12237 1	12237 1	31140 0
36,2240	55355 1	10000 0	12117 0	35035 1	05535 1	06006 1	I: 77775 1	C: 03705 0
36,2250	C: 03732 1	I: 77776 1	02117 1	04362 1	02227 1	35027 1	05535 1	00006 1
36,2260	31251 0	53356 1	12117 0	05561 0	C: 00037 0	11351 0	12271 0	04655 0
36,2270	C: 74454 1	00006 1	40025 1	52155 1	00006 1	31356 0	20155 1	07224 1
36,2300	10154 0	12314 1	12305 1	34772 1	54155 1	10155 1	12307 0	64770 0
36,2310	05233 0	C: 02320 1	C: 74066 1	05205 0	34750 1	04636 0	C: 01731 0	12271 0
36,2320	37650 0	05135 0	C: 02327 0	C: 74066 1	05547 1	C: 00205 0	05314 1	06006 1
36,2330	I: 47014 1	C: 00701 1	C: 44717 0	C: 44370 0	C: 37262 0	C: 74437 1	C: 03343 0	I: 77776 1
36,2340	00004 0	35007 0	55655 1	11773 1	64770 0	02347 0	64770 0	00006 1
36,2350	12352 0	55655 1	06006 1	I: 41335 1	C: 03373 0	C: 34474 1	I: 45002 1	C: 44522 1
36,2360	I: 41335 1	C: 03373 0	C: 34474 1	I: 64361 1	C: 03343 0	C: 05014 1	C: 27311 1	C: 15336 0
36,2370	C: 03275 1	I: 77776 1	05402 1	C: 00131 1	30075 0	74764 1	00006 1	12416 1

OCTAL LISTING FOR PARAGRAPH # 211, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2400	34755 1	55774 0	37650 0	05176 1	06006 1	I: 72364 0	C: 03320 0	C: 03262 1
36,2410	I: 45014 0	C: 04075 1	C: 44377 1	I: 77614 1	C: 01035 0	C: 45053 0	30105 0	00004 0
36,2420	74755 0	10000 0	12426 1	04636 0	C: 51203 1	12430 0	04636 0	C: 51217 1
36,2430	05561 0	C: 00205 0	05402 1	C: 00111 0	00004 0	04463 1	15205 1	I: 73545 1
36,2440	C: 03740 1	I: 65276 1	C: 03740 1	I: 41546 0	I: 73525 1	C: 03742 0	I: 72405 0	I: 77725 1
36,2450	I: 71525 0	C: 03742 0	I: 72405 0	I: 43466 1	40075 1	74764 1	10000 0	12416 1
36,2460	04636 0	C: 76333 0	35011 1	04636 0	C: 01731 0	02454 0	C: 74707 1	C: 43433 1
36,2470	C: 01516 1	C: 00306 1	C: 01517 0	C: 14631 0	C: 23146 0	C: 77730 0	05402 1	C: 00004 0
36,2500	06006 1	I: 66170 1	C: 04000 0	C: 03424 0	I: 77745 1	C: 15336 0	C: 03757 1	C: 03761 1
36,2510	I: 77776 1	35026 0	03246 1	12511 1	35033 1	03222 0	12514 1	06006 1
36,2520	I: 71331 0	C: 00122 0	C: 00000 1	C: 03757 1	C: 17632 0	C: 03761 1	C: 17634 0	C: 33572 1
36,2530	C: 17551 0	C: 33662 0	C: 37652 1	C: 64455 1	I: 71214 0	C: 02662 1	C: 03632 0	I: 51444 1
36,2540	C: 74550 1	C: 03632 0	I: 45345 1	C: 03646 0	C: 33664 0	I: 43040 1	C: 74550 1	C: 02462 0
36,2550	I: 77545 0	C: 03646 0	07171 1	C: 00002 0	C: 02544 0	C: 35436 0	C: 14040 0	C: 05066 1
36,2560	C: 44052 0	C: 60030 1	C: 26415 0	C: 25057 1	06006 1	I: 77752 1	C: 17654 0	C: 33614 1
36,2570	C: 17730 0	C: 33666 1	C: 17636 1	C: 03634 0	I: 44254 1	C: 74604 0	C: 15326 1	I: 71406 0
36,2600	I: 73525 1	I: 45465 1	C: 40051 1	C: 74617 1	I: 45345 1	C: 03646 0	C: 33664 0	I: 71240 1
36,2610	C: 74614 1	C: 33672 1	C: 37726 0	C: 74617 1	I: 77745 1	C: 33670 0	C: 03726 1	I: 77624 1
36,2620	C: 65102 1	I: 52054 1	C: 74624 1	C: 64272 1	I: 77775 1	C: 03640 0	C: 16657 1	C: 03636 1
36,2630	C: 26760 1	C: 03700 0	C: 36746 1	C: 64304 1	I: 77615 0	C: 03716 1	C: 17552 0	C: 03634 0
36,2640	I: 52054 1	C: 74643 0	C: 74665 1	I: 51575 1	C: 03710 1	I: 77776 1	07171 1	C: 00002 0
36,2650	C: 00000 1	C: 00000 1	C: 47021 1	C: 65002 0	C: 35610 0	C: 07722 1	C: 63772 0	C: 63276 1
36,2660	06006 1	I: 77615 0	C: 01343 1	I: 52052 1	C: 74667 0	I: 77745 1	C: 03726 1	I: 41425 1
36,2670	C: 03726 1	I: 53575 0	C: 03656 1	C: 36152 1	C: 26570 1	I: 77615 0	C: 33676 0	I: 45206 1
36,2700	C: 03636 1	I: 45246 0	C: 33646 0	I: 52040 1	C: 74706 0	C: 74713 1	I: 51545 1	C: 00001 0
36,2710	I: 50025 0	C: 33650 1	C: 74763 0	I: 43345 1	C: 03730 0	C: 33600 1	I: 67240 0	C: 74723 1
36,2720	C: 33630 1	I: 77650 1	C: 64272 1	C: 03730 0	I: 53025 0	C: 33616 0	C: 74744 0	I: 45345 1
36,2730	C: 00001 0	C: 03666 1	I: 65301 0	C: 00047 1	C: 03670 0	I: 56225 1	C: 03726 1	I: 53605 1
36,2740	C: 00001 0	C: 20201 0	I: 77650 1	C: 74746 1	I: 77745 1	C: 00001 0	C: 14021 1	I: 77626 0
36,2750	C: 60141 0	I: 77600 1	C: 74617 1	C: 17666 1	C: 03726 1	C: 17670 0	C: 00021 1	I: 77615 0
36,2760	C: 03726 1	C: 37726 0	C: 74617 1	I: 77624 1	C: 75007 1	I: 41345 0	C: 03720 1	C: 03744 0
36,2770	I: 53021 1	C: 03636 1	C: 75000 0	I: 71240 1	C: 75000 0	C: 15326 1	I: 77650 1	C: 75002 1

OCTAL LISTING FOR PARAGRAPH # 212, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3000	I: 57545 1	C: 15326 1	C: 37751 0	C: 64546 1	I: 52054 1	C: 75035 0	C: 64272 1	I: 45020 1
36,3010	C: 03753 0	C: 64323 1	I: 77776 1	35034 0	03232 1	34766 1	03226 1	13024 0
36,3020	12476 1	33257 1	03246 1	12476 1	35033 1	03222 0	12476 1	34535 0
36,3030	03246 1	12476 1	06006 1	I: 77650 1	C: 03753 0	I: 77624 1	C: 75007 1	I: 77776 1
36,3040	34774 1	54775 0	34770 0	54776 0	34537 1	03246 1	13044 0	06006 1
36,3050	I: 67201 0	C: 00001 0	C: 00777 0	I: 53025 0	C: 33572 1	C: 75064 1	I: 60335 1	C: 01351 1
36,3060	C: 00047 1	I: 52125 0	C: 33622 1	C: 75075 1	I: 43145 0	C: 33626 0	C: 00700 0	C: 75071 0
36,3070	I: 77752 1	I: 77752 1	I: 65301 0	C: 00047 1	C: 33624 1	I: 56325 0	C: 03706 0	I: 77776 1
36,3100	07171 1	C: 00001 0	C: 00001 0	C: 05070 0	C: 17527 1	C: 36700 0	C: 47114 0	C: 70670 1
36,3110	06006 1	I: 67206 1	C: 03076 0	I: 56205 0	I: 41257 1	C: 20165 1	C: 15334 1	I: 77621 1
36,3120	C: 03716 1	C: 03413 1	I: 77776 1	35026 0	03246 1	13123 0	34772 1	54771 1
36,3130	54772 1	06006 1	I: 77624 1	C: 63624 1	I: 53575 0	C: 03656 1	I: 74315 0	C: 03554 0
36,3140	C: 33632 0	I: 74315 0	C: 03562 0	C: 33634 0	I: 50255 0	I: 50015 0	C: 33636 1	C: 75174 1
36,3150	I: 50375 0	C: 03562 0	C: 03656 1	I: 71240 1	C: 75160 1	C: 33640 0	I: 52006 0	C: 75162 0
36,3160	I: 41545 0	C: 33642 1	I: 77756 0	C: 16732 0	I: 43146 0	C: 03666 1	C: 26734 0	C: 03640 0
36,3170	C: 26657 1	C: 03700 0	C: 36746 1	C: 25002 1	I: 43014 0	C: 01267 0	C: 03665 1	I: 77214 0
36,3200	C: 01071 0	I: 77626 0	C: 60362 0	C: 00037 0	I: 77615 0	C: 03716 1	C: 27656 1	C: 03700 0
36,3210	I: 77451 1	C: 03672 1	34756 1	54003 0	06006 1	C: 03646 0	I: 77624 1	C: 73027 0
36,3220	I: 77650 1	C: 75216 0	00006 1	23752 0	03232 1	34770 0	05516 0	15205 1
36,3230	01752 0	13255 1	00006 1	23547 0	04636 0	C: 21101 1	14103 0	13242 1
36,3240	13244 1	01547 0	51547 0	10004 1	51547 0	10003 0	00006 1	23752 0
36,3250	04636 0	C: 20743 0	14103 0	13255 1	01752 0	51752 0	10001 1	C: 01447 1
36,3260	I: 77620 0	C: 02310 1	I: 66370 0	C: 00066 1	C: 00051 0	C: 00022 1	I: 66374 1	C: 00022 1
36,3270	C: 00052 0	C: 00006 1	I: 63775 1	C: 03502 0	C: 02467 0	C: 12731 1	I: 77775 1	C: 03510 0
36,3300	I: 52717 1	C: 02555 0	C: 75046 1	C: 12731 1	I: 77775 1	C: 03516 0	I: 52717 1	C: 02643 1
36,3310	C: 75046 1	C: 12731 1	I: 77700 0	C: 75314 0	I: 43104 0	C: 75272 1	C: 02706 1	C: 75323 1
36,3320	I: 77775 1	C: 15336 0	C: 02723 0	I: 77201 1	C: 00001 0	C: 02707 0	I: 47036 1	C: 45657 1
36,3330	I: 47515 0	C: 02715 0	I: 76234 0	C: 45657 1	I: 47515 0	C: 02723 0	I: 76234 0	C: 45657 1
36,3340	I: 77171 0	C: 03526 0	C: 00000 1	C: 01114 1	I: 40151 0	C: 03526 0	C: 75347 0	C: 01117 1
36,3350	I: 77654 0	C: 75360 0	I: 40112 1	C: 75360 0	C: 01117 1	I: 52114 1	C: 00001 0	C: 75352 1
36,3360	I: 61551 1	C: 01114 1	I: 75405 1	C: 01117 1	I: 76257 0	C: 57576 1	C: 01114 1	I: 63101 1
36,3370	C: 00050 1	C: 77775 1	I: 77134 1	C: 02214 1	C: 00242 0	I: 40265 1	C: 15326 1	C: 00001 0

OCTAL LISTING FOR PARAGRAPH # 213, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3400	C: 03456 0	I: 60351 0	C: 01114 1	C: 00047 1	I: 65345 0	C: 00155 0	C: 03524 1	I: 77701 1	
36,3410	C: 00051 0	I: 70460 1	C: 00050 1	I: 41471 0	I: 77650 1	C: 63705 0	I: 77731 1	C: 00052 0	
36,3420	C: 00066 1	I: 60775 1	C: 02707 0	C: 75134 0	I: 77206 0	C: 02715 0	I: 53303 1	C: 75112 1	
36,3430	I: 77206 0	C: 02723 0	I: 53303 1	C: 75070 1	I: 61006 0	C: 75421 1	I: 45575 1	C: 74303 1	
36,3440	I: 45575 1	C: 74311 1	I: 45575 1	C: 74317 1	I: 77214 0	C: 02706 1	C: 75451 0	C: 15336 0	
36,3450	C: 03474 0	I: 66374 1	C: 00022 1	C: 00052 0	C: 00006 1	I: 77773 1	C: 74275 1	I: 53761 1	
36,3460	C: 00001 0	C: 20201 0	C: 11136 0	I: 77304 0	C: 75455 1	C: 01122 1	I: 77732 1	C: 01122 1	
36,3470	I: 77650 1	C: 02310 1	I: 45020 1	C: 02310 1	C: 27516 0	I: 74375 0	C: 03460 0	C: 03456 0	
36,3500	C: 26643 1	C: 03466 0	I: 77761 1	C: 03456 0	C: 26651 1	C: 03474 0	I: 77761 1	C: 03456 0	
36,3510	C: 02657 1	I: 77776 1	33763 0	55107 1	55110 1	34772 1	55111 0	55112 0	
36,3520	05402 1	C: 04022 0	05547 1	C: 00230 0	31110 0	55107 1	31112 1	55111 0	
36,3530	06006 1	I: 73150 1	C: 01107 0	C: 01111 1	I: 70731 0	C: 00051 0	C: 00006 1	C: 75070 1	
36,3540	I: 60276 1	C: 00052 0	I: 45161 0	C: 02643 1	C: 75753 1	I: 77653 1	C: 02467 0	C: 02665 0	
36,3550	I: 57543 1	C: 75070 1	I: 74301 0	C: 00052 0	C: 02651 1	I: 77624 1	C: 75753 1	I: 77653 1	
36,3560	C: 02555 0	C: 02673 1	I: 77614 1	C: 02746 0	C: 75577 0	I: 57543 1	C: 75070 1	I: 74301 0	
36,3570	C: 00052 0	C: 02657 1	I: 77624 1	C: 75753 1	I: 77653 1	C: 02643 1	C: 02701 0	I: 77624 1	
36,3600	C: 22327 1	I: 77776 1	31107 0	63764 1	55110 1	31111 1	67701 0	55112 0	
36,3610	06006 1	I: 66350 1	C: 01107 0	C: 00051 0	C: 00006 1	I: 77775 1	C: 02665 0	C: 06467 1	
36,3620	I: 77775 1	C: 02673 1	C: 06555 1	I: 77214 0	C: 02746 0	C: 75635 0	C: 02701 0	C: 06643 0	
36,3630	I: 52100 1	C: 75633 0	C: 75643 1	I: 77634 0	C: 75520 1	I: 43335 0	C: 01113 0	C: 35766 0	
36,3640	I: 52030 0	C: 75643 1	C: 75630 0	I: 77624 1	C: 22327 1	I: 53375 0	C: 01701 0	C: 01130 1	
36,3650	C: 03450 0	I: 47014 1	C: 00707 1	C: 75743 0	C: 27070 0	I: 77004 0	C: 57544 0	C: 00000 1	
36,3660	I: 77014 1	C: 04343 1	C: 75664 1	C: 00002 0	I: 53775 1	C: 01114 1	C: 57205 1	I: 40055 0	
36,3670	C: 01521 0	C: 75703 1	C: 25521 0	C: 01122 1	I: 53257 1	C: 57202 0	C: 01527 0	I: 77600 1	
36,3700	C: 75707 0	C: 35527 1	C: 75716 0	I: 53375 0	C: 01535 0	C: 01114 1	C: 01535 0	I: 53375 0	
36,3710	C: 01543 1	C: 01122 1	C: 01543 1	I: 45134 0	C: 02150 1	C: 23420 0	I: 77624 1	C: 22327 1	
36,3720	I: 47014 1	C: 00707 1	C: 75746 0	C: 27047 1	I: 77624 1	C: 20264 0	I: 77624 1	C: 22327 1	
36,3730	I: 77214 0	C: 02746 0	C: 75735 1	C: 03450 0	C: 01701 0	I: 66150 0	C: 02310 1	C: 00052 0	
36,3740	I: 77776 1	04655 0	C: 27527 1	I: 52034 1	C: 27023 0	C: 75655 0	I: 45034 1	C: 26774 1	
36,3750	C: 20240 0	I: 77650 1	C: 75726 0	I: 71124 0	C: 00051 0	C: 00047 1	I: 53674 1	C: 02214 1	
36,3760	C: 57576 1	I: 43524 0	C: 00051 0	C: 00066 1	C: 77771 0	C: 00014 1	C: 03766 0	C: 03767 1	
36,3770	CKSM 22503 1	@	@	@	@	@	@	@	

OCTAL LISTING FOR PARAGRAPH # 214, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2000	34770 0	54776 0	05547 1	C: 00031 0	34767 0	04636 0	C: 21074 1	04103 1
37,2010	02012 0	02004 1	34772 1	55250 0	55251 1	35027 1	05535 1	06006 1
37,2020	I: 53145 1	C: 01251 0	C: 76155 1	C: 34041 0	C: 27516 0	I: 43014 0	C: 01303 0	C: 76045 1
37,2030	C: 01474 1	I: 70535 0	C: 00777 0	I: 43030 0	C: 76036 0	C: 01674 0	I: 43014 0	C: 01676 1
37,2040	C: 01673 1	I: 77624 1	C: 27236 0	I: 77650 1	C: 76066 0	I: 77775 1	C: 03605 1	C: 25535 0
37,2050	C: 03613 0	C: 15543 1	C: 03540 0	C: 01517 0	I: 43014 0	C: 01676 1	C: 00263 0	I: 53135 0
37,2060	C: 03604 0	C: 76064 1	I: 77614 1	C: 00063 1	I: 77624 1	C: 27211 0	I: 77745 1	C: 00015 0
37,2070	C: 27540 0	C: 00017 1	C: 27605 1	C: 00025 0	C: 03613 0	I: 77614 1	C: 02605 0	C: 60015 0
37,2100	I: 47014 1	C: 00356 1	C: 76104 0	C: 60004 0	I: 53646 0	C: 57576 1	C: 27623 0	C: 00001 0
37,2110	I: 50256 0	C: 00007 0	I: 67471 1	C: 03623 0	C: 03625 0	I: 43134 0	C: 03603 1	C: 01063 0
37,2120	I: 67214 1	C: 01663 0	C: 00050 1	I: 43054 1	C: 76126 0	C: 01463 1	I: 77775 1	C: 00001 0
37,2130	C: 16152 0	C: 00015 0	I: 45014 0	C: 00662 0	C: 26453 1	I: 77605 1	C: 36166 0	C: 03621 1
37,2140	I: 77776 1	32164 0	04636 0	C: 20743 0	04103 1	04103 1	06006 1	I: 43345 1
37,2150	C: 03540 0	C: 36161 1	C: 01251 0	I: 77634 0	C: 76015 1	I: 52034 1	C: 51751 0	C: 76023 1
37,2160	C: 00003 1	C: 25140 0	C: 00001 0	C: 00000 1	C: 01453 1	C: 00243 1	C: 32703 1	I: 77420 1
37,2170	C: 02310 1	40077 0	74754 1	10000 0	12213 1	34776 0	04636 0	C: 21067 0
37,2200	04103 1	02203 1	02213 0	06006 1	I: 77624 1	C: 30761 1	I: 77624 1	C: 62756 1
37,2210	I: 77776 1	05402 1	C: 04022 0	04636 0	C: 16062 1	05547 1	C: 00116 1	32260 1
37,2220	04636 0	C: 20607 1	04103 1	02247 1	02247 1	34774 1	05516 0	05205 0
37,2230	32257 0	04636 0	C: 20607 1	04103 1	02241 1	02255 1	34773 0	05516 0
37,2240	05205 0	32262 0	54001 1	31727 1	00006 1	20001 1	55024 1	05561 0
37,2250	C: 00116 1	05527 1	06006 1	I: 77650 1	C: 02310 1	05527 1	12171 0	C: 01527 0
37,2260	C: 16600 0	C: 14655 1	C: 61740 0	05561 0	C: 00037 0	37702 0	55722 0	37651 1
37,2270	05176 1	32332 1	04636 0	C: 20576 1	02320 1	02277 1	02271 1	32331 1
37,2300	04636 0	C: 20612 0	02320 1	12320 0	00004 0	00006 1	30025 0	53723 1
37,2310	30033 1	55724 0	30034 0	55726 1	30032 0	55730 0	00003 1	02277 1
37,2320	04636 0	C: 20575 1	37702 0	55722 0	35055 1	05176 1	05547 1	C: 00037 0
37,2330	05524 1	C: 15255 1	C: 01536 0	04611 0	55771 0	04665 0	55770 1	11774 0
37,2340	02416 0	02343 1	02417 1	00004 0	35007 0	55655 1	11773 1	64770 0
37,2350	12352 0	64770 0	00006 1	12355 1	55655 1	06006 1	I: 77624 1	C: 71432 1
37,2360	I: 77776 1	05561 0	C: 00055 1	50154 1	02365 0	02415 0	05561 0	C: 00124 0
37,2370	40107 0	74761 1	10000 0	02376 1	05547 1	C: 00124 0	44770 1	55774 0

OCTAL LISTING FOR PARAGRAPH # 215, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2400	05547 1	C: 00077 1	04636 0	C: 56074 1	05561 0	C: 00077 1	34772 1	04636 0	
37,2410	C: 20753 1	05402 1	C: 00111 0	34772 1	02416 0	36214 0	55774 0	31770 0	
37,2420	22000 1	31771 1	56003 1	22000 1	04660 0	I: 45145 0	C: 02307 1	C: 54136 1	
37,2430	C: 00017 1	I: 52214 1	C: 04303 0	C: 76445 0	C: 03707 1	I: 77656 1	C: 27351 0	C: 03707 1	
37,2440	I: 57456 1	C: 24011 1	C: 00003 1	I: 52056 0	C: 76460 1	I: 53455 0	C: 03707 1	I: 77676 0	
37,2450	C: 24011 1	C: 03707 1	I: 57456 1	C: 27351 0	C: 00017 1	I: 74402 1	I: 53445 1	C: 00003 1	
37,2460	C: 34003 0	C: 32000 0	C: 34031 1	C: 74437 1	C: 00007 0	I: 53435 0	C: 15332 1	C: 24001 0	
37,2470	C: 00031 0	I: 53435 0	C: 03357 0	C: 17357 0	C: 01353 0	I: 74346 0	C: 03357 0	C: 27351 0	
37,2500	C: 00031 0	I: 53435 0	C: 03357 0	C: 17357 0	C: 01353 0	I: 74356 1	C: 03357 0	I: 76455 1	
37,2510	C: 03351 0	C: 24023 0	C: 00001 0	I: 53435 0	C: 00007 0	C: 24007 0	C: 00001 0	I: 76435 1	
37,2520	C: 00007 0	C: 24015 0	C: 00023 0	I: 53435 0	C: 00031 0	C: 24031 0	C: 00023 0	I: 76435 1	
37,2530	C: 00031 0	C: 24037 0	C: 00023 0	I: 77761 1	C: 00001 0	C: 37351 1	C: 73273 0	I: 45020 1	
37,2540	C: 01023 1	C: 32050 0	I: 64375 1	C: 02445 0	C: 00001 0	I: 77772 0	C: 37405 1	C: 15756 1	
37,2550	I: 77624 1	C: 32050 0	I: 61375 1	C: 03405 0	C: 00001 0	I: 77772 0	C: 37646 1	C: 01023 1	
37,2560	I: 77620 0	C: 02360 0	C: 34041 0	C: 45236 1	I: 77214 0	C: 01067 1	C: 03562 0	C: 02617 0	
37,2570	C: 27512 1	C: 03554 0	C: 02625 1	C: 27756 0	C: 03540 0	C: 37632 1	C: 16520 1	C: 02453 1	
37,2600	C: 26541 0	C: 03546 0	C: 37640 1	C: 16520 1	C: 02533 0	C: 37504 1	C: 02360 0	35057 0	
37,2610	05121 0	C: 03655 1	C: 14063 1	02630 0	37654 1	05135 0	C: 03154 1	C: 76067 1	
37,2620	35017 1	05233 0	C: 02652 1	C: 76066 0	44767 1	04126 0	C: 00005 1	15314 0	
37,2630	00006 1	22070 0	03171 0	34770 0	55067 0	40075 1	74770 1	26075 1	
37,2640	44752 1	70076 1	54076 1	40103 1	74763 0	26103 1	34772 1	55425 1	
37,2650	55426 1	00070 0	03171 0	34773 0	54001 1	40000 0	53166 0	34770 0	
37,2660	55067 0	34767 0	55066 1	40102 0	74767 1	10000 0	02740 0	41105 0	
37,2670	55271 0	00006 1	31662 1	53670 0	31663 0	57671 0	00006 1	31665 0	
37,2700	53673 0	31666 0	57674 0	30102 1	74755 0	00006 1	12723 1	35011 1	
37,2710	05223 1	C: 02773 0	31314 0	57533 0	55536 1	31316 1	57534 1	55537 0	
37,2720	31320 1	57535 0	55540 0	34773 0	55725 1	33153 0	05233 0	C: 02636 0	
37,2730	C: 32066 0	46214 1	04126 0	C: 00001 0	34125 0	54001 1	40000 0	53166 0	
37,2740	40075 1	74770 1	10000 0	02762 0	35017 1	05223 1	C: 02652 1	34753 1	
37,2750	05135 0	C: 03010 0	C: 76067 1	44766 0	04126 0	C: 00005 1	34760 1	00006 1	
37,2760	05011 1	15314 0	00006 1	32767 0	53062 0	12747 0	C: 03100 0	C: 76067 1	
37,2770	55066 1	05255 0	C: 00062 0	34767 0	54070 1	50000 1	30037 0	50070 0	

OCTAL LISTING FOR PARAGRAPH # 216, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3000	57533 0	50070 0	55536 1	10070 1	12774 0	11066 1	12770 1	05314 1
37,3010	34767 0	00004 0	54070 1	60000 1	50000 1	11314 1	03020 0	03026 0
37,3020	63152 1	00006 1	63026 0	05671 1	C: 00205 0	03056 1	10070 1	13012 0
37,3030	05402 1	C: 16035 0	C: 20000 0	C: 03037 0	C: 76067 1	04636 0	C: 15276 0	06006 1
37,3040	I: 71214 0	C: 03314 1	C: 77047 1	C: 03735 0	I: 77615 0	C: 01105 1	C: 03727 0	I: 51575 1
37,3050	C: 01315 1	I: 77405 0	C: 37365 0	00006 1	30155 0	21426 1	05402 1	C: 10035 0
37,3060	06006 1	I: 77624 1	C: 77336 1	I: 77776 1	05402 1	C: 10035 0	34125 0	05607 0
37,3070	C: 01070 1	C: 01027 0	00003 1	05402 1	C: 10035 0	00006 1	31062 1	52006 0
37,3100	31044 0	55277 0	05547 1	C: 00036 1	05362 0	C: 00005 1	C: 05022 1	C: 20000 0
37,3110	06006 1	I: 77624 1	C: 73677 0	I: 77776 1	04636 0	C: 17231 1	44760 0	55722 0
37,3120	00006 1	03011 1	05561 0	C: 00147 0	05561 0	C: 00162 1	30104 1	74760 0
37,3130	10000 0	13146 0	34762 0	70074 0	00006 1	13141 1	05362 0	C: 00111 0
37,3140	C: 00132 1	04655 0	C: 10162 0	05402 1	C: 00035 1	15205 1	05362 0	C: 00111 0
37,3150	C: 00002 0	13141 1	C: 63401 1	C: 00170 1	34776 0	05607 0	C: 01070 1	C: 01027 0
37,3160	00003 1	06006 1	I: 45175 0	C: 01030 0	C: 77270 1	C: 25046 1	C: 01115 0	C: 35054 0
37,3170	C: 31263 1	00006 1	30025 0	53105 0	44772 0	55063 1	55064 0	55065 1
37,3200	34772 1	55320 0	55316 0	55315 0	55317 1	55321 1	55067 0	00006 1
37,3210	40040 1	53064 0	52040 1	55314 1	23316 1	40041 0	57065 0	56041 1
37,3220	55320 0	00002 0	11166 0	13225 0	15314 0	37652 1	55277 0	11067 0
37,3230	12652 0	33267 1	54002 1	11320 0	00002 0	13240 0	00002 0	00002 0
37,3240	22007 0	11316 0	13245 0	13254 0	13245 0	22041 1	11065 1	41065 1
37,3250	13220 0	13247 1	23320 1	00002 0	11063 1	41063 1	13261 0	13255 1
37,3260	13207 0	55314 1	41064 0	55316 0	44772 0	52040 1	13215 0	C: 02653 0
37,3270	I: 41456 0	C: 01756 1	I: 67340 1	C: 03746 1	C: 00047 1	I: 77240 1	C: 77324 1	I: 41441 0
37,3300	C: 01712 1	I: 44316 0	C: 37375 1	I: 56325 0	C: 37377 0	C: 00043 0	C: 00041 1	I: 41205 0
37,3310	C: 37401 0	I: 65361 0	C: 01756 1	I: 41205 0	C: 37403 1	C: 00041 1	I: 53361 0	C: 01712 1
37,3320	I: 77626 0	C: 76662 1	I: 41455 0	C: 01756 1	I: 63545 0	C: 00045 0	I: 77701 1	C: 00050 1
37,3330	I: 53663 1	C: 37367 1	C: 56623 0	I: 45561 1	C: 76670 1	I: 77616 0	I: 74375 0	C: 01315 1
37,3340	C: 37365 0	I: 76505 0	C: 01734 0	C: 03432 1	I: 41562 0	I: 41455 0	C: 01046 1	I: 74255 0
37,3350	C: 01036 0	C: 37373 1	I: 44055 1	C: 01030 0	C: 00037 0	C: 35071 1	C: 77270 1	I: 53255 0
37,3360	I: 77655 1	C: 01036 0	C: 35077 1	C: 00037 0	C: 02312 0	C: 32537 1	C: 61377 0	C: 55754 1
37,3370	C: 77644 1	C: 65556 1	C: 00000 1	C: 31000 0	C: 01463 1	C: 06315 0	C: 00001 0	C: 05000 1

OCTAL LISTING FOR PARAGRAPH # 217, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3400	C: 02047 0	C: 36332 0	C: 00152 1	C: 14511 1	06006 1	I: 77201 1	C: 00001 0	C: 01036 0
37,3410	I: 63361 0	C: 37700 1	C: 01712 1	I: 74235 0	C: 01756 1	C: 15246 0	I: 45455 1	C: 74251 1
37,3420	I: 72056 1	C: 00044 1	C: 03542 1	I: 57435 1	C: 01756 1	I: 66256 0	C: 00051 0	C: 00476 1
37,3430	I: 77300 1	C: 77433 0	C: 03534 0	C: 03550 1	C: 03534 0	I: 57435 1	C: 03542 1	I: 77772 0
37,3440	C: 03556 1	I: 77751 1	C: 03270 1	C: 14031 0	C: 00032 0	I: 41434 1	C: 51754 0	I: 77746 1
37,3450	C: 17564 0	I: 57556 0	C: 17570 0	C: 00033 1	I: 41434 1	C: 51754 0	I: 65356 1	I: 65346 0
37,3460	C: 00001 0	I: 74276 1	C: 03564 0	I: 77772 0	C: 17572 1	C: 00003 1	C: 17574 1	C: 00031 0
37,3470	I: 41434 1	C: 51754 0	I: 65356 1	I: 74346 0	C: 03572 1	C: 17572 1	C: 00005 1	I: 57405 1
37,3500	C: 03570 0	I: 77615 0	C: 03572 1	C: 17572 1	I: 43205 1	C: 03564 0	C: 03576 0	C: 27576 0
37,3510	C: 03572 1	I: 72505 1	C: 01734 0	C: 17572 1	I: 76561 1	C: 03564 0	C: 17564 0	I: 77626 0
37,3520	C: 50211 0	C: 03564 0	I: 76505 0	C: 01734 0	C: 03564 0	I: 76435 1	C: 03572 1	C: 27600 1
37,3530	C: 03542 1	I: 53435 0	C: 03572 1	I: 50206 0	C: 03556 1	C: 24021 1	C: 00001 0	I: 77641 1
37,3540	C: 03550 1	C: 34023 1	C: 47311 1	C: 24007 0	C: 03572 1	I: 72441 0	C: 03542 1	I: 77736 0
37,3550	C: 24010 0	C: 03564 0	I: 77641 1	C: 00001 0	C: 24023 0	I: 77641 1	C: 03600 1	C: 34021 0
37,3560	C: 47311 1	C: 24011 1	C: 01756 1	I: 72441 0	C: 03556 1	I: 77726 1	C: 00013 0	I: 77551 0
37,3570	C: 00007 0	04611 0	50120 1	40012 0	57722 1	54001 1	00004 0	40102 0
37,3600	74756 0	00006 1	13605 0	26102 0	03620 0	40001 1	61722 1	00006 1
37,3610	73701 0	55723 1	00006 1	63615 0	40000 0	64773 0	00006 1	63622 1
37,3620	34772 1	55723 1	40154 0	60000 1	03671 1	00006 1	61672 0	61664 1
37,3630	03671 1	55770 1	40156 1	60000 1	03671 1	00006 1	61673 1	61665 0
37,3640	03671 1	55771 0	40155 1	60000 1	00006 1	61674 0	61666 0	57772 1
37,3650	35024 1	54003 0	00006 1	33703 0	53447 0	04611 0	00006 1	31771 1
37,3660	53665 1	31772 1	55666 1	06006 1	I: 51575 1	C: 01036 0	C: 03723 1	I: 77650 1
37,3670	C: 03324 1	54001 1	00002 0	50000 1	34751 0	26001 1	00002 0	C: 45730 1
37,3700	C: 53410 1	C: 03146 1	C: 03656 1	C: 76066 0	C: 03704 1	C: 03705 0	CKSM 64724 1	@
37,3710	@	@	@	@	@	@	@	@
37,3720	@	@	@	@	@	@	@	@
37,3730	@	@	@	@	@	@	@	@
37,3740	@	@	@	@	@	@	@	@
37,3750	@	@	@	@	@	@	@	@
37,3760	@	@	@	@	@	@	@	@
37,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 220, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2000	34770 0	57215 0	54115 0	11245 1	02006 0	02013 1	42212 0	60154 1
40,2010	00006 1	12013 0	04356 0	56154 1	54117 1	50000 1	02017 0	3275 1
40,2020	02074 0	02074 0	02074 0	02074 0	02074 0	02074 0	02074 0	02064 1
40,2030	02064 1	03275 1	03275 1	03275 1	03275 1	03275 1	03275 1	02072 0
40,2040	02251 0	03553 1	03275 1	03275 1	03275 1	03275 1	03275 1	03275 1
40,2050	03325 0	02304 1	02271 1	04200 1	03275 1	02364 1	02265 1	112 2 1
40,2060	00002 0	00002 0	15205 1	15205 1	02057 1	36214 0	71203 0	10000 0
40,2070	02074 0	03275 1	34772 1	54117 1	02057 1	02221 1	11220 1	34772 1
40,2100	55220 1	02102 0	30117 0	04423 0	03161 1	36214 0	71203 0	10000 0
40,2110	02121 1	50137 1	57204 0	54022 0	40022 0	40022 0	56022 1	6 117 0
40,2120	02136 1	50137 1	57204 0	54154 0	34772 1	54155 1	34355 0	07256 1
40,2130	56155 0	60117 0	54155 1	02136 1	26154 0	02156 1	50137 1	55204 1
40,2140	41202 1	50137 1	62212 1	00006 1	12150 0	11202 1	55202 1	05205 0
40,2150	36214 0	71203 0	10000 0	02156 1	41202 1	02146 0	04636 0	C: 6 161 1
40,2160	02154 0	44770 1	60137 1	00006 1	62154 0	02221 1	50137 1	31204 0
40,2170	54155 1	07052 1	C: 02217 1	36214 0	71203 0	50000 1	02176 0	02203 1
40,2200	00006 1	40156 1	52156 1	56156 0	50137 1	55207 1	56155 0	50137 1
40,2210	55204 1	04651 1	C: 00022 1	C: 00020 0	C: 00012 1	C: 00005 1	C: 00000 1	C: 5174 0
40,2220	C: 13261 0	51202 0	32225 0	54137 0	00002 0	C: 00004 0	C: 00004 0	C: 00004 0
40,2230	C: 00004 0	C: 00004 0	C: 00003 1	C: 00003 1	C: 00003 1	C: 00003 1	C: 00003 1	C: 00002 0
40,2240	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00244 0	C: 00001 0	C: 00001 0	C: 00000 1
40,2250	C: 00000 1	34772 1	55204 1	34351 1	55202 1	02473 0	34770 0	55203 0
40,2260	34772 1	55216 1	34170 0	54136 1	05205 0	34772 1	55205 0	34352 1
40,2270	02254 0	02344 0	02330 0	34767 0	50137 1	64762 0	27203 0	11220 1
40,2300	34772 1	55220 1	02303 0	05205 0	02344 0	02310 1	34770 0	02274 1
40,2310	22002 0	02221 1	50137 1	32336 0	54123 0	64770 0	54122 1	34772 1
40,2320	54124 1	56123 1	03247 0	34756 1	54124 1	56122 0	03247 0	00001 0
40,2330	22002 0	02221 1	50137 1	32336 0	54122 1	64770 0	54123 0	02317 0
40,2340	C: 00005 1	C: 00003 1	C: 00000 1	C: 02476 0	22002 0	36214 0	71203 0	10000 0
40,2350	05205 0	44321 1	02360 0	44322 1	02360 0	44323 0	02360 0	05205 0
40,2360	61202 0	00006 1	12327 1	00002 0	11202 1	64770 0	02370 1	64770 0
40,2370	50000 1	32225 0	54137 0	11220 1	02402 0	02377 0	02377 0	30137 1

OCTAL LISTING FOR PARAGRAPH # 221, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2400	02424 1	02417 1	10137 0	54137 0	02424 1	32472 1	27216 1	30137 1
40,2410	54125 0	00006 1	27204 1	04636 0	C: 62337 1	30125 1	54137 0	02422 1
40,2420	25220 0	05205 0	22002 0	02433 1	67702 0	00006 1	65205 0	00002 0
40,2430	55202 1	22002 0	02221 1	34772 1	50137 1	55204 1	50137 1	55207 1
40,2440	54124 1	50137 1	44762 1	71203 0	77700 0	55203 0	50137 1	32463 1
40,2450	54143 0	03161 1	50137 1	32466 1	55202 1	02473 0	44767 1	27202 1
40,2460	02473 0	50137 1	34317 0	55202 1	00001 0	C: 00016 0	C: 00005 1	C: 00004 0
40,2470	C: 00015 0	C: 00011 1	C: 00003 1	31202 0	54021 0	44755 0	00004 0	50021 1
40,2500	57226 0	00006 1	62504 1	25221 1	15642 0	10154 0	56154 1	02512 0
40,2510	02521 0	67702 0	62562 1	54154 0	02517 0	34752 0	26154 0	34767 0
40,2520	02532 1	56154 1	62562 1	10000 0	02513 1	C: 71527 1	64770 0	40000 0
40,2530	02513 1	34772 1	54156 1	10154 0	12546 0	12546 0	12537 0	44752 1
40,2540	70154 0	54154 0	00006 1	50156 0	32557 1	52124 1	00006 1	50156 0
40,2550	32557 1	52155 1	07256 1	52124 1	20155 1	02566 0	C: 05605 1	C: 03656 1
40,2560	C: 16314 0	C: 31463 1	C: 16040 1	52124 1	52155 1	04403 1	04655 0	C: 62561 1
40,2570	52124 1	52155 1	04403 1	02575 1	02607 1	56156 0	56155 0	54154 0
40,2600	02566 0	02607 1	02566 0	02607 1	36211 0	03034 0	02566 0	56002 0
40,2610	54162 0	02635 0	07226 0	07052 1	C: 00123 1	00162 1	02431 0	02310 1
40,2620	30154 1	03146 1	46214 1	50117 0	64321 0	55202 1	02635 0	30155 0
40,2630	03146 1	04655 0	C: 62563 0	02635 0	02566 0	56002 0	54144 1	50140 1
40,2640	02640 1	02655 0	50117 0	30150 0	74347 1	04315 1	00006 1	50000 1
40,2650	30001 0	52155 1	34772 1	54156 1	00144 0	30145 1	02646 1	50140 1
40,2660	02660 0	02663 0	03261 1	00006 1	50145 1	30001 0	52155 1	34321 0
40,2670	55202 1	07224 1	03133 0	00136 0	07052 1	C: 02737 0	10155 1	34756 1
40,2700	02702 0	44756 0	60155 0	03046 0	04372 0	04372 0	03051 0	04372 0
40,2710	10154 0	02715 0	02715 0	40000 0	54154 0	10162 0	02733 1	02727 1
40,2720	10154 0	C: 04151 0	02731 0	02724 1	56154 1	74750 0	54154 0	04655 0
40,2730	C: 63151 1	44750 0	02726 0	40154 0	74750 0	40000 0	02726 0	C: 26161 0
40,2740	C: 30707 1	C: 21616 0	C: 07071 0	07052 1	C: 00123 1	56156 0	56155 0	56154 1
40,2750	00006 1	12753 0	04173 0	03044 1	03051 0	02727 1	07052 1	C: 00123 1
40,2760	02753 1	10154 0	02766 1	02766 1	04173 0	04173 0	32525 1	26154 0
40,2770	07052 1	C: 02741 1	34755 1	60155 0	03046 0	02705 1	07052 1	C: 00123 1

OCTAL LISTING FOR PARAGRAPH # 222, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3000	56156 0	60000 1	54156 1	34772 1	60155 0	03046 0	03051 0	50140 1
40,3010	03010 0	03021 1	30117 0	60145 1	54002 1	56155 0	54002 0	54001 1
40,3020	02727 1	34772 1	03013 0	07052 1	C: 00123 1	36211 0	13032 1	07052 1
40,3030	C: 00123 1	34767 0	03034 0	03000 1	56002 0	54124 1	56002 0	54123 0
40,3040	04372 0	10123 0	03037 0	00124 0	56155 0	60000 1	54155 1	00002 0
40,3050	14376 0	30162 1	00006 1	16711 1	04173 0	56002 0	54144 1	10154 0
40,3060	13070 1	13070 1	64770 0	54154 0	02330 0	40155 1	54155 1	00144 0
40,3070	02310 1	00144 0	56002 0	54115 0	03055 1	00006 1	32343 1	20155 1
40,3100	00006 1	13105 1	00006 1	34750 1	52155 1	34766 1	54137 0	34355 0
40,3110	07256 1	30154 1	04423 0	34772 1	56156 0	56155 0	54154 0	10143 0
40,3120	55202 1	03161 1	10137 0	03106 0	04261 0	00115 1	56002 0	54115 0
40,3130	03055 1	34770 0	03106 0	56002 0	54115 0	34772 1	54124 1	36214 0
40,3140	03247 0	34766 1	03247 0	03055 1	34322 0	03106 0	00006 1	72244 0
40,3150	22154 1	34772 1	54155 1	56002 0	54115 0	03131 1	03146 1	04655 0
40,3160	C: 62346 1	56002 0	54114 1	34342 0	70143 0	54021 0	56021 1	54141 1
40,3170	34770 0	70143 0	10000 0	03175 1	03211 0	56124 0	60000 1	60000 1
40,3200	60000 1	60000 1	60000 1	54124 1	34753 1	70143 0	10000 0	34767 0
40,3210	64770 0	54143 0	00004 0	50141 0	11226 1	03217 0	C: 00104 1	64770 0
40,3220	54142 1	50143 1	73243 0	00006 1	60124 0	00006 1	13241 1	50143 1
40,3230	43243 0	70142 1	60124 0	40000 0	50141 0	57226 0	00006 1	63241 0
40,3240	25221 1	00003 1	00114 0	C: 00037 0	C: 01740 0	C: 02000 0	C: 03740 1	54141 1
40,3250	34767 0	54143 0	56002 0	54114 1	03212 0	03161 1	04655 0	C: 63372 1
40,3260	04261 0	43431 0	60136 0	00006 1	13277 1	42721 0	60136 0	00006 1
40,3270	13272 1	03275 1	04235 1	04362 1	04151 0	04362 1	05205 0	05726 1
40,3300	C: 21501 0	44770 1	55217 0	04235 1	04432 0	04417 1	03412 0	44767 1
40,3310	03302 0	41204 1	64354 1	00006 1	26000 0	00006 1	13275 0	34772 1
40,3320	55216 1	04261 0	03301 0	44772 0	03302 0	44766 0	00006 1	03011 1
40,3330	10115 0	34753 1	71224 0	10000 0	03343 0	04432 0	11245 1	03341 1
40,3340	05205 0	04655 0	C: 21275 1	34772 1	55215 1	11245 1	05205 0	04455 1
40,3350	05205 0	31202 0	54132 0	34770 0	03373 0	34321 0	02430 1	34767 0
40,3360	03373 0	34322 0	02430 1	34766 1	03373 0	34323 1	02430 1	30132 1
40,3370	55202 1	52131 0	05215 1	70123 0	10000 0	00002 0	16710 0	34353 0

OCTAL LISTING FOR PARAGRAPH # 223, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3400	57202 0	54140 0	11214 0	64770 0	03146 1	03407 1	02473 0	5614 1
40,3410	55202 1	05205 0	11245 1	03415 1	05205 0	34772 1	57245 0	00004 0
40,3420	05167 1	31205 1	54001 1	31204 0	50064 0	52155 1	00003 1	04432 0
40,3430	05205 0	04224 1	04636 0	C: 66714 0	00004 0	41334 0	74770 1	27334 0
40,3440	33550 1	00006 1	05011 1	33551 0	55241 0	34757 0	00006 1	05013 0
40,3450	34355 0	54117 1	43546 1	50117 0	55226 1	10117 1	03451 1	43547 0
40,3460	55227 0	55232 1	55234 1	34775 0	55221 0	37704 0	04636 0	C: 01731 0
40,3470	43552 1	00004 0	00006 1	03011 1	44757 1	00006 1	03013 0	34765 1
40,3500	00006 1	02012 0	64752 0	55241 0	44770 1	71334 0	55334 0	40000 0
40,3510	74754 1	27334 0	40000 0	74755 0	27334 0	40000 0	74756 0	27334 0
40,3520	44752 1	71333 1	55333 1	40000 0	74754 1	27333 1	40000 0	74755 0
40,3530	27333 1	40000 0	74757 1	27333 1	41337 0	74762 1	27337 0	00003 1
40,3540	05120 1	C: 03377 1	C: 60102 1	04235 1	04417 1	13335 0	C: 05675 0	C: 07675 1
40,3550	C: 00175 1	C: 40650 0	C: 00115 1	56115 1	55215 1	00004 0	34757 0	00006 1
40,3560	05011 1	35004 0	71241 0	64752 0	55241 0	41334 0	75055 0	27334 0
40,3570	41333 1	74757 1	27333 1	41337 0	74762 1	27337 0	04542 0	44757 1
40,3600	00006 1	03013 0	43216 0	00006 1	03011 1	34355 0	54117 1	00004 0
40,3610	50117 0	11226 1	64770 0	03620 0	64770 0	40000 0	77674 1	03623 0
40,3620	40000 0	77674 1	40000 0	50117 0	55226 1	00003 1	10117 1	03606 1
40,3630	54375 1	54376 1	55357 0	05205 0	C: 55000 1	C: 16001 1	06006 1	I: 77624 1
40,3640	C: 61706 1	I: 77776 1	33770 1	04636 0	C: 20576 1	15524 0	03650 1	03642 1
40,3650	06006 1	I: 46135 1	C: 02316 1	C: 61704 0	I: 73150 1	C: 02311 0	C: 02313 1	I: 45335 0
40,3660	C: 02316 1	C: 21774 0	I: 51030 0	C: 61672 0	C: 61677 0	I: 67130 1	C: 02000 0	C: 02001 1
40,3670	I: 77650 1	C: 61702 0	I: 67130 1	C: 02004 1	C: 02005 0	I: 77650 1	C: 61702 0	I: 67130 1
40,3700	C: 03000 1	C: 03001 0	I: 77614 1	C: 01671 0	I: 77776 1	15524 0	I: 40020 1	C: 00051 0
40,3710	C: 61711 1	I: 77624 1	C: 27516 0	I: 71331 0	C: 00051 0	C: 00006 1	C: 15336 0	C: 02312 0
40,3720	C: 02314 0	C: 02316 1	I: 77770 1	C: 00044 1	I: 47573 0	C: 02445 0	I: 77615 0	C: 02312 0
40,3730	C: 02312 0	I: 47573 0	C: 02533 0	I: 77615 0	C: 02314 0	C: 02314 0	I: 75500 0	C: 61724 1
40,3740	C: 16314 0	C: 02312 0	I: 77766 0	C: 02312 0	I: 52000 0	C: 61747 1	C: 61753 1	I: 77745 1
40,3750	C: 15344 0	C: 02312 0	C: 02314 0	I: 45345 1	C: 02312 0	C: 21772 0	I: 71240 1	C: 61762 0
40,3760	C: 21772 0	C: 02312 0	I: 66150 0	C: 00051 0	C: 00052 0	I: 77776 1	04655 0	C: 27527 1
40,3770	C: 01543 1	C: 01670 1	C: 17000 1	C: 00002 0	C: 00000 1	C: 03775 1	C: 03776 1	CKSM 43000 0

OCTAL LISTING FOR PARAGRAPH # 224, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2000	34772 1	55220 1	34170 0	54136 1	11216 1	02040 1	02040 1	02010 1
41,2010	32036 0	61216 0	00006 1	12025 0	36214 0	71203 0	10000 0	02021 0
41,2020	02025 1	11202 1	02031 1	02031 1	02025 1	41216 1	55216 1	04417 1
41,2030	01216 0	34772 1	54154 0	04636 0	C: 60165 0	02025 1	C: 03377 1	C: 00034 0
41,2040	34772 1	55203 0	04261 0	41204 1	55244 0	62037 1	00006 1	62133 1
41,2050	00006 1	32115 0	52006 0	50140 1	02054 1	02057 1	02220 0	10146 0
41,2060	02131 0	02350 0	02066 0	25222 1	04313 1	02120 0	34752 0	55220 1
41,2070	44170 1	60136 0	00006 1	12075 0	02116 0	02304 1	11203 0	04173 0
41,2100	04261 0	11245 1	02105 1	02106 1	02105 1	04360 0	57210 0	04305 0
41,2110	00006 1	32115 0	52006 0	02133 1	C: 02056 0	C: 64102 0	30156 0	04305 0
41,2120	44773 1	61204 0	00006 1	12133 0	34323 1	55202 1	31222 1	03351 0
41,2130	02133 1	64770 0	04305 0	45004 1	61204 0	10000 0	64770 0	02141 1
41,2140	02145 0	54154 0	04432 0	04655 0	C: 66000 1	51204 0	32150 1	04660 0
41,2150	C: 62350 0	C: 62364 1	C: 62372 0	C: 62377 0	C: 62357 1	C: 62352 1	C: 62516 1	C: 60657 0
41,2160	C: 62350 0	C: 62350 0	C: 61261 0	C: 63224 0	C: 63224 0	C: 63224 0	C: 63224 0	C: 63224 0
41,2170	C: 63224 0	C: 63224 0	C: 62350 0	C: 62350 0	C: 62350 0	C: 62741 1	C: 62750 1	C: 62765 1
41,2200	C: 62716 0	C: 62611 0	C: 62350 0	C: 63341 1	C: 62350 0	C: 62350 0	C: 63433 0	C: 63462 1
41,2210	C: 61323 1	C: 61301 1	C: 61307 1	C: 61432 0	C: 12367 0	C: 63376 0	C: 62350 0	C: 62350 0
41,2220	10146 0	02225 0	02350 0	02225 0	02225 0	46211 1	61204 0	00006 1
41,2230	62232 0	02133 1	34767 0	54117 1	62257 0	54145 0	50117 0	30150 0
41,2240	54122 1	03033 1	02260 1	02245 0	24122 0	30122 0	74347 1	04315 1
41,2250	50000 1	30000 1	50145 1	56000 1	10117 1	02233 1	02133 1	00125 1
41,2260	50000 1	12262 1	00002 0	00002 0	00002 0	00002 0	16706 1	16706 1
41,2270	00002 0	16706 1	00002 0	00002 0	16706 1	00002 0	00002 0	16706 1
41,2300	34321 0	12305 1	34322 0	12305 1	34323 1	55202 1	40002 1	55216 1
41,2310	04636 0	C: 60431 1	04360 0	00136 0	30157 1	55205 0	56002 0	54117 1
41,2320	00006 1	32115 0	52006 0	10146 0	64770 0	12330 1	12331 0	12331 0
41,2330	04305 0	34352 1	55202 1	31205 1	12344 1	30160 0	55204 1	56002 0
41,2340	54117 1	34351 1	55202 1	31204 0	04655 0	C: 61156 1	00117 0	04173 0
41,2350	04655 0	C: 61261 0	44767 1	02423 0	50145 1	40002 1	56132 1	44770 1
41,2360	02423 0	50145 1	40001 1	56131 1	44772 0	02436 1	02461 0	50145 1
41,2370	40000 0	02403 1	44770 1	02436 1	50145 1	40001 1	02403 1	44767 1

OCTAL LISTING FOR PARAGRAPH # 225, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2400	02436 1	50145 1	40002 1	56130 0	44767 1	61204 0	10000 0	02412 1
41,2410	00136 0	02412 1	54122 1	50000 1	34321 0	55202 1	50122 0	40130 1
41,2420	03351 0	56122 0	02406 1	54123 0	22002 0	02510 1	04333 0	76214 1
41,2430	60123 1	10000 0	00001 0	C: 04151 0	02350 0	00001 0	54123 0	22002 0
41,2440	02510 1	74753 0	10000 0	02350 0	02425 0	22002 0	02510 1	74753 0
41,2450	10000 0	04173 0	00001 0	22002 0	02510 1	10000 0	00001 0	00001 0
41,2460	02350 0	22002 0	30146 1	64770 0	00006 1	12477 0	50140 1	02467 0
41,2470	02472 1	00001 0	03025 0	02260 1	00001 0	24145 1	00001 0	31222 1
41,2500	75021 0	00006 1	50000 1	00000 1	40000 0	12403 0	C: 00147 0	C: 00146 1
41,2510	50140 1	32505 0	50000 1	30000 1	74344 1	00002 0	02510 1	04333 0
41,2520	76214 1	54117 1	54122 1	60145 1	50000 1	40000 0	50122 0	57206 1
41,2530	10122 1	02522 0	34772 1	54155 1	54156 1	50117 0	34321 0	55202 1
41,2540	50117 0	41206 0	54154 0	03042 1	54123 0	00006 1	32560 0	52006 0
41,2550	50140 1	02551 1	02555 0	03033 1	02570 1	03025 0	02570 1	C: 02114 1
41,2560	C: 64102 0	04636 0	C: 61072 0	10117 1	02566 0	00136 0	54117 1	02532 1
41,2570	50000 1	32573 1	04660 0	C: 61260 1	C: 62561 1	C: 60531 0	C: 60563 1	C: 60574 1
41,2600	C: 60601 0	C: 60505 1	C: 60603 1	C: 65137 1	C: 65212 0	C: 60601 0	C: 60570 0	C: 60616 0
41,2610	C: 60633 1	44767 1	02423 0	02453 1	34353 0	02336 0	02300 0	34354 1
41,2620	02336 0	02302 1	34615 1	02336 0	02304 1	46211 1	03011 1	00006 1
41,2630	32115 0	52006 0	34772 1	03071 1	50145 1	54000 0	34770 0	03071 1
41,2640	50145 1	54001 1	34767 0	03071 1	50145 1	54002 1	44774 0	61205 1
41,2650	00006 1	12653 1	03001 0	00004 0	45001 1	61206 1	00006 1	62667 1
41,2660	31206 1	04306 0	50145 1	30000 1	54001 1	34770 0	55206 0	64352 1
41,2670	00006 1	12714 0	31210 0	00006 1	62702 0	31207 0	00006 1	51206 1
41,2700	05000 1	12706 0	41207 1	00006 1	51206 1	03000 1	11206 0	10000 0
41,2710	12714 0	22000 1	50145 1	54000 0	00003 1	03001 0	44770 1	02423 0
41,2720	02453 1	34353 0	02336 0	02300 0	34354 1	02336 0	02302 1	44773 1
41,2730	03011 1	00006 1	32115 0	52006 0	34772 1	03071 1	50145 1	54000 0
41,2740	12760 0	02300 0	00006 1	32115 0	52006 0	34772 1	03071 1	12712 0
41,2750	44770 1	02423 0	34752 0	55220 1	02302 1	00006 1	32115 0	52006 0
41,2760	34770 0	03071 1	50145 1	54001 1	03001 0	44767 1	02423 0	34752 0
41,2770	55220 1	02304 1	00006 1	32115 0	52006 0	34767 0	03071 1	50145 1

OCTAL LISTING FOR PARAGRAPH # 226, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3000	54002 1	34772 1	55203 0	44772 0	55217 0	04432 0	04261 0	04655 0
41,3010	C: 61412 1	54117 1	41203 0	54021 0	40021 0	40021 0	10000 0	13021 0
41,3020	00002 0	60117 0	00006 1	16711 1	04173 0	56002 0	54114 1	34343 1
41,3030	70147 1	04324 0	00114 0	56002 0	54114 1	03063 1	70153 1	50001 0
41,3040	00000 1	00114 0	56002 0	54114 1	50140 1	03045 0	03060 1	03063 1
41,3050	70147 1	50001 0	00000 1	60000 1	00114 0	03020 0	04324 0	04333 0
41,3060	34342 0	70147 1	13053 0	50117 0	33055 1	54001 1	50117 0	34342 0
41,3070	00002 0	54117 1	56002 0	54115 0	34772 1	54162 0	50117 0	57211 1
41,3100	54155 1	50117 0	57206 1	54154 0	50140 1	03105 0	03133 0	50117 0
41,3110	30150 0	74347 1	04305 0	00006 1	60117 0	54145 0	11203 0	03170 1
41,3120	02445 0	03033 1	02260 1	03151 1	24145 1	30145 1	26117 1	34772 1
41,3130	50117 0	53777 0	03151 1	04313 1	11203 0	03170 1	02445 0	03025 0
41,3140	02260 1	03145 1	34772 1	54117 1	03124 0	30146 1	64770 0	00006 1
41,3150	13155 1	56154 1	00115 1	C: 02122 1	C: 64102 0	44774 0	61222 1	00006 1
41,3160	13001 1	31222 1	75021 0	56154 1	00006 1	50154 1	01000 0	03001 0
41,3170	03042 1	54123 0	00006 1	33154 1	52006 0	50140 1	03176 1	03202 1
41,3200	03033 1	03203 0	03025 0	50000 1	33206 0	04660 0	C: 62347 0	C: 60753 0
41,3210	C: 60674 1	C: 60743 1	C: 60776 1	C: 61023 1	C: 60761 1	C: 60776 1	C: 65361 0	C: 61261 0
41,3220	C: 61027 0	C: 60756 0	C: 61261 0	C: 61007 1	44076 0	71222 0	54155 1	40136 1
41,3230	64170 0	10000 0	03241 0	C: 75377 0	03241 0	34753 1	26155 1	34772 1
41,3240	55225 1	36043 0	71204 1	04333 0	54022 0	40022 0	56022 1	61205 1
41,3250	54154 0	34772 1	55215 1	11245 1	03256 0	04455 1	00004 0	11223 1
41,3260	03263 0	05222 0	C: 03267 1	52155 1	53224 0	00003 1	00136 0	04366 0
41,3270	03307 0	03303 1	35016 0	05233 0	C: 03267 1	C: 62102 0	34346 1	05121 0
41,3300	C: 03314 1	C: 62102 0	05314 1	34772 1	55223 1	55224 0	05314 1	11224 0
41,3310	13311 0	24002 0	00002 0	00002 0	03307 0	05205 0	11215 1	03337 0
41,3320	36043 0	71223 1	02315 1	34171 1	71223 1	63233 0	54023 1	30023 0
41,3330	55204 1	32433 1	54136 1	44076 0	71224 0	54156 1	02050 0	04356 0
41,3340	05205 0	34321 0	55202 1	31252 0	54001 1	31222 1	04671 0	03351 0
41,3350	05205 0	54022 0	56002 0	54115 0	34753 1	27202 1	34766 1	54137 0
41,3360	40022 0	40022 0	40022 0	40000 0	74774 0	04423 0	10000 0	55202 1
41,3370	04655 0	C: 61255 1	10137 0	03357 0	04261 0	00115 1	03417 0	34764 0

OCTAL LISTING FOR PARAGRAPH # 227, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "ø" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3400	61202 0	00006 1	13404 0	04173 0	34772 1	57205 1	54154 0	34352 1
41,3410	55202 1	04636 0	C: 60473 1	04261 0	30154 1	04655 0	C: 10007 1	40002 1
41,3420	55216 1	34352 1	55202 1	34772 1	55205 0	04636 0	C: 60473 1	04360 0
41,3430	34770 0	55203 0	00136 0	34770 0	71016 0	10000 0	03460 0	33277 0
41,3440	54154 0	37660 0	71016 0	54160 1	04432 0	31016 1	00006 1	12350 1
41,3450	34170 0	54157 0	00006 1	31020 1	52156 1	30160 0	00004 0	00154 1
41,3460	34345 1	03440 1	33273 1	54154 0	31016 1	03443 1	64774 1	00004 0
41,3470	54124 1	44755 0	50124 0	57226 0	10000 0	25221 1	03477 0	10124 1
41,3500	03470 1	00003 1	50123 1	03510 0	03505 1	55204 1	55205 0	55220 1
41,3510	04261 0	04417 1	03534 0	33536 1	54136 1	10123 0	03522 1	02350 0
41,3520	03466 0	02350 0	36043 0	70123 0	54157 0	30123 1	54023 1	30023 0
41,3530	54160 1	10157 0	03537 0	02335 0	34772 1	55216 1	04224 1	10160 1
41,3540	13543 1	02314 0	04224 1	30156 0	54161 0	02335 0	02314 0	34772 1
41,3550	55217 0	55220 1	55216 1	30161 1	54156 1	02040 1	C: 03556 1	C: 03557 0
41,3560	CKSM 20775 0	ø	ø	ø	ø	ø	ø	ø
41,3570	ø	ø	ø	ø	ø	ø	ø	ø
41,3600	ø	ø	ø	ø	ø	ø	ø	ø
41,3610	ø	ø	ø	ø	ø	ø	ø	ø
41,3620	ø	ø	ø	ø	ø	ø	ø	ø
41,3630	ø	ø	ø	ø	ø	ø	ø	ø
41,3640	ø	ø	ø	ø	ø	ø	ø	ø
41,3650	ø	ø	ø	ø	ø	ø	ø	ø
41,3660	ø	ø	ø	ø	ø	ø	ø	ø
41,3670	ø	ø	ø	ø	ø	ø	ø	ø
41,3700	ø	ø	ø	ø	ø	ø	ø	ø
41,3710	ø	ø	ø	ø	ø	ø	ø	ø
41,3720	ø	ø	ø	ø	ø	ø	ø	ø
41,3730	ø	ø	ø	ø	ø	ø	ø	ø
41,3740	ø	ø	ø	ø	ø	ø	ø	ø
41,3750	ø	ø	ø	ø	ø	ø	ø	ø
41,3760	ø	ø	ø	ø	ø	ø	ø	ø
41,3770	ø	ø	ø	ø	ø	ø	ø	ø

OCTAL LISTING FOR PARAGRAPH # 230, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2000	32055 0	04636 0	C: 20576 1	05524 1	02006 0	02000 0	31465 1	74765 0
42,2010	10000 0	12050 1	05561 0	C: 00212 0	04636 0	C: 40463 1	32054 1	04636 0
42,2020	C: 20576 1	05524 1	02024 0	02016 1	31465 1	74346 0	00006 1	12042 1
42,2030	40000 0	74346 0	00006 1	12042 1	00004 0	04714 1	C: 13313 1	00003 1
42,2040	04636 0	C: 40614 0	32053 0	04636 0	C: 20576 1	05524 1	05524 1	02042 0
42,2050	05547 1	C: 00212 0	02014 0	C: 01460 1	C: 01457 0	C: 01056 0	52152 0	51205 1
42,2060	32127 1	54146 0	51205 1	32273 0	54147 1	41205 0	65004 0	00006 1
42,2070	62074 0	34770 0	54140 0	02112 1	34767 0	54140 0	51205 1	32773 0
42,2100	54153 1	35041 1	70146 0	54002 1	50000 1	32557 1	54150 1	00006 1
42,2110	50002 0	32561 1	52152 0	52006 0	52124 1	00006 1	50000 1	32510 1
42,2120	52124 1	52006 0	52124 1	00006 1	50000 1	32440 0	12120 1	C: 00000 1
42,2130	C: 40000 0	C: 40000 0	C: 40000 0	C: 00000 1	C: 01250 1	C: 00775 1	C: 01206 1	C: 01363 0
42,2140	C: 00375 0	C: 77776 1	C: 02462 0	C: 01255 1	C: 02460 1	C: 02355 0	C: 77777 0	C: 01254 0
42,2150	C: 01013 1	C: 01307 1	C: 00000 1	C: 00032 0	C: 00037 0	C: 01307 1	C: 00000 1	C: 01254 0
42,2160	C: 01250 1	C: 01016 1	C: 01362 1	C: 00000 1	C: 01250 1	C: 01250 1	C: 03735 0	C: 02336 0
42,2170	C: 03412 0	C: 01250 1	C: 03660 1	C: 00024 1	C: 03662 0	C: 01516 1	C: 02640 1	C: 64000 0
42,2200	C: 02003 0	C: 24006 1	C: 24011 1	C: 64014 0	C: 64017 0	C: 02022 0	C: 22025 0	C: 22030 1
42,2210	C: 24033 1	C: 64036 0	C: 22041 1	C: 00044 1	C: 24047 1	C: 24052 0	C: 24055 1	C: 22060 1
42,2220	C: 00000 1	C: 24066 1	C: 24071 1	C: 24074 1	C: 24077 1	C: 24102 1	C: 64105 1	C: 24110 1
42,2230	C: 24113 1	C: 24116 1	C: 24121 0	C: 24124 0	C: 24127 0	C: 04132 0	C: 04135 1	C: 00000 1
42,2240	C: 04143 0	C: 04146 0	C: 64151 0	C: 00000 1	C: 00000 1	C: 24162 1	C: 22165 0	C: 64170 0
42,2250	C: 24173 1	C: 24176 1	C: 24201 1	C: 24204 1	C: 24207 1	C: 24212 0	C: 02215 0	C: 24220 1
42,2260	C: 24223 1	C: 24226 1	C: 02231 0	C: 02234 0	C: 04237 0	C: 02242 1	C: 04245 0	C: 24250 0
42,2270	C: 04253 1	C: 04256 1	C: 24261 1	C: 00000 1	C: 04040 1	C: 04140 0	C: 04102 0	C: 00000 1
42,2300	C: 00504 0	C: 02000 0	C: 04000 0	C: 04000 0	C: 04000 0	C: 00000 1	C: 24400 0	C: 02000 0
42,2310	C: 24400 0	C: 00511 1	C: 00000 1	C: 24400 0	C: 04102 0	C: 04102 0	C: 00000 1	C: 04102 0
42,2320	C: 04140 0	C: 04102 0	C: 00000 1	C: 24400 0	C: 04140 0	C: 04000 0	C: 00140 1	C: 00000 1
42,2330	C: 20102 0	C: 04140 0	C: 24400 0	C: 24400 0	C: 24400 0	C: 24400 0	C: 24400 0	C: 24400 0
42,2340	C: 24400 0	C: 24400 0	C: 24400 0	C: 24500 1	C: 00542 1	C: 24410 1	C: 20204 0	C: 00410 1
42,2350	C: 10000 0	C: 00000 1	C: 00306 1	C: 00614 1	C: 00507 0	C: 00417 0	C: 00204 1	C: 00004 0
42,2360	C: 10507 1	C: 10507 1	C: 10200 1	C: 00444 0	C: 00000 1	C: 24510 0	C: 24512 1	C: 10440 0
42,2370	C: 00204 1	C: 20451 0	C: 00457 1	C: 36460 0	C: 00000 1	C: 37044 0	C: 10217 1	C: 34444 1

OCTAL LISTING FOR PARAGRAPH # 231, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2400	C: 35004 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 10450 1	C: 40444 1	C: 00010 0	C: 00000 1
42,2410	C: 00000 1	C: 10204 0	C: 00113 1	C: 22440 1	C: 24512 1	C: 24512 1	C: 24512 1	C: 24512 1
42,2420	C: 24512 1	C: 22451 1	C: 00102 1	C: 00000 1	C: 16143 0	C: 24507 0	C: 00102 1	C: 00102 1
42,2430	C: 06143 1	C: 00102 1	C: 22440 1	C: 24507 0	C: 00000 1	C: 00000 1	C: 01162 0	C: 00006 1
42,2440	C: 03240 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 10707 0	C: 03435 0	C: 13070 1
42,2450	C: 34345 1	C: 00005 1	C: 21616 0	C: 26113 0	C: 31713 0	C: 00070 0	C: 20460 1	C: 01065 0
42,2460	C: 05740 1	C: 11414 0	C: 31463 1	C: 07475 0	C: 16051 1	C: 00001 0	C: 03434 1	C: 00002 0
42,2470	C: 22245 1	C: 00014 1	C: 35607 0	C: 07606 0	C: 06300 1	C: 16631 1	C: 11377 0	C: 12000 1
42,2500	C: 00000 1	C: 27176 1	C: 14235 0	C: 01670 1	C: 20000 0	C: 07475 0	C: 16051 1	C: 05174 0
42,2510	C: 13261 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00714 0	C: 31463 1	C: 13412 1
42,2520	C: 07534 1	C: 05605 1	C: 03656 1	C: 00001 0	C: 16170 0	C: 00441 0	C: 34306 0	C: 07176 0
42,2530	C: 21603 1	C: 15340 1	C: 15340 1	C: 01031 1	C: 21032 0	C: 34631 1	C: 23146 0	C: 14340 0
42,2540	C: 24145 1	C: 02363 0	C: 03721 0	C: 20373 1	C: 02122 1	C: 00424 0	C: 30446 1	C: 00631 0
42,2550	C: 23146 0	C: 00260 0	C: 06213 1	C: 04231 0	C: 27400 0	C: 01031 1	C: 21032 0	C: 03660 1
42,2560	C: 03762 1	C: 03425 1	C: 01250 1	C: 01251 0	C: 00000 1	C: 02354 1	C: 02356 0	C: 03762 1
42,2570	C: 00746 1	C: 00750 0	C: 00752 1	C: 02342 0	C: 02344 0	C: 02334 1	C: 00771 0	C: 03660 1
42,2600	C: 03625 0	C: 03065 1	C: 03066 1	C: 00000 1	C: 03073 0	C: 03072 1	C: 00000 1	C: 03023 0
42,2610	C: 03024 1	C: 00000 1	C: 03501 0	C: 03503 1	C: 03505 1	C: 02346 1	C: 02344 0	C: 02334 1
42,2620	C: 02311 0	C: 02313 1	C: 00000 1	C: 02632 1	C: 00000 1	C: 00000 1	C: 02311 0	C: 02313 1
42,2630	C: 02315 1	C: 02311 0	C: 02313 1	C: 02315 1	C: 03765 0	C: 03743 1	C: 03753 0	C: 03633 1
42,2640	C: 03631 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 02640 1	C: 02634 1	C: 02636 0
42,2650	C: 02610 1	C: 02612 0	C: 02614 0	C: 03721 0	C: 03756 0	C: 03760 0	C: 03400 0	C: 03402 1
42,2660	C: 03326 0	C: 03722 0	C: 03740 1	C: 03736 0	C: 03713 1	C: 03724 0	C: 03726 1	C: 03637 0
42,2670	C: 03722 0	C: 03713 1	C: 00013 0	C: 00013 0	C: 00013 0	C: 03315 0	C: 03675 0	C: 03715 1
42,2700	C: 03713 1	C: 00746 1	C: 00750 0	C: 03315 0	C: 03722 0	C: 03677 1	C: 03315 0	C: 03174 0
42,2710	C: 03756 0	C: 01140 0	C: 03751 1	C: 03752 1	C: 01140 0	C: 03751 1	C: 03752 1	C: 00000 1
42,2720	C: 00000 1	C: 00000 1	C: 03620 0	C: 03622 1	C: 03624 1	C: 03315 0	C: 03722 0	C: 03637 0
42,2730	C: 02632 1	C: 02546 1	C: 03655 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
42,2740	C: 00000 1	C: 03741 0	C: 03737 1	C: 01352 1	C: 03372 1	C: 03373 0	C: 00000 1	C: 03660 1
42,2750	C: 03762 1	C: 03425 1	C: 03404 1	C: 03406 0	C: 03410 1	C: 03537 0	C: 03541 1	C: 03543 0
42,2760	C: 03674 1	C: 03676 0	C: 03700 0	C: 03537 0	C: 03541 1	C: 03543 0	C: 03664 0	C: 03666 1
42,2770	C: 03670 0	C: 03404 1	C: 03406 0	C: 03410 1	C: 03725 1	C: 03727 0	C: 00000 1	C: 03704 1

OCTAL LISTING FOR PARAGRAPH # 232, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3000	C: 03706 0	C: 03710 1	C: 00746 1	C: 02350 0	C: 02352 1	C: 01755 1	C: 01757 0	C: 01761 0
42,3010	C: 00036 1	C: 00035 1	C: 00000 1	C: 02773 0	C: 02775 0	C: 00000 1	C: 02757 0	C: 02761 0
42,3020	C: 02763 1	C: 03725 1	C: 03727 0	C: 00000 1	C: 03660 1	C: 03724 0	C: 03722 0	C: 02311 0
42,3030	C: 02313 1	C: 02315 1	C: 01250 1	C: 01251 0	C: 01252 0	C: 01253 1	C: 01254 0	C: 01255 1
42,3040	C: 02311 0	C: 02313 1	C: 02315 1	C: 16351 1	C: 00142 0	C: 16347 0	C: 16512 0	C: 22347 1
42,3050	C: 24454 1	C: 00000 1	C: 00553 1	C: 00143 1	C: 06344 1	C: 22347 1	C: 00512 1	C: 00012 1
42,3060	C: 24344 1	C: 24344 1	C: 24503 1	C: 00512 1	C: 00007 0	C: 16347 0	C: 16347 0	C: 24503 1
42,3070	C: 06512 1	C: 16512 0	C: 22507 0	C: 16505 0	C: 20410 0	C: 16352 1	C: 24507 0	C: 24512 1
42,3100	C: 24252 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 24507 0	C: 12512 1	C: 22447 0	C: 00000 1
42,3110	C: 00000 1	C: 24512 1	C: 00103 0	C: 24511 1	C: 16347 0	C: 16347 0	C: 16347 0	C: 16347 0
42,3120	C: 16347 0	C: 24512 1	C: 00302 0	C: 32655 0	C: 10347 0	C: 16344 0	C: 00302 0	C: 00302 0
42,3130	C: 16347 0	C: 00302 0	C: 24511 1	C: 16344 0	C: 06143 1	C: 06043 0	C: 06247 0	04636 0
42,3140	C: 60635 1	07226 0	03326 0	07052 1	C: 03200 0	34323 1	55202 1	04636 0
42,3150	C: 61072 0	03344 1	33202 1	56154 1	55212 0	33203 0	56155 0	04403 1
42,3160	34322 0	55202 1	04636 0	C: 61072 0	00006 1	33207 1	52155 1	31212 1
42,3170	04403 1	34321 0	55202 1	04636 0	C: 61072 0	00136 0	C: 25660 0	C: 31742 1
42,3200	C: 01727 1	C: 01217 1	C: 00011 1	C: 32445 0	C: 02104 0	C: 10422 1	C: 05174 0	C: 13261 0
42,3210	C: 00000 1	C: 00062 0	04636 0	C: 60635 1	07226 0	10154 0	03220 1	03251 1
42,3220	63306 1	10000 0	03235 0	03251 1	03251 1	10155 1	03230 0	03251 1
42,3230	63307 0	10000 0	03235 0	03251 1	03251 1	10154 0	33311 1	03246 1
42,3240	43311 0	54154 0	43312 0	54155 1	33310 0	03327 1	54154 0	33312 1
42,3250	03243 1	03313 0	33304 0	07256 1	46214 1	27202 1	04636 0	C: 61126 0
42,3260	34772 1	54124 1	44767 1	50117 0	64321 0	54143 0	04636 0	C: 61161 0
42,3270	03344 1	56155 0	00006 1	73305 0	52155 1	50117 0	34321 0	55202 1
42,3300	04636 0	C: 61126 0	04655 0	C: 62563 0	C: 23147 1	C: 23346 1	C: 77753 0	C: 41126 1
42,3310	C: 03252 1	C: 00025 0	C: 37016 1	10155 1	13323 1	13323 1	13317 0	00006 1
42,3320	43211 1	20155 1	13326 1	00006 1	33211 0	13321 0	56002 0	54144 1
42,3330	07052 1	C: 03176 1	00006 1	30155 0	53213 1	04372 0	04372 0	34772 1
42,3340	56156 0	56155 0	56154 1	00144 0	56002 0	54144 1	31213 0	00006 1
42,3350	74766 0	00006 1	74754 1	22155 0	31212 1	54154 0	07052 1	C: 03204 1
42,3360	00144 0	41203 0	74172 0	10000 0	03501 0	07052 1	C: 03444 0	03453 0
42,3370	34772 1	54156 1	33446 1	54154 0	33447 0	56155 0	07256 1	03464 1

OCTAL LISTING FOR PARAGRAPH # 233, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3400	52156 1	52124 1	31207 0	23212 1	52155 1	07052 1	C: 03444 0	03453 0
42,3410	43451 0	03470 1	56155 0	00006 1	73450 1	20124 1	00006 1	13421 1
42,3420	04173 0	31210 0	23213 0	52155 1	07052 1	C: 03444 0	03453 0	43452 0
42,3430	03470 1	52124 1	20155 1	00006 1	13436 1	04173 0	07224 1	52155 1
42,3440	50145 1	52001 1	04655 0	C: 63001 0	C: 00006 1	C: 03240 1	C: 00025 0	C: 37100 1
42,3450	C: 13560 0	C: 00073 0	C: 13557 1	56156 0	60000 1	54156 1	34772 1	60155 0
42,3460	54155 1	34772 1	60154 1	56154 1	30154 1	00006 1	16711 1	04173 0
42,3470	54156 1	10155 1	64770 0	13475 0	64770 0	60156 0	00006 1	66711 0
42,3500	04173 0	44125 1	55244 0	04173 0	06006 1	I: 45034 1	C: 51751 0	C: 47530 1
42,3510	C: 34041 0	C: 27170 1	I: 46135 1	C: 00050 1	C: 65527 1	I: 77775 1	C: 00001 0	C: 00003 1
42,3520	I: 45145 0	C: 00015 0	C: 54141 1	I: 57455 1	C: 00003 1	I: 77650 1	C: 65531 0	I: 57575 1
42,3530	C: 00001 0	I: 64201 0	C: 00003 1	C: 01734 0	I: 65372 1	C: 15336 0	C: 24025 0	C: 00003 1
42,3540	I: 77624 1	C: 47633 1	C: 00003 1	I: 63256 0	C: 00003 1	I: 72431 1	C: 15330 0	I: 40045 1
42,3550	C: 00003 1	C: 65552 0	I: 40056 0	C: 65567 0	I: 50206 0	C: 15334 1	I: 65552 0	I: 50315 0
42,3560	C: 00017 1	C: 15332 1	I: 51152 0	C: 65567 0	I: 45345 1	C: 15344 0	I: 77606 1	I: 50375 0
42,3570	C: 00011 1	C: 15330 0	I: 65552 0	I: 77625 0	C: 15326 1	C: 16312 0	C: 00025 0	C: 02314 0
42,3600	I: 77776 1	35047 1	05176 1	31247 1	74764 1	00006 1	15524 0	33625 0
42,3610	04636 0	C: 20607 1	05626 0	05626 0	05205 0	34766 1	05516 0	34755 1
42,3620	05176 1	34770 0	04636 0	C: 01731 0	13504 1	C: 01463 1	05402 1	C: 07026 1
42,3630	C: 30000 1	C: 03706 0	C: 56100 0	34770 0	54332 1	05344 1	C: 00033 1	50302 0
42,3640	13641 0	13644 0	13647 0	13647 0	34767 0	54300 0	13672 0	33744 0
42,3650	54156 1	33746 1	04636 0	C: 20576 1	13733 1	13651 1	03735 0	44767 1
42,3660	60304 0	00006 1	63651 0	40304 1	64353 0	00006 1	63651 0	30304 0
42,3670	54300 0	24303 1	33745 1	60303 1	54156 1	33746 1	04636 0	C: 20576 1
42,3700	13733 1	13675 1	03735 0	40303 0	60300 1	00006 1	63710 1	13671 0
42,3710	33743 1	54156 1	33747 0	04636 0	C: 20576 1	13733 1	13750 1	03735 0
42,3720	30330 1	00006 1	63710 1	40330 0	60300 1	64770 0	00006 1	63710 1
42,3730	33745 1	60330 1	13674 0	04655 0	C: 57706 1	40154 0	74763 0	10000 0
42,3740	00002 0	50002 0	77771 0	C: 00330 1	C: 00304 0	C: 00303 1	C: 05201 1	C: 05202 1
42,3750	00004 0	30103 0	56001 0	34766 1	00006 1	06001 0	54103 1	05402 1
42,3760	C: 04026 1	00004 0	44767 1	60302 0	00006 1	63770 1	04655 0	C: 57757 0
42,3770	34346 1	05135 0	C: 03545 0	C: 56103 0	05205 0	C: 03775 1	C: 03776 1	CKSM 03706 0

OCTAL LISTING FOR PARAGRAPH # 234, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2000	50154 1	02002 1	02121 1	02133 1	02227 1	02364 1	03064 0	03062 0
43,2010	02451 0	03001 0	02544 0	12535 1	02265 1	02265 1	03037 0	02265 1
43,2020	02600 0	02312 0	02641 0	03102 1	02445 0	02265 1	02273 0	02301 1
43,2030	02304 1	02307 1	02437 0	02342 0	02774 1	03054 0	02116 0	02037 1
43,2040	03656 1	03660 1	03662 0	03664 0	02706 1	02713 0	02116 0	02116 0
43,2050	02352 1	02116 0	02703 1	02705 1	02557 1	02564 1	02116 0	02574 0
43,2060	02621 0	02773 0	02770 0	02722 1	03022 1	02735 1	02116 0	02731 0
43,2070	03006 1	02116 0	13030 0	02265 1	02116 0	02265 1	11247 0	02116 0
43,2100	30100 0	77646 0	10000 0	02116 0	34124 1	55247 0	30002 0	54155 1
43,2110	44767 1	04202 0	02113 0	10067 1	05152 1	00155 0	04362 1	04655 0
43,2120	C: 21275 1	31335 0	00006 1	12125 1	02116 0	04636 0	C: 16627 0	04636 0
43,2130	C: 17644 1	02132 0	02117 1	44124 0	61205 1	00006 1	12143 1	62165 1
43,2140	00006 1	12166 0	02116 0	02076 1	32163 1	04636 0	C: 20576 1	05524 1
43,2150	12151 1	32164 0	04636 0	C: 21064 0	02260 1	04636 0	C: 16724 1	04636 0
43,2160	C: 17644 1	05524 1	05524 1	C: 06226 1	C: 12200 0	C: 77670 0	02714 1	02076 1
43,2170	35043 0	54003 0	11354 0	02200 1	02175 0	04362 1	05671 1	C: 00115 1
43,2200	11323 0	02207 0	02207 0	02207 0	05671 1	C: 00117 0	05524 1	32226 0
43,2210	04636 0	C: 20576 1	05524 1	02214 1	31773 0	55313 0	31775 0	55312 1
43,2220	32164 0	04636 0	C: 21064 0	34770 0	55323 0	05524 1	C: 06134 1	02076 1
43,2230	32256 1	04636 0	C: 20576 1	05524 1	02235 1	32257 0	04636 0	C: 21064 0
43,2240	02260 1	04636 0	C: 17133 0	04636 0	C: 17644 1	05524 1	32255 1	04636 0
43,2250	C: 17244 0	04636 0	C: 17644 1	05524 1	05524 1	C: 02757 0	C: 06335 1	C: 12400 0
43,2260	31335 0	00006 1	16711 1	04362 1	05524 1	04417 1	34223 0	00006 1
43,2270	01007 1	04655 0	C: 63001 0	00006 1	30033 1	53014 1	30034 0	55015 0
43,2300	02117 1	03065 1	C: 00006 1	03071 1	05547 1	C: 00220 1	02303 0	05561 0
43,2310	C: 00220 1	02303 0	02076 1	32341 0	04636 0	C: 20576 1	05524 1	05524 1
43,2320	44615 0	60154 1	00006 1	12325 0	05524 1	00004 0	34772 1	54001 1
43,2330	52025 1	52155 1	53255 0	20155 1	07224 1	52155 1	20025 1	00003 1
43,2340	05524 1	C: 06230 0	05354 0	C: 00002 0	02116 0	35055 1	05135 0	C: 02000 0
43,2350	C: 66065 1	02117 1	05354 0	C: 00002 0	02116 0	35055 1	05135 0	C: 03132 1
43,2360	C: 66105 0	05402 1	C: 00174 0	02117 1	02714 1	35001 0	00006 1	02012 0
43,2370	10000 0	12116 1	02427 1	02076 1	45004 1	00006 1	03012 1	32163 1

OCTAL LISTING FOR PARAGRAPH # 235, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2400	04636 0	C: 20576 1	12414 0	02404 0	04611 0	04636 0	C: 42450 0	04636 0
43,2410	C: 42467 1	34767 0	05223 1	C: 02417 1	02427 1	15524 0	02117 1	00006 1
43,2420	31310 1	53477 0	31311 0	55500 1	04714 1	C: 42503 1	05314 1	34764 0
43,2430	70101 0	10000 0	00002 0	34764 0	00006 1	02030 0	15651 1	02076 1
43,2440	34755 1	05135 0	C: 03504 0	C: 64104 0	05205 0	05547 1	C: 00055 1	03065 1
43,2450	C: 00020 0	04611 0	40102 0	74076 0	00006 1	62465 1	31465 1	74753 0
43,2460	00006 1	62116 0	04636 0	C: 36344 1	02117 1	44760 0	00006 1	03012 1
43,2470	31465 1	00006 1	74766 0	76214 1	00004 0	50000 1	12477 0	12522 1
43,2500	12517 1	12517 1	00006 1	32516 1	52113 0	34750 1	54030 0	40102 0
43,2510	74076 0	26102 0	04714 1	C: 42642 1	02117 1	C: 02000 0	C: 54106 1	04714 1
43,2520	C: 42042 1	12117 0	04714 1	C: 42642 1	34770 0	55340 0	00006 1	32721 1
43,2530	52113 0	44076 0	70102 0	54102 0	02117 1	02714 1	02076 1	34754 0
43,2540	05135 0	C: 02427 1	C: 56106 0	05205 0	40102 0	74076 0	00006 1	62551 1
43,2550	02116 0	02076 1	34754 0	05121 0	C: 02000 0	C: 64106 1	05205 0	02076 1
43,2560	35051 0	05176 1	04655 0	C: 46330 0	02076 1	05547 1	C: 00222 0	35047 1
43,2570	05121 0	C: 02000 0	C: 62064 1	05205 0	02076 1	05561 0	C: 00222 0	02567 1
43,2600	02076 1	30074 1	74762 1	00006 1	12616 0	30075 0	74764 1	00006 1
43,2610	12616 0	35055 1	05121 0	C: 02263 1	C: 76067 1	05205 0	05671 1	C: 00406 0
43,2620	05524 1	04606 0	31722 1	00006 1	12627 1	00006 1	62632 1	37702 0
43,2630	55722 0	02117 1	34762 0	70105 1	00006 1	12117 0	05547 1	C: 00231 1
43,2640	12117 0	06006 1	I: 43014 0	C: 04275 0	C: 04306 0	C: 66655 1	I: 43014 0	C: 00350 1
43,2650	C: 66701 1	C: 05270 1	I: 43014 0	C: 01261 0	C: 00670 0	I: 43014 0	C: 00652 0	C: 66676 0
43,2660	C: 00267 1	I: 43014 0	C: 00270 1	C: 04266 1	I: 45034 1	C: 11030 1	C: 27516 0	I: 77776 1
43,2670	05362 0	C: 00002 0	C: 00001 0	00004 0	04655 0	C: 12712 0	I: 43014 0	C: 00270 1
43,2700	C: 04266 1	I: 77776 1	02117 1	03065 1	C: 00026 0	03071 1	32711 1	54334 1
43,2710	02117 1	C: 03643 0	C: 00125 1	03071 1	31214 1	00006 1	16711 1	12116 1
43,2720	C: 03226 1	C: 12106 0	02714 1	02076 1	34754 0	05135 0	C: 02377 0	C: 62066 0
43,2730	15205 1	05561 0	C: 00131 1	03065 1	C: 00066 1	02714 1	02076 1	34770 0
43,2740	55376 0	34772 1	55362 0	33177 0	55361 0	03454 1	23372 0	23373 1
43,2750	33176 1	54156 1	32763 1	04636 0	C: 20576 1	02760 1	03565 1	02750 1
43,2760	33177 0	55371 1	05524 1	C: 01201 0	31376 1	00006 1	13270 0	03454 1
43,2770	05632 0	03065 1	C: 00215 1	03071 1	34754 0	05135 0	C: 02000 0	C: 36103 0

OCTAL LISTING FOR PARAGRAPH # 236, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3000	05205 0	34754 0	05135 0	C: 02033 0	C: 36103 0	05205 0	34756 1	70105 1
43,3010	00006 1	12116 1	05561 0	C: 00213 1	05354 0	C: 00027 1	02116 0	05402 1
43,3020	C: 00112 0	02673 1	02076 1	35051 0	05135 0	C: 02000 0	C: 50107 1	15205 1
43,3030	05547 1	C: 00221 0	05547 1	C: 00204 1	34772 1	04655 0	C: 10007 1	05354 0
43,3040	C: 00026 0	02116 0	04606 0	45051 1	71751 1	55751 1	31747 1	00006 1
43,3050	74757 1	30001 0	27751 1	02117 1	02076 1	35047 1	05135 0	C: 03636 1
43,3060	C: 60105 0	05205 0	03065 1	C: 00177 0	03071 1	30002 0	05565 1	70001 1
43,3070	13077 0	30002 0	67701 0	05565 1	40000 0	00006 1	04001 1	50061 0
43,3100	54074 0	12117 0	02076 1	34766 1	55255 0	34767 0	70106 1	00006 1
43,3110	13112 1	34770 0	55256 0	33131 1	04636 0	C: 20576 1	05524 1	05524 1
43,3120	31256 1	00006 1	13126 0	05547 1	C: 00243 1	13105 1	05561 0	C: 00243 1
43,3130	13105 1	C: 01014 0	06006 1	I: 47145 1	C: 02636 0	C: 45640 1	I: 77776 1	56154 1
43,3140	55250 0	04636 0	C: 20715 0	33165 0	04636 0	C: 20743 0	13157 0	13151 0
43,3150	13143 0	06006 1	I: 47135 0	C: 01251 0	C: 51754 0	C: 02634 1	I: 77776 1	34772 1
43,3160	55632 0	05402 1	C: 00004 0	04655 0	C: 21275 1	C: 01435 1	C: 00061 0	C: 01373 1
43,3170	C: 01773 0	C: 60017 1	C: 17777 0	C: 25252 0	C: 52400 1	C: 76777 1	C: 01371 0	C: 03270 1
43,3200	31360 0	00006 1	13211 1	00006 1	31376 1	51377 0	52001 1	34772 1
43,3210	55360 1	00004 0	30002 0	55357 0	55363 1	25365 0	05673 0	C: 01102 0
43,3220	11362 0	34772 1	55362 0	03270 1	01357 1	10000 0	13200 1	13200 1
43,3230	10000 0	13200 1	00002 0	00006 1	23371 0	03264 1	11362 0	03244 0
43,3240	03235 0	03244 0	25366 0	01371 0	65736 0	00006 1	63250 0	03221 0
43,3250	25366 0	64774 1	50000 1	03254 1	01371 0	01371 0	01371 0	03271 0
43,3260	03452 1	01371 0	01371 0	01371 0	00006 1	23361 1	04655 0	C: 03177 0
43,3270	03233 0	34770 0	55372 1	34772 1	54003 0	35030 1	55377 1	35041 1
43,3300	55373 0	03321 1	35024 1	55377 1	35041 1	55373 0	03321 1	35024 1
43,3310	55377 1	33170 1	55373 0	03321 1	55372 1	33166 0	55377 1	33167 1
43,3320	55373 0	00004 0	30003 1	55374 1	00006 1	51377 0	30001 0	53376 0
43,3330	31377 0	55360 1	54001 1	24001 0	50000 1	52001 1	51377 0	40001 1
43,3340	51377 0	60000 1	03225 1	31360 0	00006 1	13371 0	00006 1	51377 0
43,3350	40001 1	51377 0	52001 1	51377 0	40000 0	51377 0	60001 0	03225 1
43,3360	31360 0	00006 1	13371 0	00006 1	31376 1	51377 0	52001 1	34772 1
43,3370	55360 1	00003 1	03264 1	31374 0	54003 0	25377 0	41377 1	61373 1

OCTAL LISTING FOR PARAGRAPH # 237, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3400	00006 1	13403 1	03321 1	11372 1	03314 1	25372 0	30003 1	6476 1
43,3410	54003 0	63175 1	00006 1	13307 1	10003 0	03302 0	35024 1	54003 0
43,3420	35004 0	55372 1	64765 1	50000 1	40000 0	11372 1	03421 0	33173 1
43,3430	54020 1	54022 0	54021 0	54023 1	60020 0	60022 1	60021 1	60023 0
43,3440	63174 0	03225 1	60020 0	60022 1	60021 1	60023 0	64770 0	03225 1
43,3450	25367 1	03233 0	34771 1	55376 0	34772 1	55374 1	34770 0	55377 1
43,3460	34772 1	55371 1	55373 0	34770 0	55375 0	31374 0	54001 1	74344 1
43,3470	61373 1	04671 0	03515 0	64756 1	03526 0	40000 0	55377 1	00006 1
43,3500	13503 0	34755 1	03504 0	35050 1	55373 0	34772 1	55371 1	34770 0
43,3510	55375 0	51373 1	30000 1	03515 0	03526 0	55372 1	61371 0	55371 1
43,3520	34772 1	61371 0	55371 1	41372 1	61373 1	00002 0	22000 1	31373 1
43,3530	75041 0	64344 0	00006 1	13622 0	11375 0	03540 0	03540 0	03622 1
43,3540	10001 1	03550 1	03550 1	03550 1	11375 0	03551 0	37702 0	03551 0
43,3550	34770 0	55375 0	11376 0	10067 1	05152 1	03557 0	03264 1	25373 1
43,3560	11377 1	03465 0	03465 0	03511 1	03511 1	41374 1	63655 1	00006 1
43,3570	12764 1	31374 0	64756 1	55374 1	03600 1	34752 0	27374 1	03614 1
43,3600	74344 1	00006 1	13612 0	63172 0	00006 1	13607 1	03614 1	35010 0
43,3610	27374 1	03614 1	63171 0	27374 1	11377 1	03457 1	34770 0	03475 1
43,3620	34762 0	03457 1	31374 0	74344 1	04333 0	54001 1	31374 0	74350 1
43,3630	00006 1	13637 1	54021 0	30001 0	74774 0	60021 1	54001 1	31376 1
43,3640	00006 1	13643 1	02746 0	11371 1	03646 0	03647 1	64770 0	55371 1
43,3650	40001 1	61371 0	67702 0	03225 1	03565 1	C: 66100 0	34772 1	13665 0
43,3660	34770 0	13665 0	34767 0	13665 0	36214 0	54331 1	02076 1	31214 1
43,3670	00006 1	13707 0	40104 0	74760 0	10000 0	13702 0	41214 0	64124 1
43,3700	00006 1	13707 0	44767 1	71214 0	00006 1	13707 0	13717 1	31214 1
43,3710	54301 1	30331 0	54302 1	34770 0	54303 0	04655 0	C: 65626 0	04362 1
43,3720	04415 0	15524 0	C: 03722 0	C: 03723 1	CKSM 54201 0	@	@	@
43,3730	@	@	@	@	@	@	@	@
43,3740	@	@	@	@	@	@	@	@
43,3750	@	@	@	@	@	@	@	@
43,3760	@	@	@	@	@	@	@	@
43,3770	@	@	@	@	@	@	@	@

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14,3454	TO 14,3533	775	15,3515	TO 15,3576	1388	16,3754	TO 16,3765	996	17,3747	TO 17,3771	1290
14,3534	TO 14,3567	776	15,3577	TO 15,3660	1389	16,3766	TO 16,3775	1241	17,3772	TO 17,3773	30
	14,3570	777	15,3661	TO 15,3742	1390		16,3776	30	20,2000	TO 20,2041	223
14,3571	TO 14,3616	780	15,3743	TO 15,3775	1391	17,2000	TO 17,2032	274	20,2042	TO 20,2063	224
14,3617	TO 14,3650	781		15,3776	29	17,2033	TO 17,2051	275	20,2064	TO 20,2134	420
14,3651	TO 14,3663	786	16,2000	TO 16,2011	493	17,2052	TO 17,2104	778	20,2135	TO 20,2202	421
14,3664	TO 14,3743	787	16,2012	TO 16,2062	677	17,2105	TO 17,2124	785	20,2203	TO 20,2211	423
14,3744	TO 14,3772	788	16,2063	TO 16,2064	678	17,2125	TO 17,2162	786	20,2212	TO 20,2243	460
14,3773	TO 14,3774	29	16,2065	TO 16,2141	723	17,2163	TO 17,2176	943	20,2244	TO 20,2310	461
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20,2374 TO 20,2454	719	21,2416 TO 21,2424	1007	22,2745 TO 22,3012	416	23,2624 TO 23,2657	522
20,2455 TO 20,2502	720	21,2425 TO 21,2472	1009	22,3013 TO 22,3036	417	23,2660 TO 23,2720	524
20,2503 TO 20,2564	721	21,2473 TO 21,2547	1010	22,3037 TO 22,3103	418	23,2721 TO 23,2755	525
20,2565 TO 20,2611	722		21,2550 1011	22,3104 TO 22,3156	419	23,2756 TO 23,3014	574
20,2612 TO 20,2613	733	21,2551 TO 21,2600	1012	22,3157 TO 22,3162	420	23,3015 TO 23,3016	575
20,2614 TO 20,2643	734	21,2601 TO 21,2635	1013	22,3163 TO 22,3171	423	23,3017 TO 23,3027	576
20,2644 TO 20,2713	966	21,2636 TO 21,2703	1014	22,3172 TO 22,3221	498	23,3030 TO 23,3074	586
20,2714 TO 20,2761	967	21,2704 TO 21,2724	1015	22,3222 TO 22,3235	499	23,3075 TO 23,3142	587
20,2762 TO 20,3003	968	21,2725 TO 21,2760	1016	22,3236 TO 22,3316	500	23,3143 TO 23,3144	626
20,3004 TO 20,3041	969	21,2761 TO 21,3027	1017		22,3317 501	23,3145 TO 23,3150	675
20,3042 TO 20,3110	970	21,3030 TO 21,3101	1018	22,3320 TO 22,3327	502	23,3151 TO 23,3232	676
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20,3170 TO 20,3226	973	21,3170 TO 21,3236	1021	22,3376 TO 22,3405	656	23,3276 TO 23,3310	1355
20,3227 TO 20,3266	974	21,3237 TO 21,3271	1022	22,3406 TO 22,3414	673	23,3311 TO 23,3343	1356
20,3267 TO 20,3337	975	21,3272 TO 21,3333	1024	22,3415 TO 22,3476	674	23,3344 TO 23,3410	1358
20,3340 TO 20,3405	976	21,3334 TO 21,3373	1026	22,3477 TO 22,3547	675	23,3411 TO 23,3431	1359
20,3406 TO 20,3456	977	21,3374 TO 21,3441	1027	22,3550 TO 22,3557	685	23,3432 TO 23,3471	1360
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20,3602 TO 20,3613	980	21,3530 TO 21,3605	1030	22,3621 TO 22,3635	1501	23,3530 TO 23,3544	1364
20,3614 TO 20,3623	981	21,3606 TO 21,3662	1031	22,3636 TO 22,3674	1502	23,3545 TO 23,3601	1365
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20,3703 TO 20,3742	1068	21,3740 TO 21,3764	1034	22,3727 TO 22,3760	1505	23,3651 TO 23,3704	1368
20,3743 TO 20,3747	1069	21,3765 TO 21,3770	1035	22,3761 TO 22,3772	1506	23,3705 TO 23,3742	1369
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21,2032 TO 21,2042	734	22,2127 TO 22,2201	405	23,2053 TO 23,2115	299	24,2001 TO 24,2061	505
21,2043 TO 21,2057	735	22,2202 TO 22,2262	406	23,2116 TO 23,2154	300	24,2062 TO 24,2103	506
21,2060 TO 21,2115	997	22,2263 TO 22,2303	407	23,2155 TO 23,2212	303	24,2104 TO 24,2113	587
21,2116 TO 21,2122	998	22,2304 TO 22,2360	408	23,2213 TO 23,2262	305	24,2114 TO 24,2122	588
21,2123 TO 21,2165	1000	22,2361 TO 22,2435	409	23,2263 TO 23,2320	306	24,2123 TO 24,2172	679
21,2166 TO 21,2200	1001	22,2436 TO 22,2517	410	23,2321 TO 23,2327	307	24,2173 TO 24,2213	680
21,2201 TO 21,2237	1002	22,2520 TO 22,2554	411	23,2330 TO 23,2357	517	24,2214 TO 24,2240	693
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24,2357	TO 24,2440	697	25,2705	TO 25,2747	869	26,2532	TO 26,2545	806	27,2456	TO 27,2521	588
24,2441	TO 24,2516	698	25,2750	TO 25,3012	870	26,2546	TO 26,2553	807	27,2522	TO 27,2544	589
24,2517	TO 24,2564	699	25,3013	TO 25,3031	871	26,2554	TO 26,2622	808	27,2545	TO 27,2622	590
24,2565	TO 24,2633	700	25,3032	TO 25,3076	872	26,2623	TO 26,2651	809	27,2623	TO 27,2635	591
24,2634	TO 24,2650	701	25,3077	TO 25,3150	873	26,2652	TO 26,2710	812	27,2636	TO 27,2670	607
24,2651	TO 24,2725	702	25,3151	TO 25,3217	874	26,2711	TO 26,2751	813	27,2671	TO 27,2673	608
24,2726	TO 24,3003	703	25,3220	TO 25,3270	875	26,2752	TO 26,3020	814	27,2674	TO 27,2741	688
24,3004	TO 24,3053	704	25,3271	TO 25,3311	876	26,3021	TO 26,3032	815	27,2742	TO 27,3023	689
24,3054	TO 24,3101	705	25,3312	TO 25,3331	877	26,3033	TO 26,3050	816	27,3024	TO 27,3031	690
24,3102	TO 24,3152	706	25,3332	TO 25,3374	878	26,3051	TO 26,3076	818	27,3032	TO 27,3051	720
24,3153	TO 24,3157	707	25,3375	TO 25,3451	879	26,3077	TO 26,3141	859	27,3052	TO 27,3065	819
24,3160	TO 24,3224	708	25,3452	TO 25,3523	880	26,3142	TO 26,3147	860	27,3066	TO 27,3071	820
24,3225	TO 24,3275	709	25,3524	TO 25,3600	881	26,3150	TO 26,3174	887	27,3072	TO 27,3135	1331
24,3276	TO 24,3345	710	25,3601	TO 25,3610	882	26,3175	TO 26,3254	888	27,3136	TO 27,3150	1332
24,3346	TO 24,3413	711	25,3611	TO 25,3633	883	26,3255	TO 26,3324	889	27,3151	TO 27,3201	1374
24,3414	TO 24,3467	712	25,3634	TO 25,3702	884	26,3325	TO 26,3344	1205	27,3202	TO 27,3217	1375
24,3470	TO 24,3510	713	25,3703	TO 25,3751	885	26,3345	TO 26,3366	1243	27,3220	TO 27,3255	1377
24,3511	TO 24,3560	714	25,3752	TO 25,3766	886		26,3367	1244	27,3256	TO 27,3324	1380
24,3561	TO 24,3562	715	25,3767	TO 25,3770	887	26,3370	TO 26,3415	1245	27,3325	TO 27,3365	1381
24,3563	TO 24,3630	737	25,3771	TO 25,3772	31	26,3416	TO 26,3450	1246	27,3366	TO 27,3435	1382
24,3631	TO 24,3661	738	26,2000	TO 26,2020	550	26,3451	TO 26,3532	1247	27,3436	TO 27,3502	1383
24,3662	TO 24,3730	740	26,2021	TO 26,2037	646	26,3533	TO 26,3566	1248	27,3503	TO 27,3525	1384
24,3731	TO 24,3750	741	26,2040	TO 26,2111	783	26,3567	TO 26,3616	1249	27,3526	TO 27,3544	1385
24,3751	TO 24,3767	1501	26,2112	TO 26,2135	784	26,3617	TO 26,3627	1250	27,3545	TO 27,3562	1496
24,3770	TO 24,3771	31	26,2136	TO 26,2154	790	26,3630	TO 26,3653	1251	27,3563	TO 27,3630	1497
25,2000	TO 25,2027	852	26,2155	TO 26,2233	791	26,3654	TO 26,3714	1442	27,3631	TO 27,3701	1498
25,2030	TO 25,2077	853	26,2234	TO 26,2244	792	26,3715	TO 26,3747	1443	27,3702	TO 27,3742	1499
25,2100	TO 25,2114	854	26,2245	TO 26,2312	793	26,3750	TO 26,3772	1444	27,3743	TO 27,3764	1500
25,2115	TO 25,2124	855	26,2313	TO 26,2314	794	26,3773	TO 26,3774	31	27,3765	TO 27,3766	32
25,2125	TO 25,2165	856	26,2315	TO 26,2336	795		27,2000	219	30,2000	TO 30,2013	458
25,2166	TO 25,2235	857	26,2337	TO 26,2367	796	27,2001	TO 27,2061	220	30,2014	TO 30,2075	459
25,2236	TO 25,2257	858	26,2370	TO 26,2405	797	27,2062	TO 27,2073	221	30,2076	TO 30,2121	460
25,2260	TO 25,2317	861	26,2406	TO 26,2427	798	27,2074	TO 27,2132	394	30,2122	TO 30,2132	461
25,2320	TO 25,2367	862	26,2430	TO 26,2431	799	27,2133	TO 27,2201	395	30,2133	TO 30,2152	462
25,2370	TO 25,2437	863	26,2432	TO 26,2437	800	27,2202	TO 27,2224	396	30,2153	TO 30,2225	561
25,2440	TO 25,2511	864	26,2440	TO 26,2471	801	27,2225	TO 27,2277	398	30,2226	TO 30,2304	562
25,2512	TO 25,2564	865		26,2472	802	27,2300	TO 27,2352	399	30,2305	TO 30,2366	563
25,2565	TO 25,2570	866	26,2473	TO 26,2476	803	27,2353	TO 27,2426	400	30,2367	TO 30,2434	564
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30,2466	TO 30,2500	609	31,3535	TO 31,3551	681	32,3775	TO 32,3776	32	34,2332	TO 34,2341	542
30,2501	TO 30,2557	610	31,3552	TO 31,3605	682	33,2000	TO 33,2001	426	34,2342	TO 34,2405	543
30,2560	TO 30,2641	611	31,3606	TO 31,3623	686	33,2002	TO 33,2040	427	34,2406	TO 34,2412	544
30,2642	TO 30,2723	612	31,3624	TO 31,3664	922	33,2041	TO 33,2113	428	34,2413	TO 34,2416	545
30,2724	TO 30,3005	613	31,3665	TO 31,3704	923	33,2114	TO 33,2121	429	34,2417	TO 34,2474	546
30,3006	TO 30,3067	614	31,3705	TO 31,3736	1260	33,2122	TO 33,2145	430	34,2475	TO 34,2556	547
30,3070	TO 30,3151	615	31,3737	TO 31,3767	1261	33,2146	TO 33,2202	431	34,2557	TO 34,2624	548
30,3152	TO 30,3233	616	31,3770	TO 31,3771	32	33,2203	TO 33,2226	432	34,2625	TO 34,2632	577
30,3234	TO 30,3315	617	32,2000	TO 32,2016	431	33,2227	TO 33,2274	435	34,2633	TO 34,2714	578
30,3316	TO 30,3362	618	32,2017	TO 32,2026	623		33,2275	436	34,2715	TO 34,2772	579
30,3363	TO 30,3403	619	32,2027	TO 32,2054	647	33,2276	TO 33,2343	437	34,2773	TO 34,3054	580
30,3404	TO 30,3465	620	32,2055	TO 32,2131	648	33,2344	TO 33,2405	438	34,3055	TO 34,3136	581
30,3466	TO 30,3547	621	32,2132	TO 32,2210	649	33,2406	TO 33,2443	439	34,3137	TO 34,3220	582
30,3550	TO 30,3631	622	32,2211	TO 32,2267	650	33,2444	TO 33,2521	440	34,3221	TO 34,3250	583
30,3632	TO 30,3647	623	32,2270	TO 32,2271	651	33,2522	TO 33,2577	441	34,3251	TO 34,3323	584
30,3650	TO 30,3720	716	32,2272	TO 32,2303	907	33,2600	TO 33,2647	442	34,3324	TO 34,3374	585
30,3721	TO 30,3766	717	32,2304	TO 32,2322	908	33,2650	TO 33,2710	443	34,3375	TO 34,3405	586
30,3767	TO 30,3770	32	32,2323	TO 32,2337	909	33,2711	TO 33,2763	444	34,3406	TO 34,3431	589
31,2000	TO 31,2051	507	32,2340	TO 32,2421	910	33,2764	TO 33,3042	445	34,3432	TO 34,3441	595
31,2052	TO 31,2132	508	32,2422	TO 32,2454	911	33,3043	TO 33,3117	446	34,3442	TO 34,3515	596
31,2133	TO 31,2145	509	32,2455	TO 32,2473	912	33,3120	TO 33,3172	447	34,3516	TO 34,3576	597
31,2146	TO 31,2206	510	32,2474	TO 32,2545	913	33,3173	TO 33,3211	448	34,3577	TO 34,3652	598
31,2207	TO 31,2270	511	32,2546	TO 32,2605	915	33,3212	TO 33,3263	449	34,3653	TO 34,3730	599
31,2271	TO 31,2337	512	32,2606	TO 32,2664	916	33,3264	TO 33,3340	450	34,3731	TO 34,3755	600
31,2340	TO 31,2350	618	32,2665	TO 32,2746	917	33,3341	TO 33,3415	451	34,3756	TO 34,3771	1386
31,2351	TO 31,2376	619	32,2747	TO 32,3025	918	33,3416	TO 33,3454	452	34,3772	TO 34,3773	33
31,2377	TO 31,2436	626	32,3026	TO 32,3075	919	33,3455	TO 33,3475	527	35,2000	TO 35,2033	466
31,2437	TO 31,2443	627	32,3076	TO 32,3101	920	33,3476	TO 33,3537	528	35,2034	TO 35,2114	467
31,2444	TO 31,2473	628	32,3102	TO 32,3144	925	33,3540	TO 33,3607	530	35,2115	TO 35,2176	468
31,2474	TO 31,2554	629	32,3145	TO 32,3223	926	33,3610	TO 33,3660	531	35,2177	TO 35,2205	469
31,2555	TO 31,2636	630	32,3224	TO 32,3300	927	33,3661	TO 33,3671	532	35,2206	TO 35,2250	472
31,2637	TO 31,2720	631	32,3301	TO 32,3354	928	33,3672	TO 33,3735	544	35,2251	TO 35,2330	473
31,2721	TO 31,3001	632	32,3355	TO 32,3432	929	33,3736	TO 33,3775	545	35,2331	TO 35,2412	474
31,3002	TO 31,3061	633	32,3433	TO 32,3463	930		33,3776	33	35,2413	TO 35,2474	475
31,3062	TO 31,3143	634	32,3464	TO 32,3536	932	34,2000	TO 34,2030	536	35,2475	TO 35,2556	476
31,3144	TO 31,3225	635	32,3537	TO 32,3615	933	34,2031	TO 34,2074	537	35,2557	TO 35,2560	477
31,3226	TO 31,3307	636	32,3616	TO 32,3664	934	34,2075	TO 34,2152	538	35,2561	TO 35,2632	479
31,3310	TO 31,3371	637	32,3665	TO 32,3714	935	34,2153	TO 34,2225	539	35,2633	TO 35,2650	480
31,3372	TO 31,3453	638	32,3715	TO 32,3740	936	34,2226	TO 34,2271	540	35,2651	TO 35,2713	481

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35,2721	TO 35,2773	483	36,3174	TO 36,3245	905	37,3240	TO 37,3267	839	40,3553	TO 40,3620	392
35,2774	TO 35,3026	484	36,3246	TO 36,3257	906	37,3270	TO 37,3327	840	40,3621	TO 40,3635	393
35,3027	TO 35,3073	485	36,3260	TO 36,3300	1252	37,3330	TO 37,3403	841	40,3636	TO 40,3676	640
35,3074	TO 35,3136	486	36,3301	TO 36,3362	1253	37,3404	TO 37,3443	890	40,3677	TO 40,3760	641
35,3137	TO 35,3141	487	36,3363	TO 36,3444	1254	37,3444	TO 37,3515	891	40,3761	TO 40,3774	642
35,3142	TO 35,3157	488	36,3445	TO 36,3471	1255	37,3516	TO 37,3566	892	40,3775	TO 40,3776	34
35,3160	TO 35,3204	600	36,3472	TO 36,3520	1256	37,3567	TO 37,3570	893	41,2000	TO 41,2037	334
35,3205	TO 35,3241	601	36,3521	TO 36,3602	1257	37,3571	TO 37,3630	894	41,2040	TO 41,2116	335
35,3242	TO 35,3272	603	36,3603	TO 36,3664	1258	37,3631	TO 37,3676	895	41,2117	TO 41,2175	336
35,3273	TO 35,3330	605	36,3665	TO 36,3746	1259	37,3677	TO 37,3703	896	41,2176	TO 41,2217	337
35,3331	TO 35,3412	606	36,3747	TO 36,3765	1260	37,3704	TO 37,3705	33	41,2220	TO 41,2263	338
35,3413	TO 35,3432	607	36,3766	TO 36,3767	33	40,2000	TO 40,2052	326	41,2264	TO 41,2342	339
35,3433	TO 35,3510	644	37,2000	TO 37,2045	456	40,2053	TO 40,2120	327	41,2343	TO 41,2351	340
35,3511	TO 35,3553	645	37,2046	TO 37,2127	457	40,2121	TO 40,2201	328	41,2352	TO 41,2427	342
35,3554	TO 35,3561	671	37,2130	TO 37,2166	458	40,2202	TO 40,2251	329	41,2430	TO 41,2476	343
35,3562	TO 35,3565	672	37,2167	TO 37,2212	567	40,2252	TO 40,2326	330	41,2477	TO 41,2553	344
35,3566	TO 35,3570	735	37,2213	TO 37,2262	568	40,2327	TO 40,2374	331	41,2554	TO 41,2610	345
35,3571	TO 35,3634	938	37,2263	TO 37,2275	569	40,2375	TO 40,2452	332	41,2611	TO 41,2652	353
35,3635	TO 35,3676	939	37,2276	TO 37,2332	570	40,2453	TO 40,2504	333	41,2653	TO 41,2720	354
35,3677	TO 35,3735	1326	37,2333	TO 37,2355	571	40,2505	TO 40,2510	345	41,2721	TO 41,3001	355
35,3736	TO 35,3767	1327	37,2356	TO 37,2424	572	40,2511	TO 40,2562	346	41,3002	TO 41,3055	356
35,3770	TO 35,3771	33	37,2425	TO 37,2444	601	40,2563	TO 40,2624	347	41,3056	TO 41,3132	357
36,2000	TO 36,2011	478	37,2445	TO 37,2461	602	40,2625	TO 40,2656	348	41,3133	TO 41,3202	358
36,2012	TO 36,2015	532	37,2462	TO 37,2517	604	40,2657	TO 40,2673	352	41,3203	TO 41,3223	359
36,2016	TO 36,2021	552	37,2520	TO 37,2536	605	40,2674	TO 40,2722	359	41,3224	TO 41,3251	364
36,2022	TO 36,2100	553	37,2537	TO 37,2557	670	40,2723	TO 40,2774	360	41,3252	TO 41,3325	365
36,2101	TO 36,2146	554	37,2560	TO 37,2606	683	40,2775	TO 40,3047	361	41,3326	TO 41,3340	366
36,2147	TO 36,2220	555	37,2607	TO 37,2613	826	40,3050	TO 40,3054	362	41,3341	TO 41,3350	367
36,2221	TO 36,2267	556	37,2614	TO 37,2651	827	40,3055	TO 40,3125	368	41,3351	TO 41,3375	370
36,2270	TO 36,2340	557	37,2652	TO 37,2717	828	40,3126	TO 40,3160	369	41,3376	TO 41,3432	373
36,2341	TO 36,2414	558	37,2720	TO 37,2761	829	40,3161	TO 40,3201	370	41,3433	TO 41,3465	374
36,2415	TO 36,2464	559	37,2762	TO 37,2767	830	40,3202	TO 40,3253	371	41,3466	TO 41,3540	379
36,2465	TO 36,2475	560	37,2770	TO 37,3007	831	40,3254	TO 40,3300	372	41,3541	TO 41,3555	380
36,2476	TO 36,2525	898	37,3010	TO 37,3044	832	40,3301	TO 40,3305	374	41,3556	TO 41,3557	34
36,2526	TO 36,2607	899	37,3045	TO 37,3110	833	40,3306	TO 40,3324	375	42,2000	TO 42,2020	265
36,2610	TO 36,2671	900	37,3111	TO 37,3151	834	40,3325	TO 40,3350	376	42,2021	TO 42,2055	266
36,2672	TO 36,2753	901	37,3152	TO 37,3153	835	40,3351	TO 40,3411	382	42,2056	TO 42,2114	282
36,2754	TO 36,3032	902	37,3154	TO 37,3170	836	40,3412	TO 40,3431	383	42,2115	TO 42,2163	283
36,3033	TO 36,3111	903	37,3171	TO 37,3177	837	40,3432	TO 40,3476	390	42,2164	TO 42,2215	284

OCCUPIED LOCATIONS		PAGE	OCCUPIED LOCATIONS		PAGE	OCCUPIED LOCATIONS		PAGE	OCCUPIED LOCATIONS		PAGE
42,2216	TO 42,2240	285	43,2535	TO 43,2543	264						
42,2241	TO 42,2272	286	43,2544	TO 43,2556	265						
42,2273	TO 42,2343	287	43,2557	TO 43,2577	267						
42,2344	TO 42,2377	288	43,2600	TO 43,2620	268						
42,2400	TO 42,2437	289	43,2621	TO 43,2640	269						
42,2440	TO 42,2516	290	43,2641	TO 43,2701	270						
42,2517	TO 42,2573	291	43,2702	TO 43,2721	271						
42,2574	TO 42,2655	292	43,2722	TO 43,2733	272						
42,2656	TO 42,2737	293	43,2734	TO 43,2773	273						
42,2740	TO 42,3021	294	43,2774	TO 43,3002	274						
42,3022	TO 42,3076	295	43,3003	TO 43,3021	275						
42,3077	TO 42,3136	296	43,3022	TO 43,3056	276						
42,3137	TO 42,3146	348	43,3057	TO 43,3064	277						
42,3147	TO 42,3225	349	43,3065	TO 43,3101	278						
42,3226	TO 42,3305	350	43,3102	TO 43,3131	279						
42,3306	TO 42,3360	351	43,3132	TO 43,3136	452						
42,3361	TO 42,3430	362	43,3137	TO 43,3165	453						
42,3431	TO 42,3503	363	43,3166	TO 43,3223	1394						
42,3504	TO 42,3557	940	43,3224	TO 43,3270	1395						
42,3560	TO 42,3625	941	43,3271	TO 43,3345	1396						
42,3626	TO 42,3636	1493	43,3346	TO 43,3425	1397						
42,3637	TO 42,3707	1494	43,3426	TO 43,3470	1398						
42,3710	TO 42,3754	1495	43,3471	TO 43,3547	1399						
42,3755	TO 42,3774	1496	43,3550	TO 43,3626	1400						
42,3775	TO 42,3776	34	43,3627	TO 43,3655	1401						
43,2000	TO 43,2046	249	43,3656	TO 43,3677	1492						
43,2047	TO 43,2115	250	43,3700	TO 43,3721	1493						
43,2116	TO 43,2120	251	43,3722	TO 43,3723	34						
43,2121	TO 43,2132	252									
43,2133	TO 43,2143	253									
43,2144	TO 43,2165	254									
43,2166	TO 43,2226	255									
43,2227	TO 43,2260	256									
43,2261	TO 43,2311	257									
43,2312	TO 43,2350	258									
43,2351	TO 43,2363	259									
43,2364	TO 43,2420	260									
43,2421	TO 43,2455	261									
43,2456	TO 43,2527	262									
43,2530	TO 43,2534	263									

THE SUBROUTINES IN THIS PROGRAM ARE AS FOLLOWS:

ERASTOTL.041
DIOGENES.064
MEDUSA .035
MENELAUS.061
ULYSSES .029
ZEUS .046

THE ASSEMBLY WAS GOOD AND MANUFACTURABLE. NO LINES WERE CUSSED.

BINARY RECORDS FOR "ARTEMIS.R072" SUCCESSFULLY STORED.